

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

WONDERLAND SWITZERLAND AG)	
)	
Plaintiff,)	
)	Civil Action No. 18-1990-RGA
v.)	
)	
EVENFLO COMPANY, INC.)	JURY TRIAL DEMANDED
)	
)	
Defendant.)	

SECOND AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Wonderland Switzerland AG (“Wonderland”) files this Second Amended Complaint for patent infringement against Defendant Evenflo Company, Inc. Wonderland alleges:

THE PARTIES

1. Wonderland is a corporation limited by share ownership (AG) duly organized and existing under the laws of Switzerland, having its principal place of business at Beim Bahnhof 5, 6312 Steinhausen, Switzerland.

2. On information and belief, Evenflo is a Delaware corporation having its principal place of business at 225 Byers Road, Miamisburg, Ohio 45342-3614.

JURISDICTION AND VENUE

3. This Court has subject matter jurisdiction over the patent infringement claims set forth herein under at least 28 U.S.C. §§ 1331 and 1338(a) because this action arises under the patent laws of the United States, 35 U.S.C. §§ 1 *et seq.*

4. This Court has both general and specific personal jurisdiction over Defendant

Evenflo because Evenflo is organized and incorporated under the laws of this state. On information and belief, Evenflo has also established minimum contacts with the forum state of Delaware, including in at least the following ways: (1) Evenflo owns and/or operates an interactive Internet website, www.evenflo.com, that is accessible to residents of Delaware, through which goods, including Evenflo's EveryStage DLX All-in-One Car Seat ("EveryStage Car Seat"), accused of infringement herein, are advertised and sold, (2) on information and belief, Evenflo offers its goods and sells its goods to residents of Delaware, including its EveryStage Car Seat, accused of infringement herein, at least through online retailers such as Amazon.com. Thus, on information and belief, Evenflo has purposefully availed itself of the benefits of the state of Delaware and the exercise of jurisdiction by this Court is proper.

5. Venue is proper in this federal district pursuant to 28 U.S.C. § 1400(b) because Defendant is incorporated in the State of Delaware and, on information and belief, has committed acts of infringement in this District.

STATEMENT OF FACTS

Wonderland and Its Innovative Adjustable Car Seats

6. Wonderland and its affiliates are leading innovators in juvenile products and have been for more than thirty years. Wonderland and its affiliates design, manufacture, and sell an assortment of products for children of all ages to keep children safe, including state-of-the-art child car seats, play yards, strollers, rockers, and high chairs. Wonderland's innovations have generated over 270 patents in the U.S., and nearly 700 worldwide.

7. Child car seats protect children during a car accident, but children quickly outgrow them. Buying new car seats can be a significant expense, and appreciating the inconvenience of having to purchase multiple car seats as a child grows, Wonderland and its affiliates improved child car seats so that they can be conveniently adjusted to accommodate a growing child,

including the conversion of its car seats into booster seats for older children.

8. Wonderland's inventions protected by the patents-in-suit allow adjustment and configuration of the head rest and harness on child car seats in one motion without complex and cumbersome modifications. Wonderland and its affiliates also developed and patented a harness storage system that allows storage of harness belts and buckles when using the car seat as a booster seat. These systems have proved superior to competing child car seats because of their innovative designs.

Defendant's EveryStage Car Seat

9. Defendant is in the business of manufacturing and selling juvenile products, including child car seats. On information and belief, Defendant introduced the EveryStage Car Seat in 2018, and has sold, and continues to sell, the EveryStage Car Seat online and in retail stores throughout the United States, including Delaware.

10. The EveryStage Car Seat directly competes with child car seats of Wonderland and its affiliates as well as their customers who market well-known brands such as Graco, Nuna, and Joie.

11. The Evenflo website touts the EveryStage Car Seat as "fully adjustable with up to 10 different positions" for "an accurate fit for a growing child," thus serving as a single car seat for every stage of the child's development. *See* http://www.evenflo.com/car-seats/us_everystage.html?cgid=car-seat#start=3.

12. The head rest and harness adjustment system, the harness storage system, and the restraint harness assembly in the EveryStage Car Seat were previously invented, patented, and commercialized by Wonderland and its affiliates. Wonderland, its affiliates, and their customers have sold products using these features since 2011, long before Defendant introduced its EveryStage Car Seat. For example, Wonderland's customer, Graco, sold the Nautilus, Nautilus

Snuglock, Nautilus True Shield, Milestone, 4Ever, 4Ever Extend2Fit, Extend2Fit Convertible, Extend2Fit All in One, Size4Me, and Smart Seat, each incorporating at least one of the patented systems.

13. Evenflo announced its EveryStage Car Seat in 2018. A related Wonderland company, Joie, sold and continues to sell, a car seat similarly named “Every Stage” with a customizable head rest and support system “for an ultimate fit at every stage” of the child’s development. *See* <https://www.joiebaby.com/product/every-stage/>. The Joie “Every Stage” car seat adjusts the head rest and harness simultaneously without re-threading, and includes a hideaway compartment for storing the harness system when the child outgrows the 5-point harness. These features are protected by the patents at issue in this case.

14. On information and belief, over two years after Joie released its Every Stage car seat, Defendant released its EveryStage Car Seat that not only uses a nearly-identical product name, but also the same Wonderland patented technology to provide the “every stage” functionality it touts to consumers.

Wonderland’s Patents

15. The United States Patent and Trademark Office (“PTO”) issued U.S. Patent No. 7,862,117, entitled “Head Rest and Harness Adjustment for Child Seat,” on January 4, 2011. A copy of the ’117 patent is attached as Exhibit A.

16. The ’117 patent relates to a car seat for transporting children in an automobile, and to an apparatus in a car seat that can adjust the shoulder harness and head rest without requiring a substantial change in the length of the shoulder harness belt. *See* Exhibit A, 1:14-18. The innovative car seat design allows adjustments to the head rest to accommodate changes in a growing child without having to also adjust the length of the harness belt. *See id.*, 2:47-56.

17. The ’117 patent was originally assigned to Wonderland Nurserygoods Co., Ltd.,

and that assignment was recorded with the PTO on December 9, 2007. The '117 patent was assigned from Wonderland Nurserygoods Co., Ltd. to Wonderland Switzerland AG, and that assignment was recorded with the PTO on November 9, 2018.

18. The '117 patent includes four independent claims 1, 7, 9, and 15. Claim 9 is representative and recites:

9. A car seat for transporting a child in an automobile and having a seat back on which a head rest is mounted for generally vertical movement relative to said seat back said seat back including harness belts positionable for support of the child within said car seat, comprising:

said seat back being formed with a pair of laterally spaced openings therethrough;

said head rest including a movable guide bar positioned in register with said openings and being vertically movable along said openings in response to a corresponding vertical movement of said head rest relative to said seat back, said movable guide bar member being operable to direct said harness belt through the openings in said seat back;

a fixed guide bar mounted in said seat back above said openings; and

said harness belts extending from an anchor point and being wrapped over said fixed guide bar and extending therefrom to said movable guide bar to be directed through said openings and extend forwardly of said seat back for engagement with the child in said car seat, such that the vertical movement of said movable guide bar redirects the positioning of the corresponding said harness belts.

19. The PTO issued U.S. Patent No. 8,087,725, entitled "Head Rest and Harness Adjustment for Child Car Seat," on January 3, 2012. A copy of the '725 patent is attached as Exhibit B.

20. The '725 patent is a continuation of the '117 patent.

21. The '725 patent was originally assigned to Wonderland Nurserygoods Co., Ltd., via the assignment of its parent '117 patent recorded with the PTO on December 9, 2007. The '725 patent was further assigned from Wonderland Nurserygoods Co., Ltd. to Wonderland

Switzerland AG, and that assignment was recorded with the PTO on November 9, 2018.

22. The '725 patent has four independent claims 1, 8, 15, and 21. Claim 1 is representative and recites:

1. A car seat for transporting a child in an automobile, comprising:
 - a seat member including a seat back having a front surface and a rear surface, said seat back including a control rack formed with a plurality of generally vertically spaced engagement portions located on said rear surface to define a plurality of selected vertical positions;
 - a head rest movably mounted on said seat back for vertical movement relative thereto;
 - a locking mechanism mounted on said head rest for vertical movement therewith to engage said control rack to secure said head rest into one of the plurality of selected vertical positions, said locking mechanism including a lock bar that can be moved into engagement with a selected one of said engagement portions to fix said head rest in the corresponding selected vertical position; and
 - harness belts extending vertically under said head rest from a position at an upper portion of said seat back and passing through at least one opening in said seat back below said head rest for positioning in front of said seat back, said harness belts being connected to said lock bar so that said harness belts will move vertically in response to a corresponding vertical movement of said head rest.

23. The PTO issued U.S. Patent No. 8,123,294, entitled "Harness Storage System for Child Car Seats," on February 28, 2012. A copy of the '294 patent is attached as Exhibit C.

24. The '294 patent relates to a car seat for transporting children in an automobile and to a five-point harness storage system to allow converting the car seat from a car seat for small children to a belt-positioning booster for larger children. *See* Exhibit C, 1:15-19.

25. The '294 patent was originally assigned to Wonderland Nurserygoods Hong Kong Co., Ltd., and that assignment was recorded with the PTO on September 4, 2009. The '294 patent was assigned from Wonderland Nurserygoods Hong Kong Co., Ltd. to Wonderland Nurserygoods

Co., Ltd., and that assignment was recorded with the PTO on November 21, 2018. The '294 patent was assigned from Wonderland Nurserygoods Co., Ltd. to Wonderland Switzerland AG in an assignment recorded with the PTO on November 23, 2018.

26. The '294 patent includes four independent claims 1, 6, 12, and 13. Claim 6 is representative and recites:

6. In a car seat having a seat back supported on a seat member and projecting upwardly therefrom, said seat member having a first portion of a rigid shell and a seat pad mounted on the rigid shell, said back rest having a second portion of a rigid shell on which a back panel pad and a head rest pad are supported, each of said back panel pad and said head rest pad being selectively removable from said rigid shell; and a harness including a pair of laterally spaced shoulder straps supported from said rigid shell, a pair of laterally spaced belt straps connected to said rigid shell, and a crotch strap connected to said rigid shell, said harness including a pair of latch members, each said latch member being connected to one of said shoulder straps and to a corresponding said belt strap, both said latch members being engagable with a harness buckle connected to said crotch strap, the improvement comprising:

a harness storage cavity formed in said rigid shell and including a cover forming a smooth support when closed over said harness storage cavity, said harness storage cavity being sized to receive said latch members or said harness buckle, said shoulder straps and said belt straps are positionable behind said back panel pad and said head rest pad and against said rigid shell to permit said latch members or said harness buckle to be stored in said harness storage cavity with said shoulder straps and said belt straps projecting out of said harness storage cavity along said rigid shell.

27. Wonderland has all rights, title, and interest to each of the '117 patent, '725 patent, and '294 patent (collectively, "the patents-in-suit"), including the right to sue for infringement of each of the patents-in-suit.

COUNT ONE
(Patent Infringement of U.S. Patent 7,862,117)

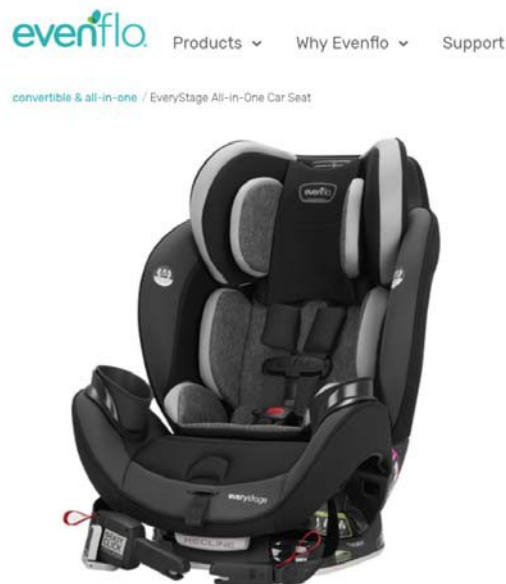
28. Wonderland realleges and incorporates by reference herein each of the preceding paragraphs.

29. Defendant has made, used, sold, offered for sale, and imported into the United

States, and continues to do so, child car seats, including the Evenflo EveryStage Car Seat, that practices at least one claim of the '117 patent.

30. The Evenflo EveryStage Car Seat includes every element of at least claim 9 of the '117 patent.

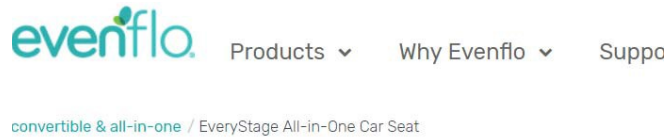
31. Independent claim 9 recites a car seat “for transporting a child in an automobile and having a seat back on which a head rest is mounted for generally vertical movement relative to said seat back said seat back including harness belts positionable for support of the child within said car seat, comprising.” The EveryStage Car Seat is designed to transport a child in a car and has a seat back with a head rest that moves vertically relative to the seat back mounted on the seat back. These features are apparent in the images of the EveryStage Car Seat on the Evenflo website (e.g., see image below). The seat back also has harness belts that can be positioned to support the child in the car seat. The head rest and seat back are in the product images (see example below) on Evenflo’s website http://www.evenflo.com/car-seats/us_everystage.html?cgid=car-seat#start=3.



32. Independent claim 9 further recites “said seat back being formed with a pair of

laterally spaced openings therethrough.” On information and belief, the EveryStage Car Seat’s seat back has two openings spaced laterally apart. The harness straps in the product images on Evenflo’s website http://www.evenflo.com/car-seats/us_everystage.html?cgid=car-seat#start=3 are directed through a pair of laterally spaced openings in the seat back.

33. Claim 9 recites “said head rest including a movable guide bar positioned in register with said openings and being vertically movable along said openings in response to a corresponding vertical movement of said head rest relative to said seat back, said movable guide bar member being operable to direct said harness belt through the openings in said seat back.” Evenflo’s website http://www.evenflo.com/car-seats/us_everystage.html?cgid=car-seat#start=3 shows the EveryStage Car Seat in at least three different configurations (“Infant,” “Convertible,” and “Booster”) (copied below), each having a different vertical head rest position. On information and belief, the head rest of the EveryStage Car Seat includes a movable guide bar that can be manually adjusted by a user by pushing a button and manually lifting, and is positioned in register with the pair of laterally spaced openings, where the guide bar moves vertically along the openings as the head rest moves vertically relative to the seat back, and directs the harness belt through the openings in the seat back.



10 YEARS OF USE



INFANT + CONVERTIBLE + BOOSTER

34. Claim 9 requires “a fixed guide bar mounted in said seat back above said openings.” On information and belief, the EveryStage Car Seat also includes a fixed guide bar mounted in the seat back and above the openings, such that the harness belts of the EveryStage Car Seat on Evenflo’s website http://www.evenflo.com/car-seats/us_everystage.html?cgid=car-seat#start=3, are wrapped over the fixed guide bar before they are extended forwardly of the seat back to engage with the child in the car seat.

35. Claim 9 recites “said harness belts extending from an anchor point and being wrapped over said fixed guide bar and extending therefrom to said movable guide bar to be directed through said openings and extend forwardly of said seat back for engagement with the child in said car seat, such that the vertical movement of said movable guide bar redirects the positioning of the corresponding said harness belts.” On information and belief, the harness belt of the EveryStage Car Seat on Evenflo’s website <http://www.evenflo.com/car->

seats/us_everystage.html?cgid=car-seat#start=3, extends from an anchor point through the openings, and is wrapped over the fixed guide bar and extends forwardly from the seat back to engage with the child seated in the child seat. This allows the vertical movement of the movable guide bar to redirect the positioning of the harness belt of the EveryStage Car Seat on Evenflo's above-identified website.

36. By making, using, selling, offering for sale, and/or importing in the United States the EveryStage Car Seat, Defendant has infringed and is continuing to infringe at least one claim of the '117 patent. 35 U.S.C. § 271(a).

37. On information and belief, Defendant has taken and is continuing to take active steps to induce direct infringement by its direct and indirect customers of those claims under 35 U.S.C. § 271(b) by making, selling, and/or offering for sale its EveryStage Car Seats in the United States with knowledge of the '117 patent, knowing its EveryStage Car Seats are specifically designed to operate in a vehicle seat in an infringing manner, knowing use of its EveryStage Car Seats by those customers constitutes direct infringement, and by intentionally encouraging infringement of the '117 patent by those customers to take advantage of the sales of its EveryStage Car Seats. 35 U.S.C. § 271(b).

38. Upon information and belief, Defendant is also inducing the infringement of one or more claims of the '117 patent by its direct and indirect customers under 35 U.S.C. § 271(b) by providing instructions and/or assistance in the installation and/or operation of its EveryStage Car Seats in customers' vehicle seats.

39. On information and belief, Defendant has contributed and is continuing to contribute to the direct infringement of the claims of the '117 patent under 35 U.S.C. § 271(c) by selling and/or offering for sale its EveryStage Car Seats in the United States with knowledge of

the '117 patent, knowing its EveryStage Car Seats are specifically designed to operate as a material component in its direct and indirect customers' vehicle seats in an infringing manner, and knowing use of its EveryStage Car Seats by those customers constitutes direct infringement. 35 U.S.C. § 271(c).

40. Defendant's EveryStage Car Seats are not staple articles of commerce, and there are no substantial noninfringing uses of Defendant's EveryStage Car Seat other than as a component in its direct and indirect customers' vehicle seats to be used in an infringing manner, and that Defendant's EveryStage Car Seat constitutes a material component of the claimed invention because they are specifically designed to work with the vehicle seats and directly embody significant characteristics of the '117 patent claims. 35 U.S.C. § 271(c).

41. Despite Defendant's knowledge of the '117 patent and its infringing activities, Defendant has infringed and is continuing to infringe one or more claims of the '117 patent by manufacturing, selling, and/or offering for sale additional EveryStage Car Seats. This intentional infringement without regard for Wonderland's patent rights constitutes egregious conduct sufficient to establish willful infringement under 35 U.S.C. § 284.

42. The ongoing and continuous infringement by Defendant of the '117 patent entitles Wonderland to an injunction permanently enjoining Defendant from further infringing Wonderland's patent rights, pursuant to 35 U.S.C. § 283.

43. Wonderland has suffered and continues to suffer damages from Defendant's infringement of the '117 patent, and is entitled to compensation and other monetary relief to the extent allowed by law, pursuant to 35 U.S.C. §§ 284 and 285.

COUNT TWO
(Patent Infringement of U.S. Patent No. 8,087,725)

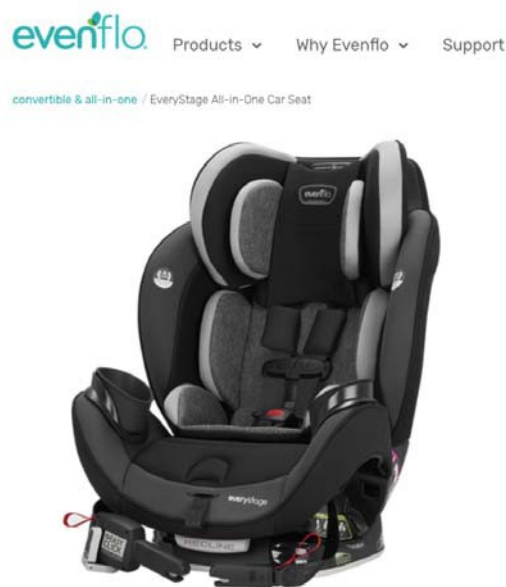
44. Wonderland realleges and incorporates by reference herein each of the preceding

paragraphs.

45. Defendant has made, used, sold, offered for sale, and imported into the United States, and continues to do so, child safety seats, including the Evenflo Every Stage Car Seat, that practice at least one claim of the '725 patent.

46. The Evenflo EveryStage Car Seat includes every element of at least independent claim 1 of the '725 patent.

47. Independent claim 1 recites a car seat “for transporting a child in an automobile.” The EveryStage is a car seat designed to transport a child in a car in the product images from Evenflo’s website http://www.evenflo.com/car-seats/us_everystage.html?cgid=car-seat#start=3.



48. Independent claim 1 further recites “a seat member including a seat back having a front surface and a rear surface, said seat back including a control rack formed with a plurality of generally vertically spaced engagement portions located on said rear surface to define a plurality of selected vertical positions.” The EveryStage Car Seat on Evenflo’s website http://www.evenflo.com/car-seats/us_everystage.html?cgid=car-seat#start=3 includes a seat back with a front surface and a rear surface. On information and belief, the seat back also includes a

control rack formed with multiple vertically spaced engagement portions, such as metal rails with multiple preformed holes at a plurality of selected vertical positions, placed on the rear surface to define certain vertical positions.

49. Independent claim 1 recites “a head rest movably mounted on said seat back for vertical movement relative thereto.” The EveryStage Car Seat has a head rest mounted on the seat back such that it moves vertically relative to the seat back on Evenflo’s website http://www.evenflo.com/car-seats/us_everystage.html?cgid=car-seat#start=3. Evenflo’s website shows the EveryStage Car Seat in at least three different configurations (“Infant,” “Convertible,” and “Booster”), each having a different vertical head rest position.

50. Independent claim 1 recites “a locking mechanism mounted on said head rest for vertical movement therewith to engage said control rack to secure said head rest into one of the plurality of selected vertical positions, said locking mechanism including a lock bar that can be moved into engagement with a selected one of said engagement portions to fix said head rest in the corresponding selected vertical position.” As noted above, Evenflo’s website http://www.evenflo.com/car-seats/us_everystage.html?cgid=car-seat#start=3 shows the EveryStage Car Seat in at least three different configurations (“Infant,” “Convertible,” and “Booster”) (copied below), each having a different vertical head rest position. On information and belief, the EveryStage Car Seat’s head rest also includes a locking mechanism mounted in the head rest so that a user can manually move the head rest vertically and position it at a selected vertical position at which the locking mechanism engages with the control rack, such as to position a lock bar of the locking mechanism within a pair of holes preformed on a pair of metal rails at the desired vertical position, to secure the head rest into one of the multiple specific vertical positions. The locking mechanism includes a lock bar that can be moved to engage with the

engagement portions to set the head rest in the specific vertical position.



convertible & all-in-one / EveryStage All-in-One Car Seat

10 YEARS OF USE



INFANT + CONVERTIBLE + BOOSTER

51. Independent claim 1 recites “harness belts extending vertically under said head rest from a position at an upper portion of said seat back and passing through at least one opening in said seat back below said head rest for positioning in front of said seat back, said harness belts being connected to said lock bar so that said harness belts will move vertically in response to a corresponding vertical movement of said head rest.” Evenflo’s website http://www.evenflo.com/car-seats/us_everystage.html?cgid=car-seat#start=3 shows the EveryStage Car Seat has harness belts that extend from below the head rest in front of the seat back. On information and belief, the EveryStage Car Seat harness belts extend vertically under the head rest from the upper portion of the seat back and pass through two openings in the seat back that are also below the head rest. The harness belts are also connected to the lock bar so that they move vertically in response to the movement of the head rest.

52. By making, using, selling, offering for sale, and/or importing into the United States the EveryStage Car Seat, Defendant has infringed and is continuing to infringe at least one claim of the '725 patent. 35 U.S.C. § 271.

53. On information and belief, Defendant has taken and is continuing to take active steps to induce direct infringement of those claims by its direct and indirect customers under 35 U.S.C. § 271(b) by making, selling, and/or offering for sale its EveryStage Car Seats in the United States with knowledge of the '725 patent, knowing its EveryStage Car Seats are specifically designed to operate in a vehicle seat in an infringing manner, knowing use of its EveryStage Car Seats by those customers constitutes direct infringement, and by intentionally encouraging infringement of the '725 patent by those customers to take advantage of the sales of its EveryStage Car Seats. 35 U.S.C. § 271(b).

54. Upon information and belief, Defendant is also inducing the infringement of one or more claims of the '725 patent by its direct and indirect customers under 35 U.S.C. § 271(b) by providing instructions and/or assistance in the installation and/or operation of its EveryStage Car Seats in those customers' vehicle seats.

55. On information and belief, Defendant has contributed and is continuing to contribute to the direct infringement of those claims of the '725 patent by its direct and indirect customers under 35 U.S.C. § 271(c) by selling and/or offering for sale its EveryStage Car Seats in the United States with knowledge of the '725 patent, knowing its EveryStage Car Seats are specifically designed to operate as a material component in those customers' vehicle seats in an infringing manner, and knowing use of its EveryStage Car Seats by those customers constitutes direct infringement.

56. Defendant's EveryStage Car Seats are not staple articles of commerce, and there

are no substantial noninfringing uses of Defendant's EveryStage Car Seat other than as a component in those customers' vehicle seats to be used in an infringing manner, and that Defendant's EveryStage Car Seat constitutes a material component of the claimed invention because they are specifically designed to work with the vehicle seats and directly embody significant characteristics of the '725 patent claims. 35 U.S.C. § 271(c).

57. Despite Defendant's knowledge of the '725 patent and its infringing activities, Defendant has infringed and is continuing to infringe one or more claims of the '725 patent by manufacturing, selling, and/or offering for sale additional EveryStage Car Seats. This intentional infringement without regard for Wonderland's patent rights constitutes egregious conduct sufficient to establish willful infringement under 35 U.S.C. § 284.

58. The ongoing and continuous infringement by Defendant of the '725 patent entitles Wonderland to the entry of an injunction permanently enjoining Defendant from further infringing Wonderland's patent rights, pursuant to 35 U.S.C. § 283.

59. Wonderland has suffered and continues to suffer damages from Defendant's infringement of the '725 patent, and Wonderland is entitled to compensation and other monetary relief to the extent allowed by law, pursuant to 35 U.S.C. §§ 284 and 285.

COUNT THREE
(Patent Infringement of U.S. Patent No. 8,123,294)

60. Wonderland realleges and incorporates by reference herein each of the preceding paragraphs.

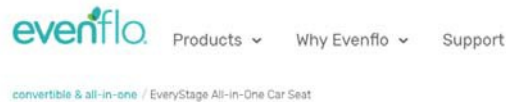
61. Defendant has made, used, sold, offered for sale, and/or imported into the United States, and continues to do so, child car seats, including the Evenflo EveryStage Car Seat, that practice at least one claim of the '294 patent.

62. The Evenflo EveryStage Car Seat includes every element of at least independent

claim 6 of the '294 patent, literally or equivalently.

63. Independent claim 6 recites a car seat “having a seat back supported on a seat member and projecting upwardly therefrom, said seat member having a first portion of a rigid shell and a seat pad mounted on the rigid shell, said back rest having a second portion of a rigid shell on which a back panel pad and a head rest pad are supported, each of said back panel pad and said head rest pad being selectively removable from said rigid shell; and a harness including a pair of laterally spaced shoulder straps supported from said rigid shell, a pair of laterally spaced belt straps connected to said rigid shell, and a crotch strap connected to said rigid shell, said harness including a pair of latch members, each said latch member being connected to one of said shoulder straps and to a corresponding said belt strap, both said latch members being engageable with a harness buckle connected to said crotch strap.”

64. At http://www.evenflo.com/car-seats/us_everystage.html?cgid=car-seat#start=3, Evenflo’s website shows the EveryStage Car Seat includes a seat back supported on a seat member and projecting upwardly from the seat member. The seat member has a rigid shell and a seat pad mounted on the rigid shell. The seat back has a portion that supports a back panel pad and a head rest pad, each removable from the rigid shell. The picture of the EveryStage Car Seat from Evenflo’s website below shows the EveryStage Car Seat also includes a harness having two laterally spaced shoulder straps supported by the rigid shell, two belt straps connected to the rigid shell, and a crotch strap also connected to the rigid shell. The harness includes two latch members, each of which is connected to one of the shoulder straps and a corresponding belt strap. The crotch strap also has a harness buckle connected to it. As the picture of the Evenflo Car Seat from the Evenflo website shows, both latch members are engageable with the harness buckle (with a red button for manually disengaging the latch members) connected to the crotch strap.



65. Independent claim 6 further recites “a harness storage cavity formed in said rigid shell and including a cover forming a smooth support when closed over said harness storage cavity, said harness storage cavity being sized to receive said latch members or said harness buckle, said shoulder straps and said belt straps are positionable behind said back panel pad and said head rest pad and against said rigid shell to permit said latch members or said harness buckle to be stored in said harness storage cavity with said shoulder straps and said belt straps projecting out of said harness storage cavity along said rigid shell.”

66. At http://www.evenflo.com/car-seats/us_everystage.html?cgid=car-seat#start=3, Evenflo’s website shows the EveryStage Car Seat in at least three different configurations (“Infant,” “Convertible,” and “Booster”), where the Booster configuration shows the child seat without the harness in the seating area. On information and belief, the EveryStage Car Seat includes a harness storage cavity formed in the rigid shell and includes a cover, which forms a smooth support when the cover is closed over the harness storage cavity when the EveryStage Car Seat is in its Booster configuration on the Evenflo website. On information and belief, the harness storage cavity is sized to receive at least one of the latch members or the harness buckle, which

can be stored in the harness storage cavity, for example when the EveryStage Car Seat is in its Booster configuration. The shoulder straps and belt straps can be positioned behind the back panel pad and the head rest pad and against the rigid shell so at least one of the latch members or harness buckle can be stored in the harness storage cavity with the shoulder straps and belt straps projecting out of the harness storage cavity along the rigid shell.



67. By making, using, selling, offering for sale, and/or importing into the United States the EveryStage Car Seat, Defendant has infringed and is continuing to infringe at least one claim of the '294 patent. 35 U.S.C. §§ 271(a), (b), and/or (c).

68. On information and belief, Defendant has taken and is continuing to take active steps to induce direct infringement of those claims by its direct and indirect customers under 35 U.S.C. § 271(b) by making, selling, and/or offering for sale its EveryStage Car Seats in the United States with knowledge of the '294 patent, knowing its EveryStage Car Seats are specifically designed to operate in a vehicle seat in an infringing manner, knowing use of its EveryStage Car Seats by those customers constitutes direct infringement, and by intentionally encouraging infringement of the '294 patent by those customers to take advantage of the sales of its EveryStage

Car Seats. 35 U.S.C. § 271(b).

69. Upon information and belief, Defendant is also inducing the infringement of one or more claims of the '294 patent by its direct and indirect customers under 35 U.S.C. § 271(b) by providing instructions and/or assistance in the installation and/or operation of its EveryStage Car Seats in customers' vehicle seats.

70. On information and belief, Defendant has contributed and is continuing to contribute to the direct infringement of the '294 patent of those claims by its direct and indirect customers under 35 U.S.C. § 271(c) by selling and/or offering for sale its EveryStage Car Seats in the United States with knowledge of the '294 patent, knowing its EveryStage Car Seats are specifically designed to operate as a material component in those customers' vehicle seats in an infringing manner, and knowing use of its EveryStage Car Seats by those customers constitutes direct infringement. 35 U.S.C. § 271(c).

71. Defendant's EveryStage Car Seats are not staple articles of commerce, and there are no substantial noninfringing uses of Defendant's EveryStage Car Seats other than as a component in those customers' vehicle seats to be used in an infringing manner, and that Defendant's EveryStage Car Seat constitutes a material component of the claimed invention because they are specifically designed to work with the vehicle seats and directly embody significant characteristics of the '294 patent claims. 35 U.S.C. § 271(c).

72. Despite Defendant's knowledge of the '294 patent and its infringing activities, Defendant has infringed and is continuing to infringe one or more claims of the '294 patent by manufacturing, selling, and/or offering for sale additional EveryStage Car Seats. This intentional infringement without regard for Wonderland's patent rights constitutes egregious conduct sufficient to establish willful infringement under 35 U.S.C. § 284.

73. The ongoing and continuous infringement by Defendant of the '294 patent entitles Wonderland to the entry of an injunction permanently enjoining Defendant from further infringing Wonderland's patent rights, pursuant to 35 U.S.C. § 283.

74. Wonderland has suffered and is continuing to suffer damages from Defendant's infringement of the '294 patent, and Wonderland is entitled to compensation and other monetary relief to the extent allowed by law, pursuant to 35 U.S.C. §§ 284 and 285.

REQUEST FOR RELIEF

WHEREFORE, Plaintiff Wonderland respectfully requests the Court enter judgment in its favor and against Defendant on the patent infringement claims set forth above and respectfully requests that this Court:

(a) enter judgment that Defendant has infringed and continues to infringe at least one claim of the '117 patent in violation of at least one of 35 U.S.C. § 271(a), (b), and/or (c);

(b) award Wonderland all available and legally permissible damages and relief sufficient to compensate Wonderland for Defendant's infringement of the '117 patent, including to the full extent permitted by 35 U.S.C. § 284, together with interest, in an amount to be determined at trial;

(c) declare Defendant's infringement of the '117 patent to be willful and award Wonderland treble damages in accordance with 35 U.S.C. § 284;

(d) enter judgment that Defendant has infringed and continues to infringe at least one claim of the '725 patent in violation of at least one of 35 U.S.C. § 271(a), (b), and/or (c);

(e) award Wonderland all available and legally permissible damages and relief sufficient to compensate Wonderland for Defendant's infringement of the '725 patent, including to the full extent permitted by 35 U.S.C. § 284, together with interest, in an amount to be determined at trial;

(f) declare Defendant's infringement of the '725 patent to be willful and award Wonderland treble damages in accordance with 35 U.S.C. § 284;

(g) enter judgment that Defendant has infringed and continues to infringe at least one claim of the '294 patent in violation of at least one of 35 U.S.C. § 271(a), (b), and/or (c);

(h) award Wonderland all available and legally permissible damages and relief sufficient to compensate Wonderland for Defendant's infringement of the '294 patent, including to the full extent permitted by 35 U.S.C. § 284, together with interest, in an amount to be determined at trial;

(i) declare Defendant's infringement of the '294 patent to be willful and award Wonderland treble damages in accordance with 35 U.S.C. § 284;

(j) enter a permanent injunction against Defendant, barring and enjoining its further making, using, selling, offering for sale, and/or importing into the United States of all infringing products;

(k) declare this to be an exceptional case under 35 U.S.C. §§ 285 and 271(e)(4) and award Wonderland costs, expenses, and disbursements in this action, including reasonable attorney fees; and

(l) award Wonderland such other and further relief as may be permitted and is appropriate at law or in equity.

JURY DEMAND

Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, Wonderland hereby respectfully requests a trial by jury on all issues triable of right by a jury.

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Dated: September 13, 2019

EXHIBIT A

(12) **United States Patent**
Hutchinson et al.

(10) **Patent No.:** **US 7,862,117 B2**
(45) **Date of Patent:** **Jan. 4, 2011**

(54) **HEAD REST AND HARNESS ADJUSTMENT
FOR CHILD CAR SEAT**

(75) Inventors: **James M. F. Hutchinson**, Mohnton, PA
(US); **Robert E. Haut**, West Chester, PA
(US)

(73) Assignee: **Wonderland Nurserygoods Co., Ltd.**,
Taipei (TW)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

6,398,302 B1	6/2002	Freedman	297/250.1
6,491,348 B1	12/2002	Kain	297/484
6,623,074 B2	9/2003	Asbach	297/250.1
6,626,493 B2	9/2003	Kain	297/250.1
6,682,143 B2	1/2004	Amirault	297/250.1
6,688,685 B2	2/2004	Kain	297/250.1
6,695,412 B2 *	2/2004	Barger et al.	297/484
6,779,843 B2	8/2004	Kain	297/250.1
7,021,710 B2	4/2006	Kain	297/256.11

(21) Appl. No.: **11/953,063**

(22) Filed: **Dec. 9, 2007**

(65) **Prior Publication Data**

US 2008/0136232 A1 Jun. 12, 2008

Related U.S. Application Data

(60) Provisional application No. 60/874,392, filed on Dec.
12, 2006.

(51) **Int. Cl.**
B60N 2/28 (2006.01)

(52) **U.S. Cl.** 297/256.1; 297/250.1; 297/410

(58) **Field of Classification Search** 297/256.11,
297/256.1, 410, 253, 250.1
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,754,999 A	7/1988	Kain	297/250
4,790,601 A *	12/1988	Burleigh et al.	297/484
4,858,997 A	8/1989	Shubin	297/487
5,125,686 A *	6/1992	Yano et al.	280/801.2
6,030,047 A	2/2000	Kain	297/484
6,135,553 A	10/2000	Lovie	297/250.1
6,155,638 A	12/2000	Bapst	297/250.1
6,189,970 B1	2/2001	Rosko	297/250.1
6,273,509 B1 *	8/2001	Reithmeier et al.	297/410

(Continued)

FOREIGN PATENT DOCUMENTS

DE 10107874 9/2002

(Continued)

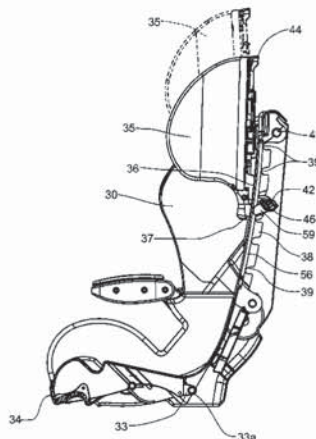
Primary Examiner—Peter R. Brown

(74) *Attorney, Agent, or Firm*—Miller Law Group, PLLC

(57) **ABSTRACT**

A car seat includes a vertically adjustable head rest and harness support apparatus that will properly locate the position of the harness relative to the child in response to the positioning of the head rest. The head rest is movable along a curved track to provide horizontal clearance with respect to the vehicle head rest when in a fully raised position. The harness belt is trapped in a length adjustment lock and follows a path that extends around a fixed guide bar at the top of the car seat frame then downwardly through a guide member that directs the belt through an opening in the seat back for engagement with the child. The guide member is supported on a harness control tube that engages a rack device to fix the position of the harness control tube when the position of the head rest is selected.

16 Claims, 17 Drawing Sheets



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U.S. PATENT DOCUMENTS

7,048,336	B2 *	5/2006	Mawbey et al.	297/408	2005/0173956	A1 *	8/2005	Balensiefer et al.	297/256.11
7,055,903	B2 *	6/2006	Balensiefer et al.	297/256.11	2005/0189806	A1 *	9/2005	Hall et al.	297/256.11
7,195,314	B2 *	3/2007	Spence et al.	297/250.1	2005/0200177	A1	9/2005	Balenseifer	297/250.1
7,232,185	B2 *	6/2007	Hartenstine et al.	297/250.1	2005/0212342	A1 *	9/2005	Kain et al.	297/410
7,246,852	B2 *	7/2007	Balensiefer	297/250.1	2005/0225136	A1	10/2005	Horton	297/250.1
7,246,854	B2 *	7/2007	Dingman et al.	297/250.1	2006/0220427	A1 *	10/2006	Patrizi et al.	297/250.1
7,306,284	B2 *	12/2007	Horton et al.	297/250.1	2007/0040428	A1 *	2/2007	Sakumoto	297/250.1
7,370,912	B2 *	5/2008	Williams et al.	297/256.11	2007/0057545	A1 *	3/2007	Hartenstine et al.	297/250.1
7,452,031	B2 *	11/2008	Woellert et al.	297/250.1	2007/0120403	A1 *	5/2007	Drexler	297/250.1
7,547,065	B2 *	6/2009	Barger	297/250.1	2007/0284925	A1 *	12/2007	Balensiefer	297/256.11
2002/0145318	A1 *	10/2002	Asbach et al.	297/250.1	FOREIGN PATENT DOCUMENTS				
2003/0151282	A1 *	8/2003	Williams et al.	297/250.1	EP	1084900	3/2001		
2003/0193225	A1 *	10/2003	Kain	297/250.1	EP	1695865	8/2006		
2004/0124676	A1 *	7/2004	Kain	297/250.1	JP	2008636	1/1990		
2004/0124678	A1 *	7/2004	Williams et al.	297/256.11	WO	20060015428	2/2006		
2004/0245821	A1 *	12/2004	Chen	297/250.1	* cited by examiner				

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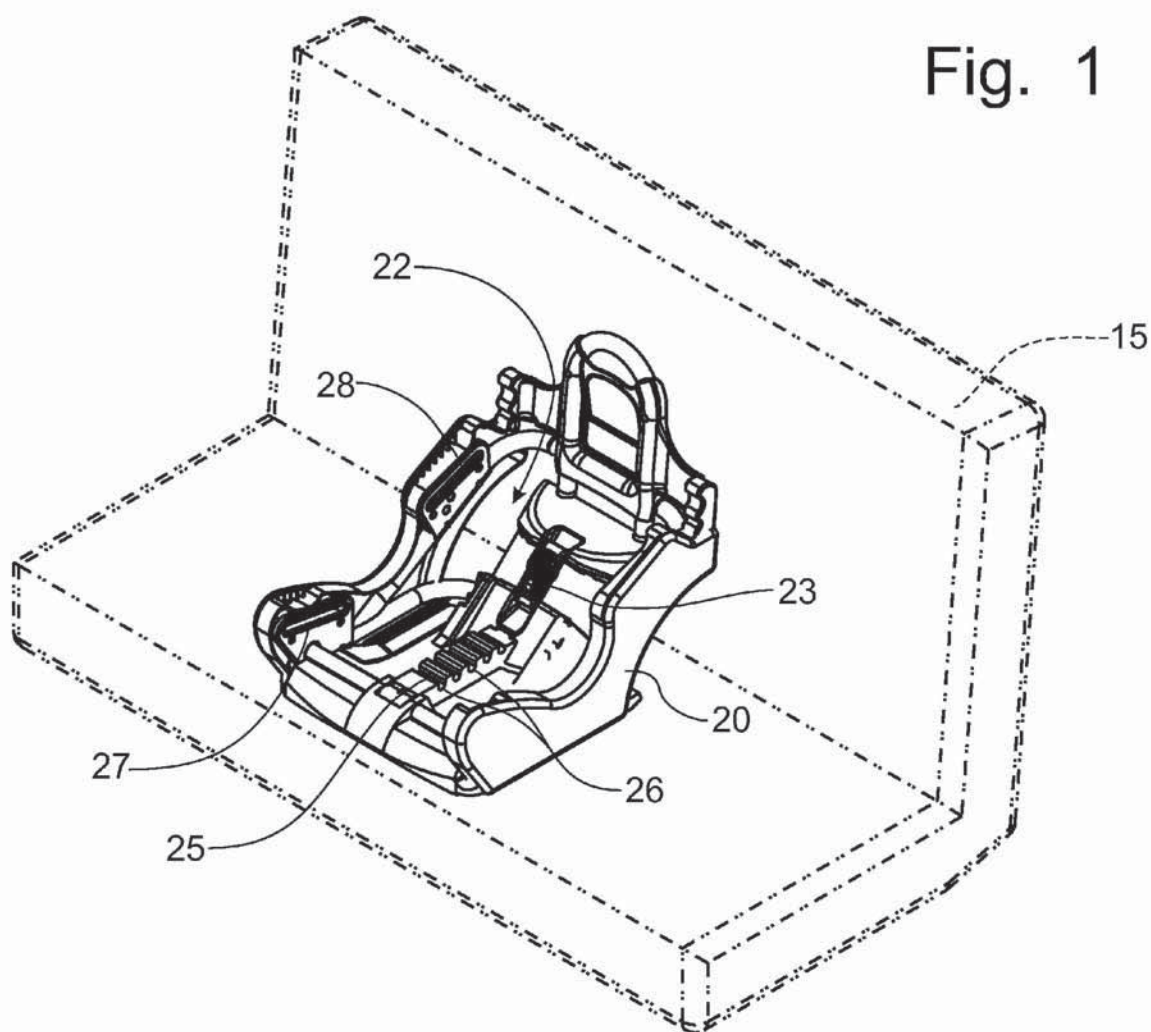


Fig. 2

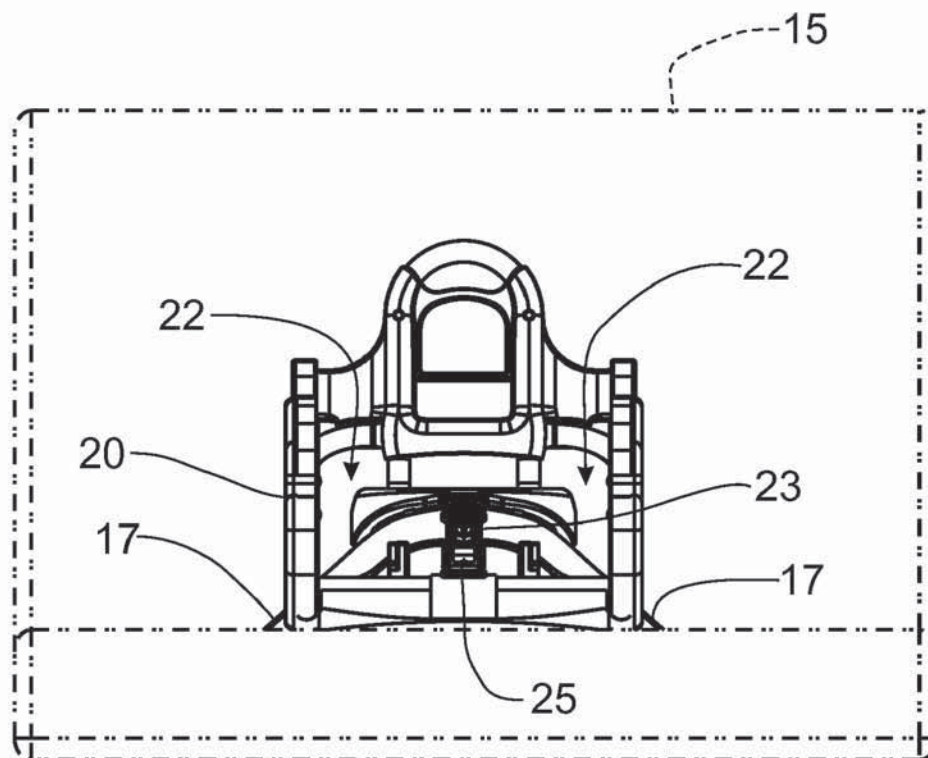
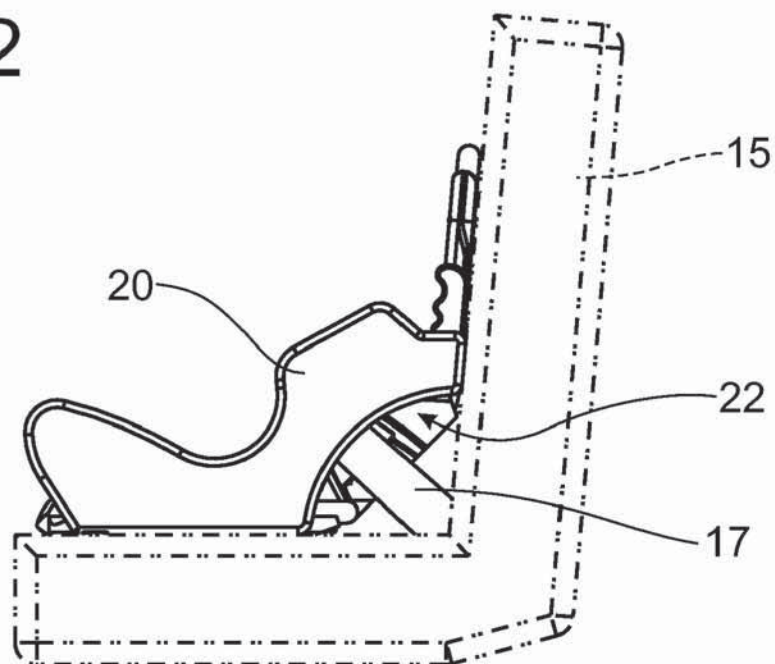


Fig. 3

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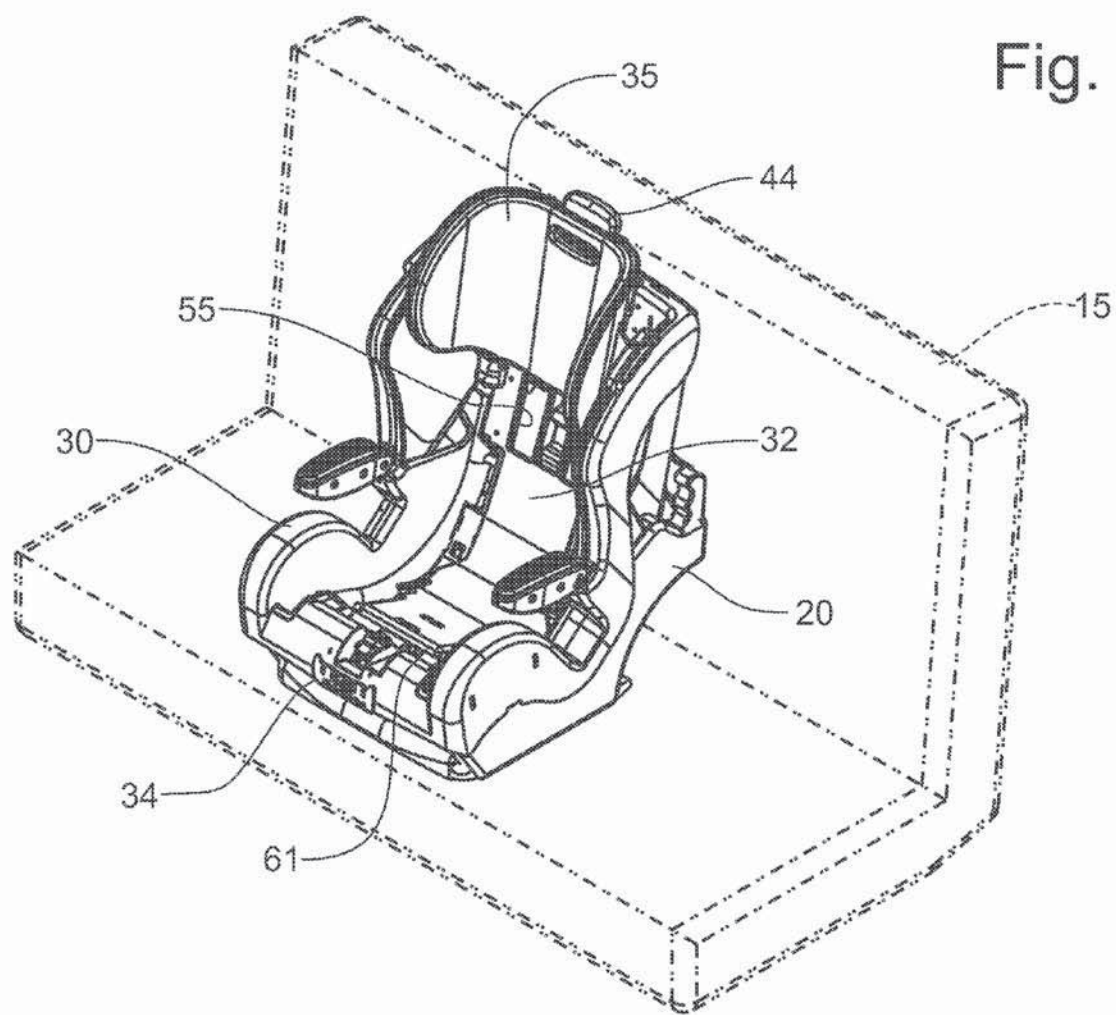


Fig. 5

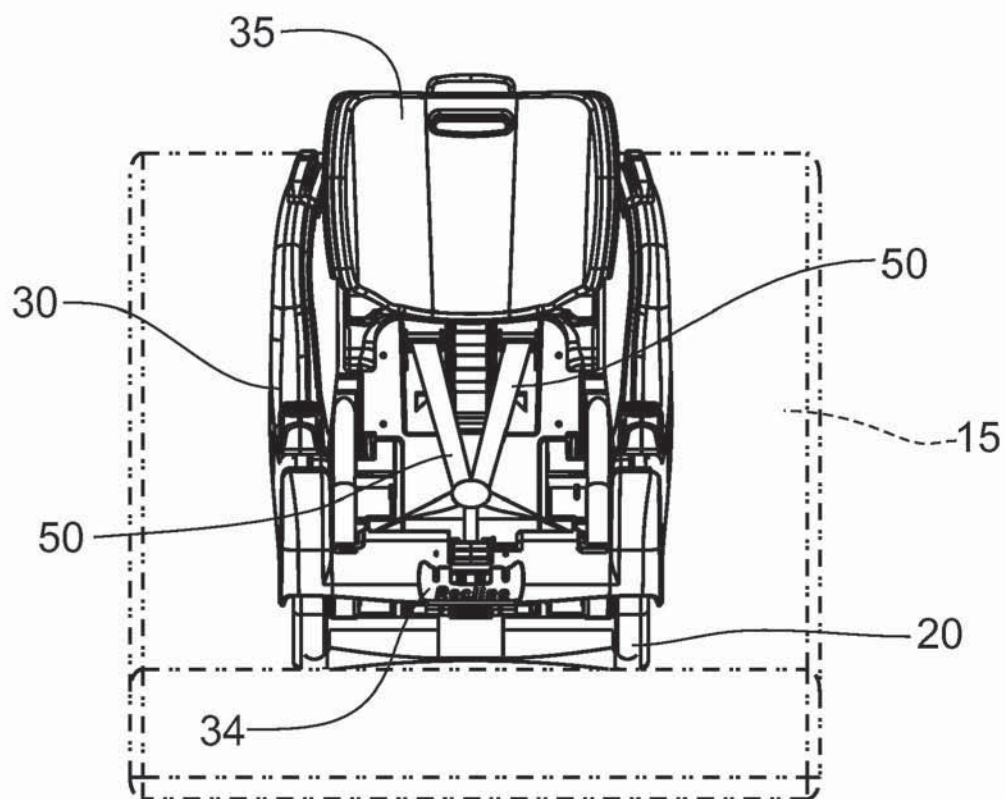
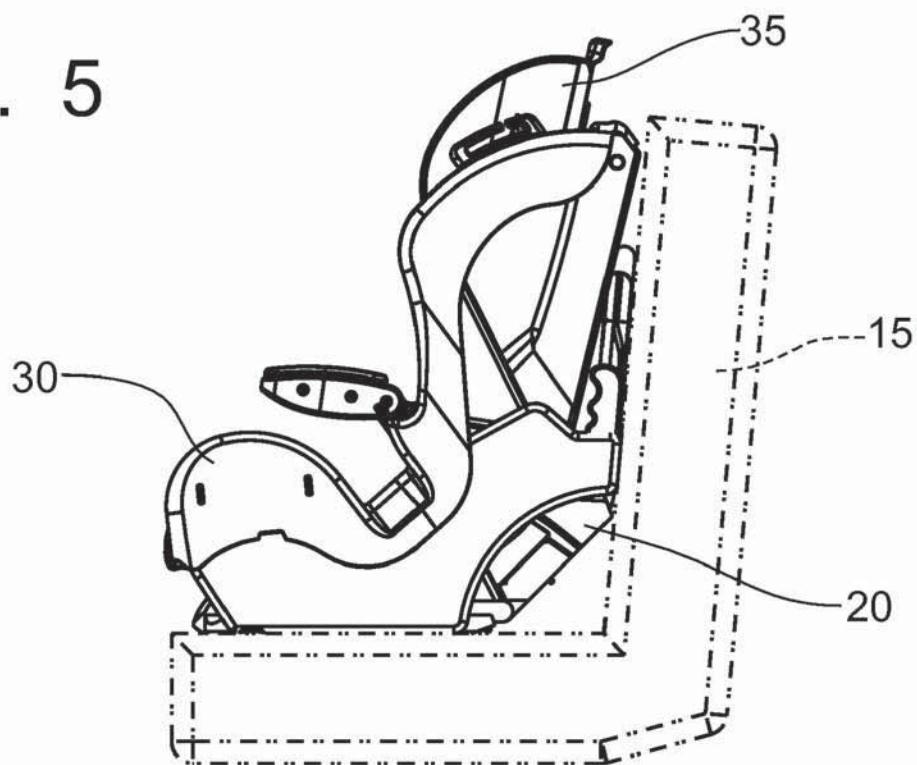


Fig. 6

Fig. 7

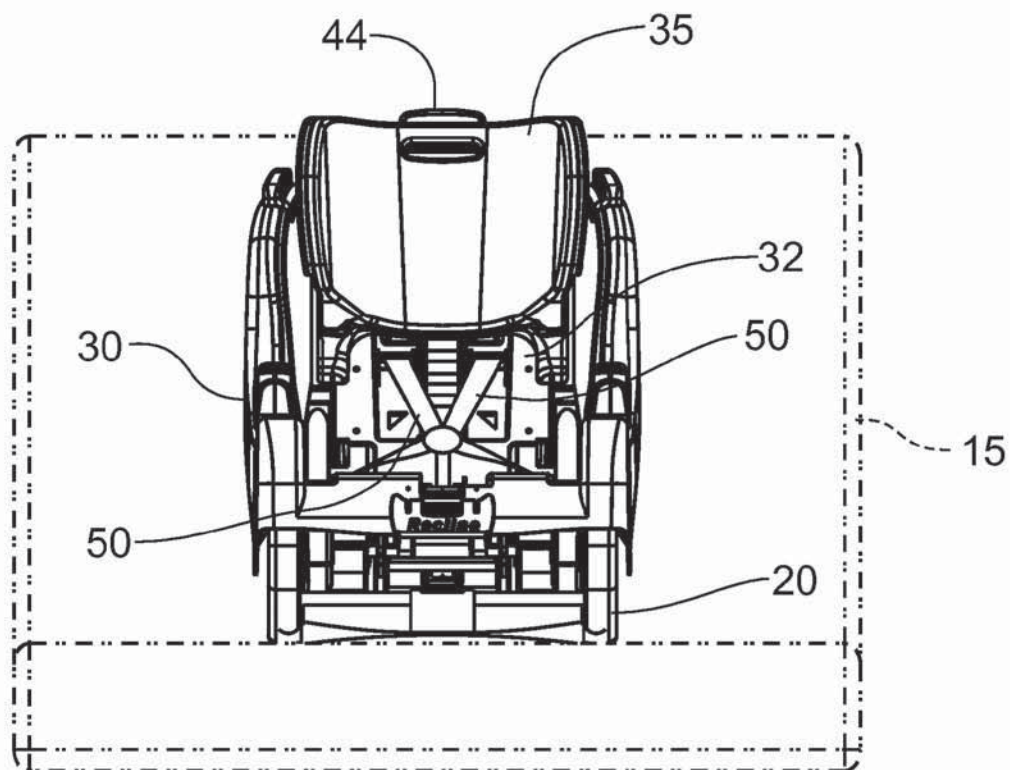
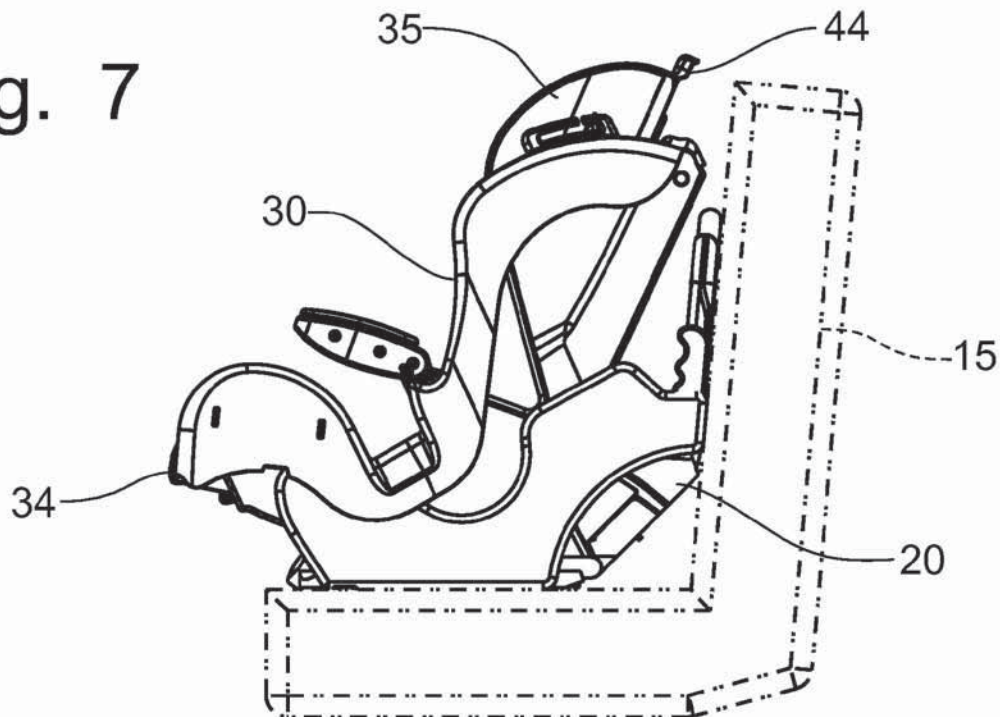
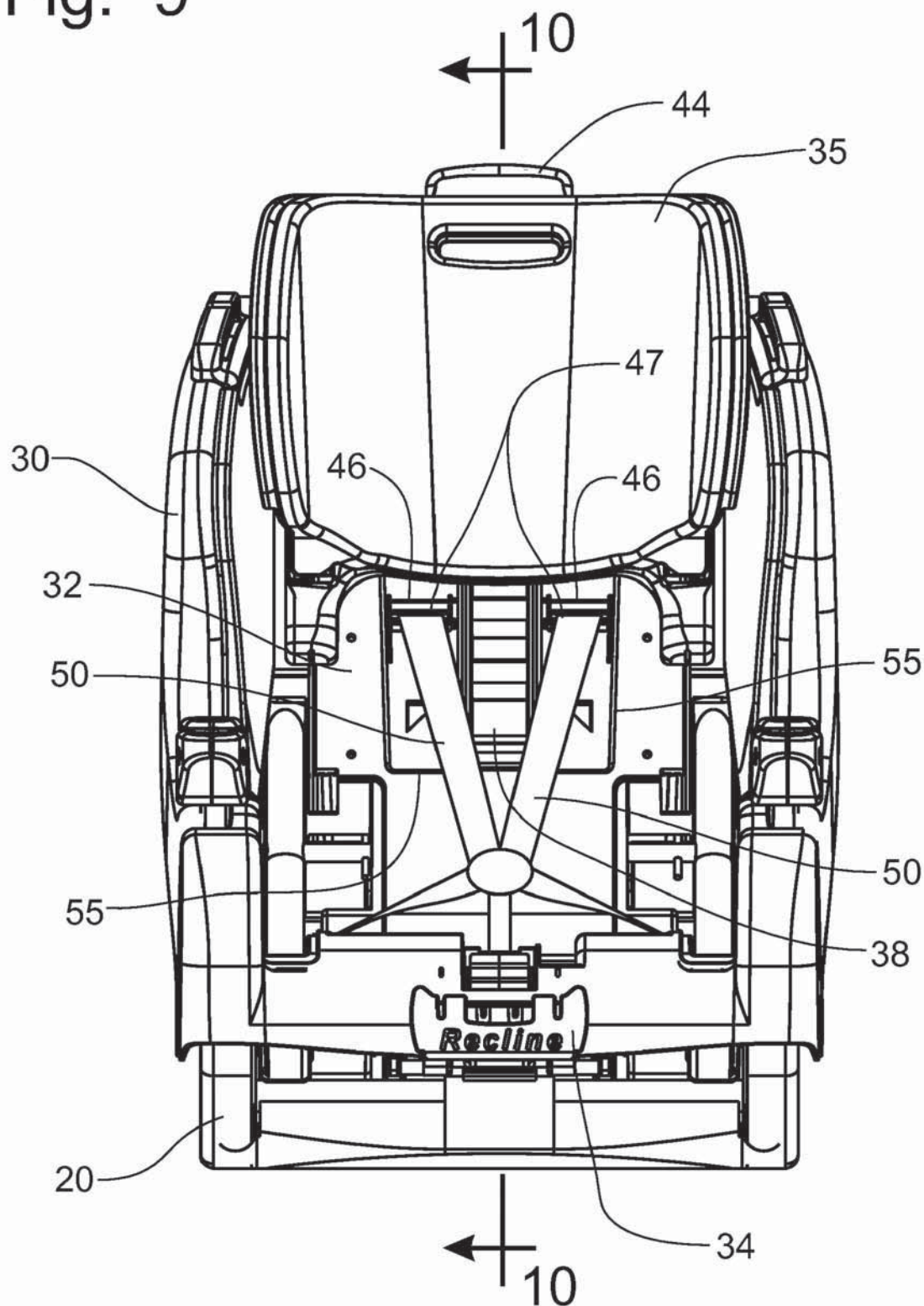


Fig. 8

Fig. 9



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Fig. 11

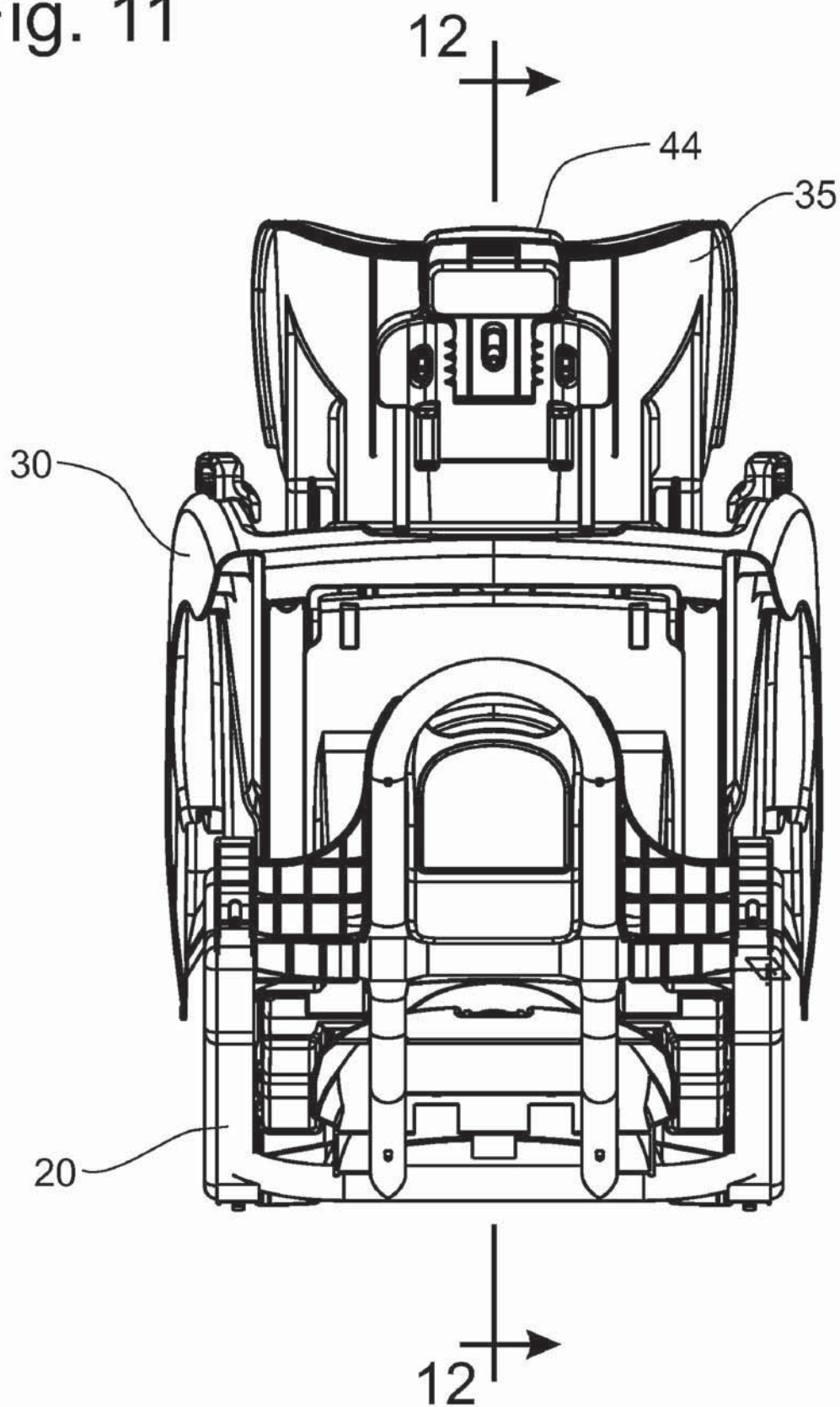


Fig. 13

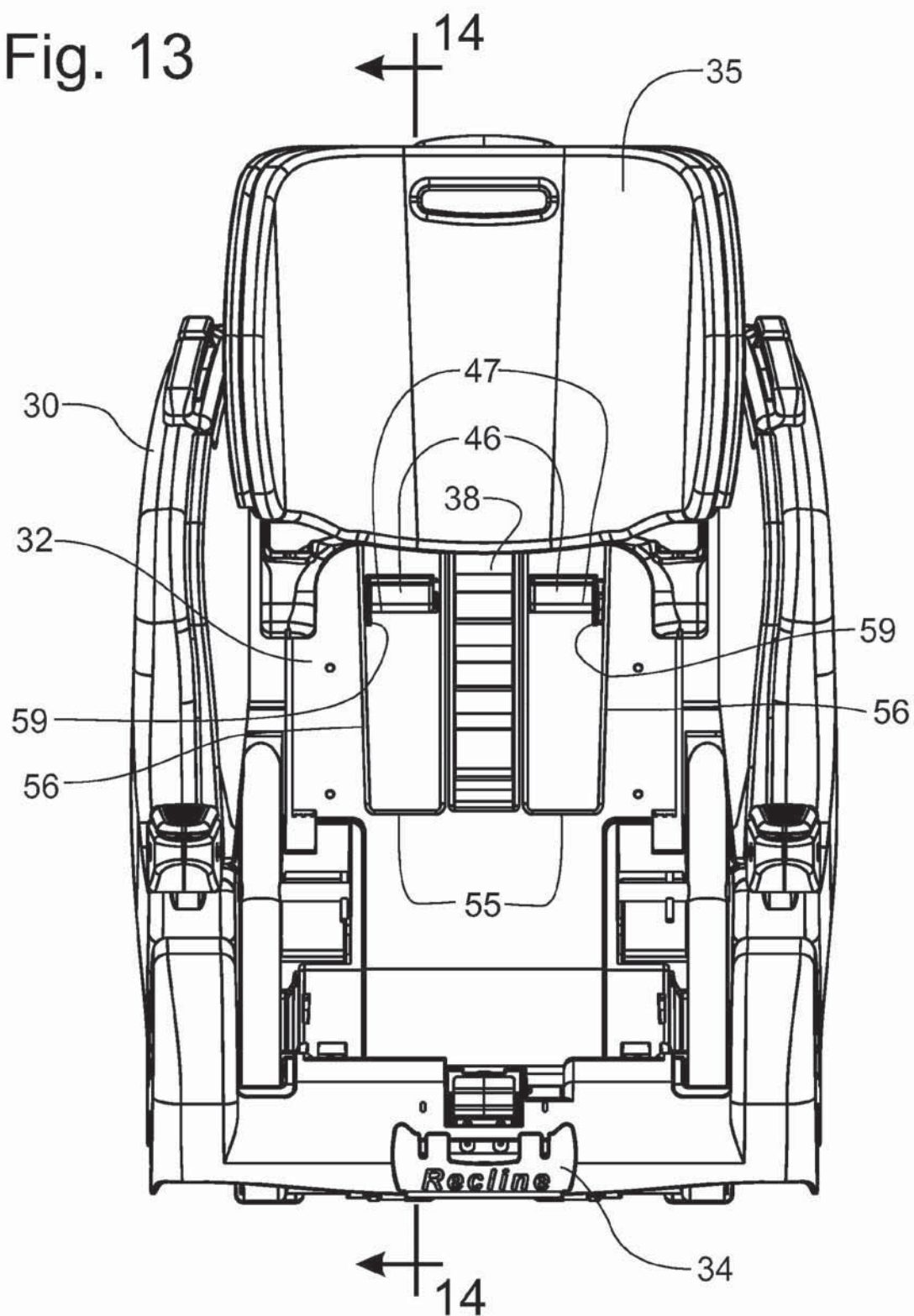


Fig. 14

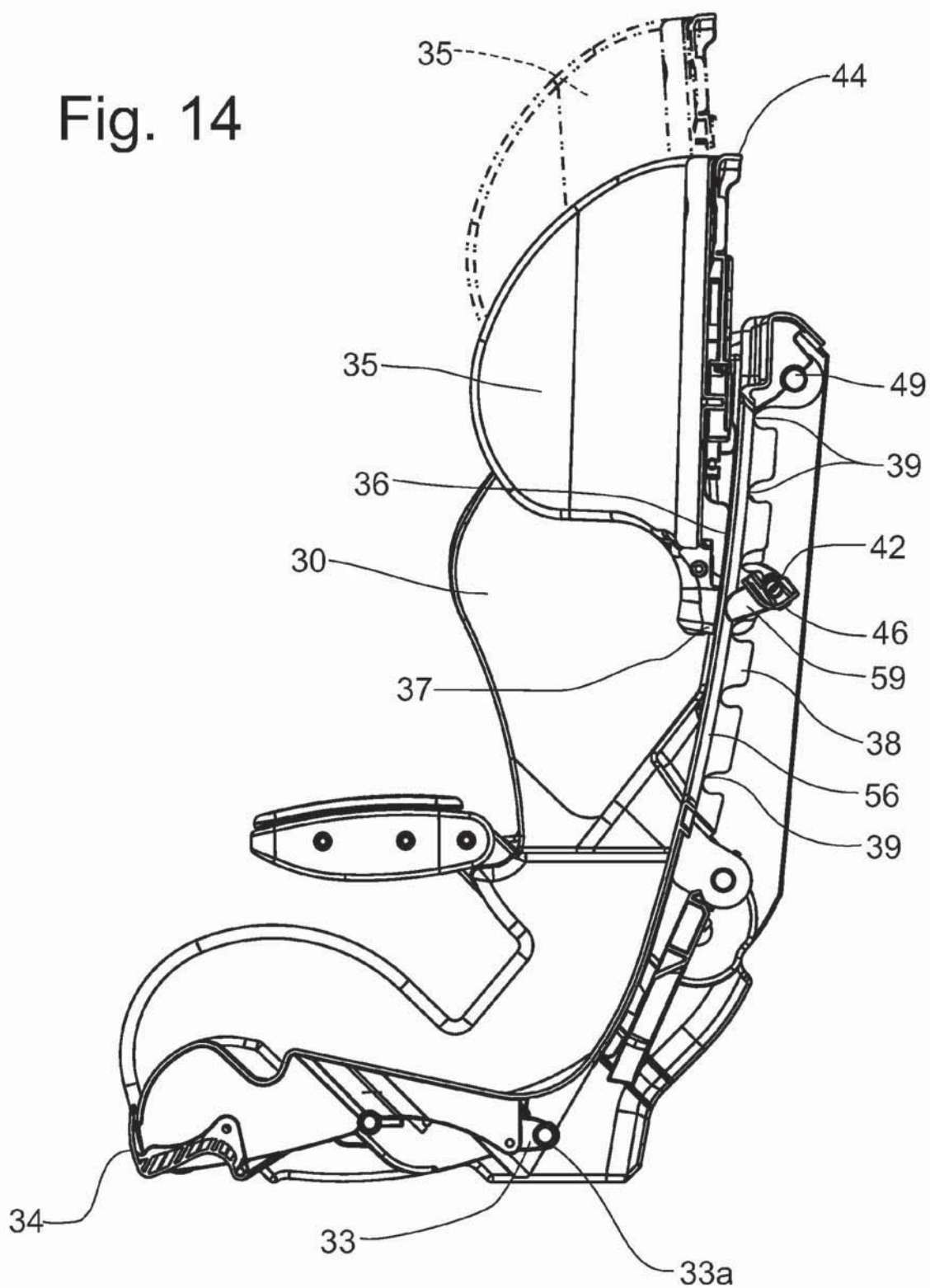


Fig. 15

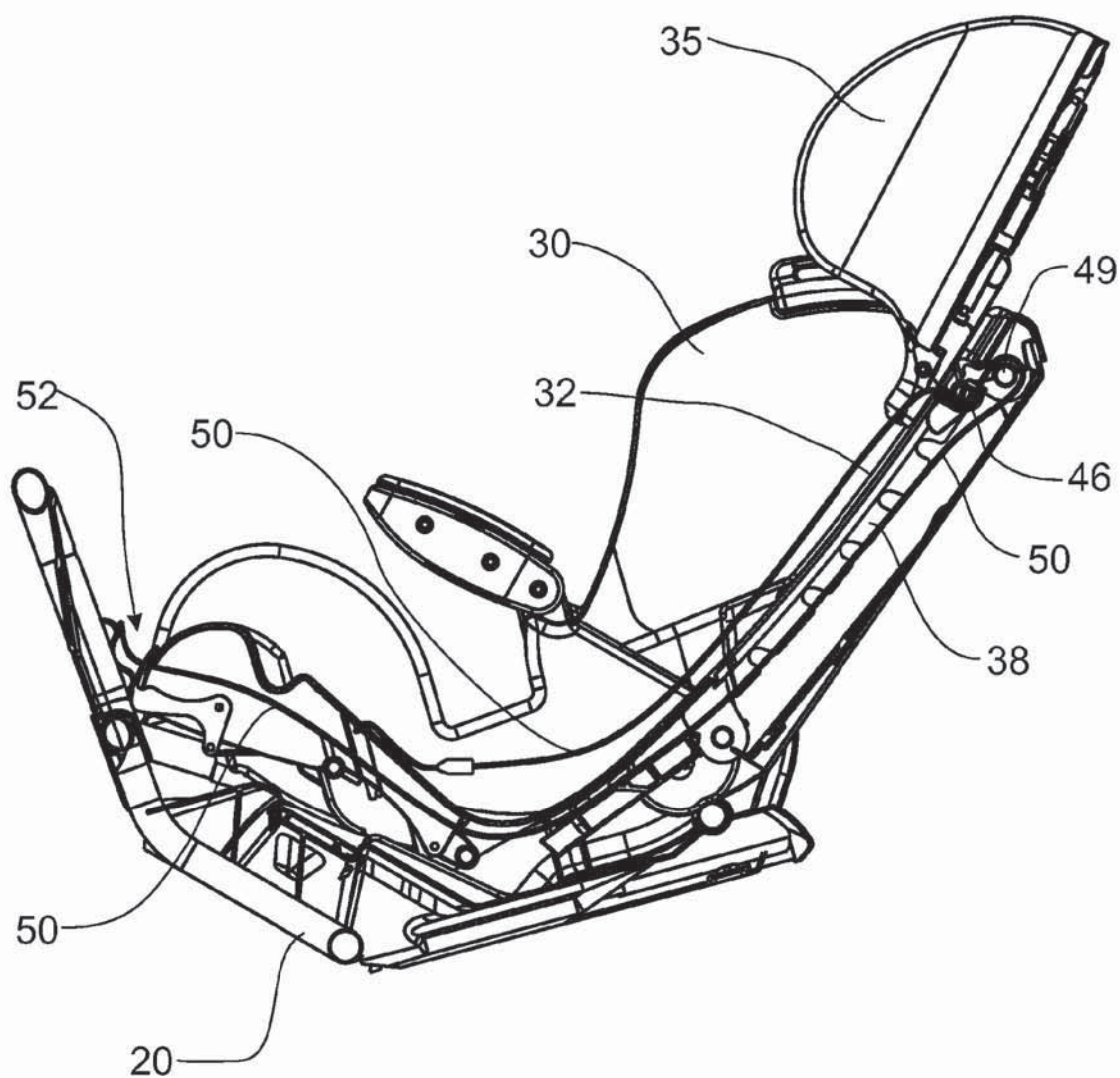
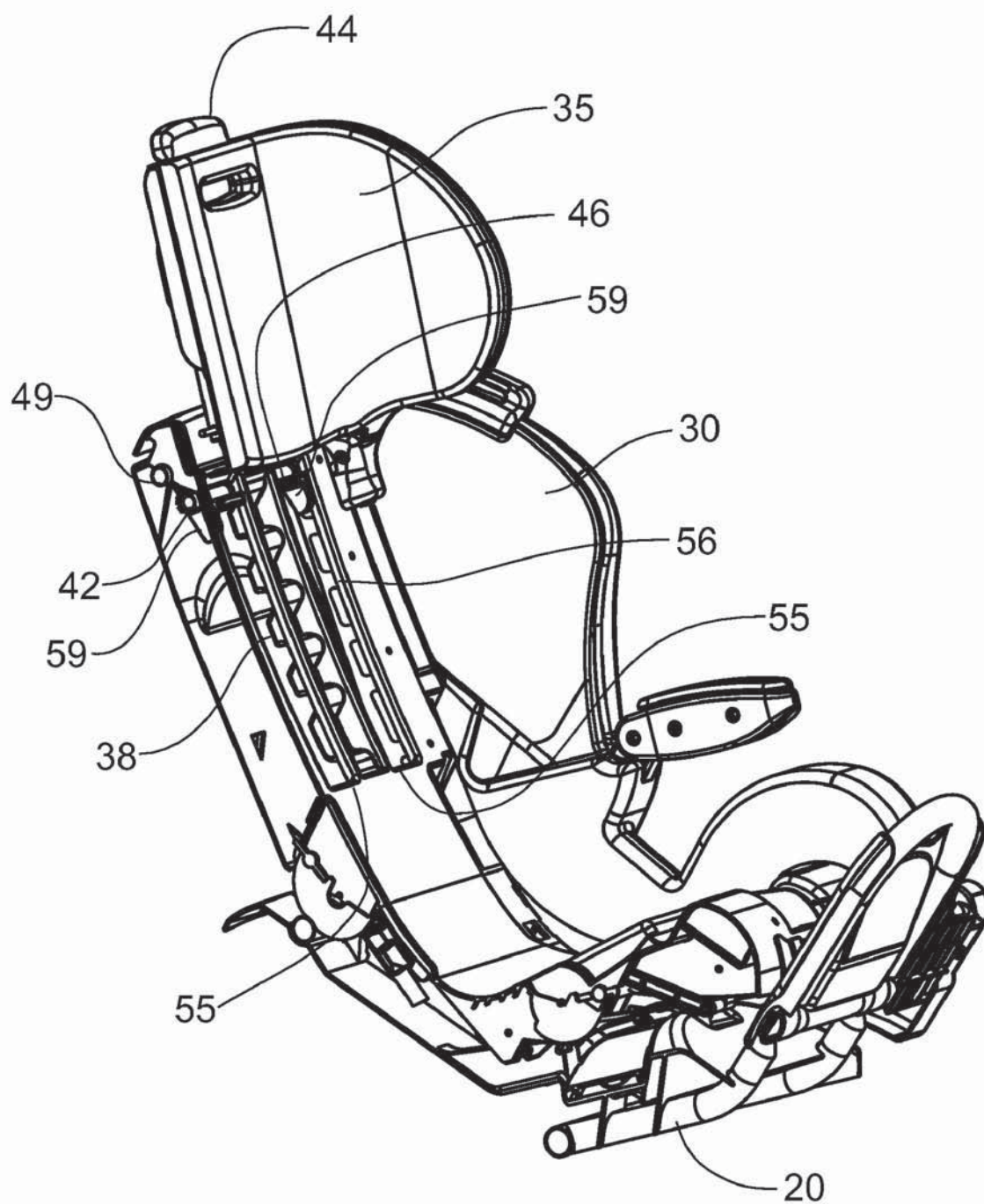


Fig. 16



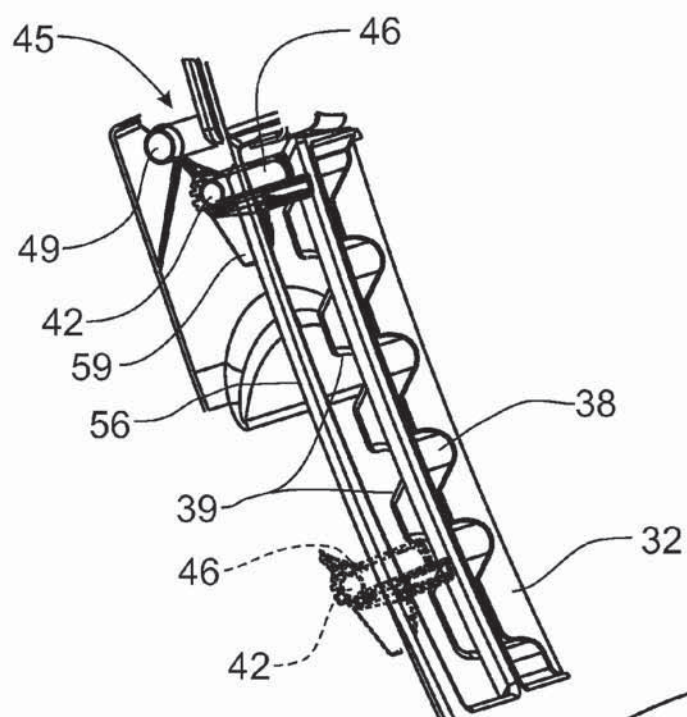


Fig. 17

Fig. 19

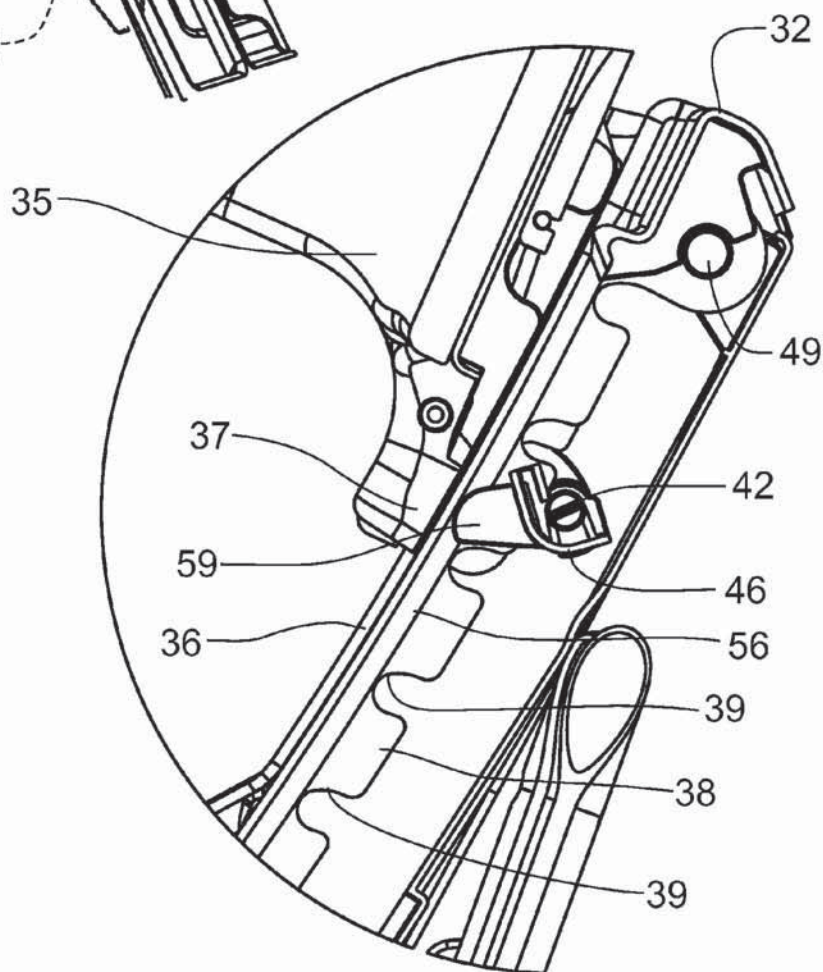


Fig. 18

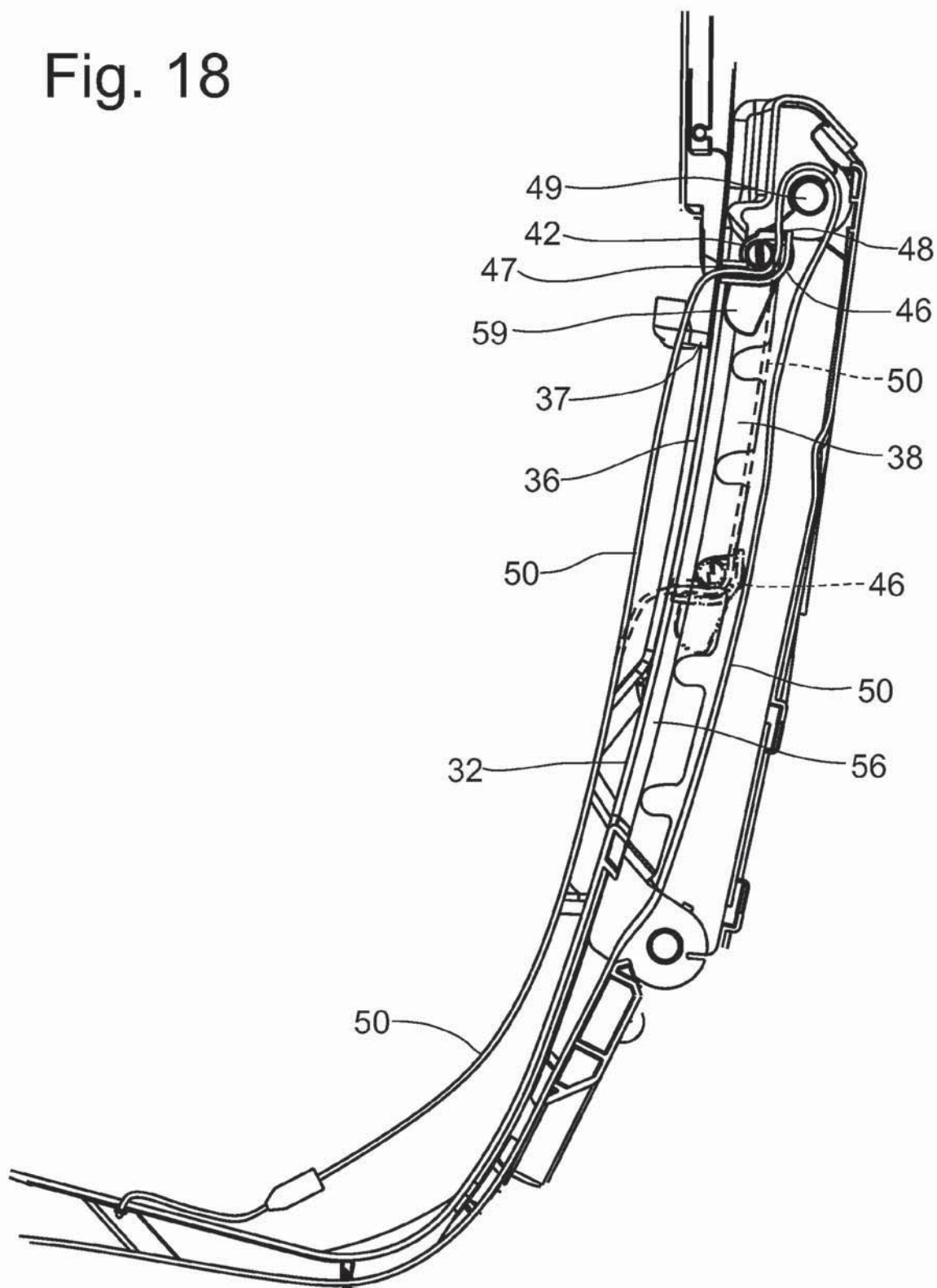


Fig. 20

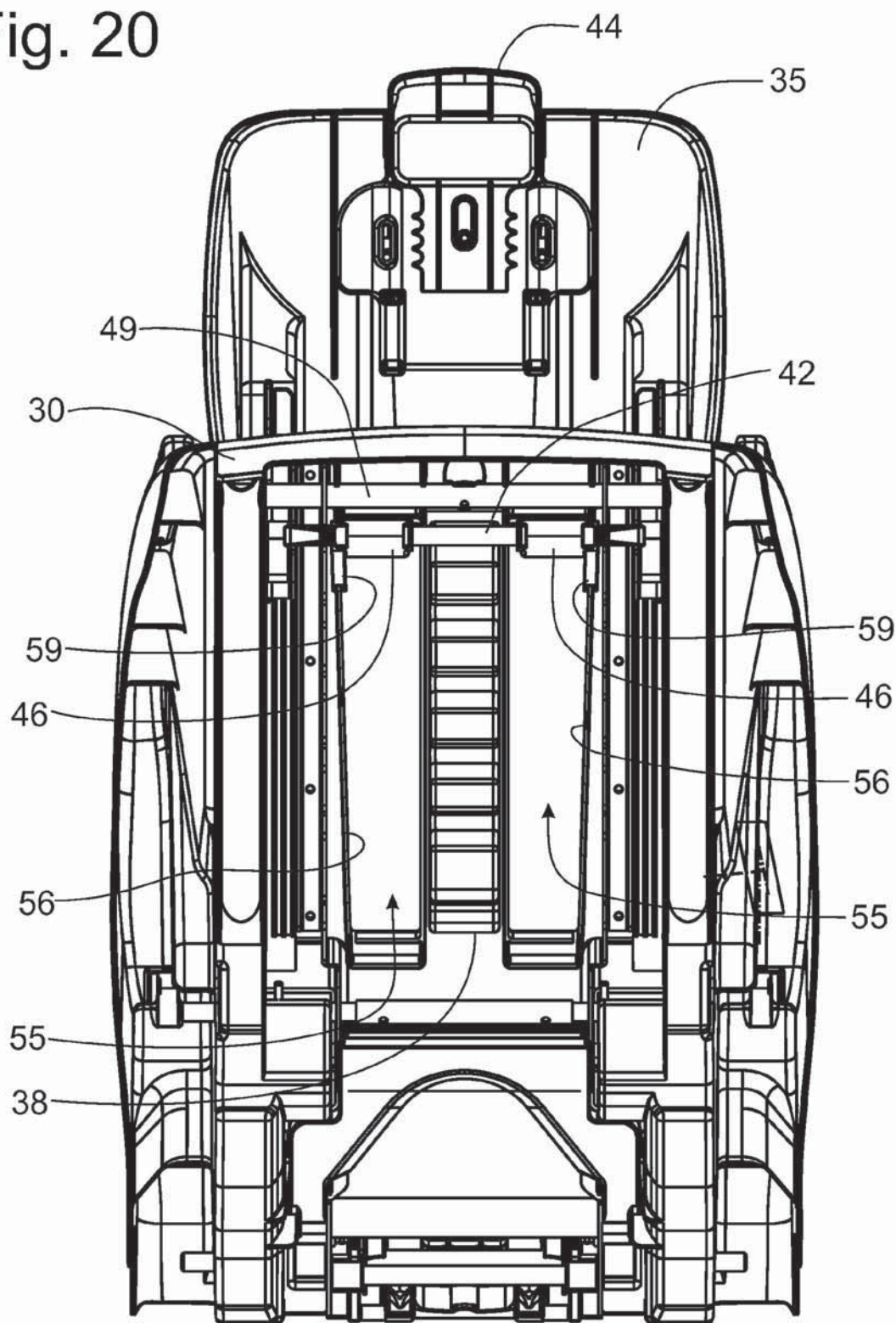
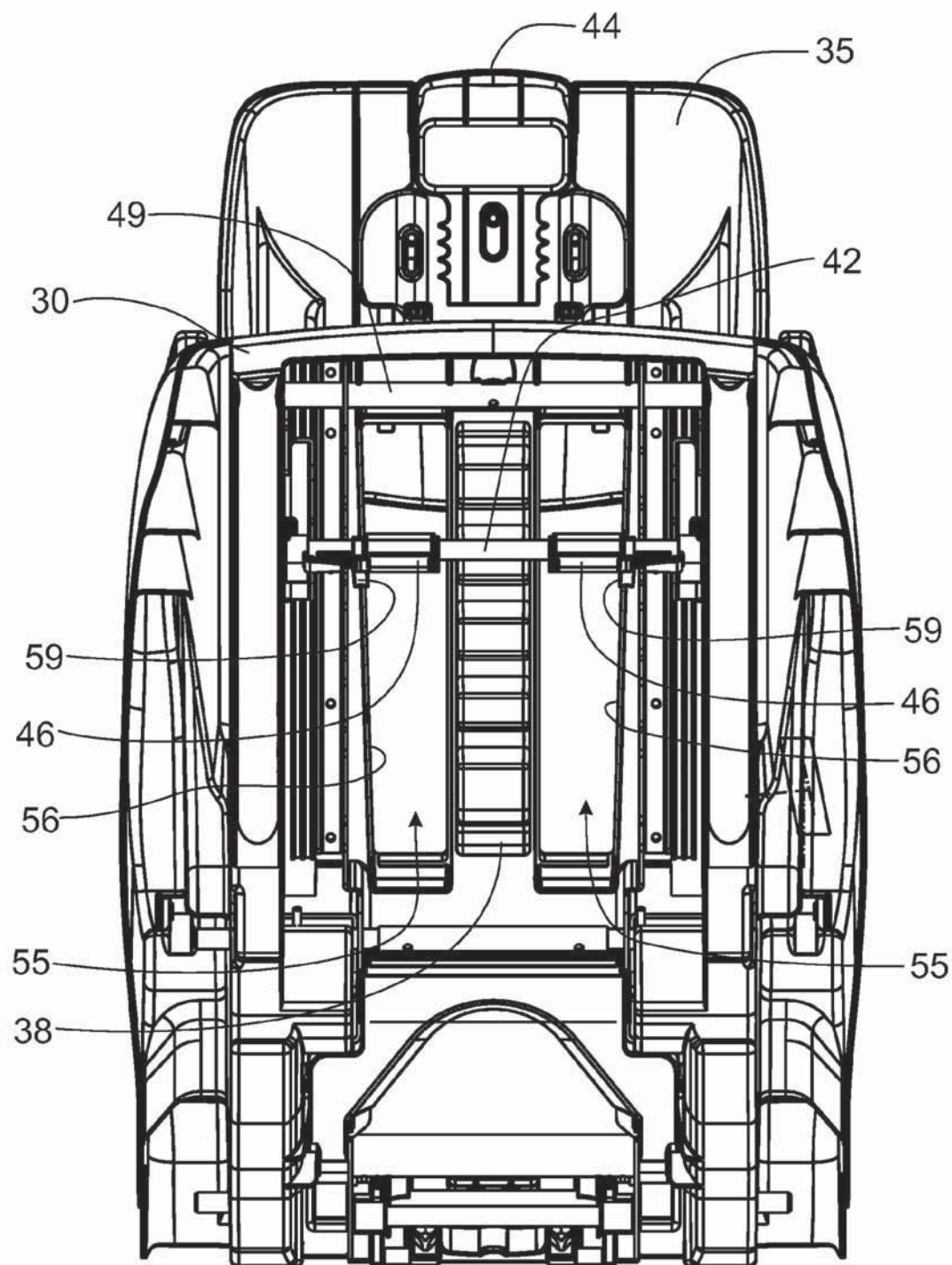


Fig. 21



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HEAD REST AND HARNESS ADJUSTMENT FOR CHILD CAR SEAT

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims domestic priority on U.S. Provisional Patent Application Ser. No. 60/874,392, filed on Dec. 12, 2006, the contents of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates generally to a car seat for use in transporting children in an automobile, and, more particularly, to a shoulder harness and head rest adjustment apparatus that can be adjusted without causing a substantial change in the length of the shoulder harness belt.

BACKGROUND OF THE INVENTION

Car safety seats for children are commercially available in a many configurations corresponding to differences in the age, weight, and size of the child being transported. Parents can choose a car seat that is not only the correct size for their child and their vehicle, but one that also suits their tastes, budget, and life style. As children grow in size and maturity level, they need different kinds of car seats. For example, a child may initially use a rearwardly facing infant car seat, then graduate to a forward facing toddler seat with an integrated harness, and finally to a belt positioning booster seat utilizing the vehicle's lap and shoulder belt system before being able to safely use the vehicle's seat belts alone.

There are many car seats on the market that can be used in multiple configurations. For instance, a forward facing car seat with an integral harness appropriate for a 20-40 pound child might accommodate a child weighing 30-100 pounds as a belt positioning booster seat with the removal of the harness and utilizing the vehicle's lap and shoulder belts. This is convenient for the care giver because it means fewer seats to purchase. Some parents choose to buy a belt positioning booster seat for their older child. Such a booster seat may be configured with a high back, such as is disclosed in U.S. Pat. No. 6,682,143, granted to Davis Amirault on Jan. 27, 2004, or can have no back at all. Older children who don't want to be seen sitting in a "baby seat" like this option and parents don't have to manage a big bulky car seat.

Currently available car seats typically have a monolithic shell, i.e. the back and seat cannot be used separately. Some car seats are designed to have a no back base option, but are configured as a separate seat fastened under the monolithic seat and back, such as is disclosed in U.S. Pat. No. 4,754,999, issued on Jul. 5, 1998, to James Kain. The problem with this configuration is the redundancy of seats; one as part of the monolithic shell, and one as a seat only.

States review and regulate restraint age limits and weight requirements. With continuing age and weight increases for recommendations in child restraint safety, a variety of restraint sizes are needed to accommodate the increasing span of children needing car seat safety restraints. The shoulder height and proper placement of belt paths are critical to the safety function of car seat restraints. As the child grows the headrest area needs to accommodate their body size and move up as they grow. Some seats are used for more than one child and the head rest area needs to move up and down to fit properly with each child. Purchasing new seats as the child grows is a costly alternative. Some seats on the market have

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up and down head rest adjustment but they are not always obvious or easy to operate. One example of a car seat having an adjustable head rest can be found in U.S. Pat. No. 6,623, 074, granted to Ronald Asbach on Sep. 23, 2003, wherein the head rest is vertically movable on the seat back with the harness straps passing through the head rest to be adjustable therewith. Another example can be found in U.S. Patent Application Publication No. 2005/0225136, filed by William Horton and published on Oct. 13, 2005, in which the head rest is vertically adjustable relative to the seat back.

In these prior art devices, the overall length of the harness belt changes with the positional adjustment of the head rest and the appropriate relocating of the harness belt path to match the adjusted position of the head rest. To accommodate the changes in harness belt length, the car seat is provided with a belt length adjustment mechanism, usually located at the lower front portion of the car seat apparatus. Each time the position of the head rest is adjusted, the belt length adjustment needs to be manipulated to correct the length of the harness belt for proper fit of the harness on the child.

The movement of the head rest relative to the seat back or the bottom of the seat is accomplished in each of the different structural configurations within the above-identified prior art car seats though a linearly shape track. As the head rest is moved from a lowermost position to the highest position, the top portion of the head rest simply extends linearly away from the bottom of the car seat. When the seat is reclined, the head rest, of course, tips rearwardly, assuming that the car seat is placed into a forward facing orientation. This structural configuration can result in an interference between the top portion of the head rest and top of the vehicle seat, or the vehicle head rest at the top of the vehicle seat. Accordingly, it would be desirable to provide a head rest adjustment mechanism that would be operable to provide an improved clearance between the top of the car seat head rest and the top portions of the vehicle seat when the seat is reclined and the head rest is positionally elevated.

It would also be desirable to provide a harness support apparatus cooperable with an adjustable head rest for a car seat so that the overall length of the harness belt remains unchanged irrespective of the position at which the head rest is adjusted.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a car seat for transporting children in an automobile that has a positionally adjustable head rest cooperable with a movable harness that relocates in response to the positional adjustment of the head rest.

It is another object of this invention to provide a support apparatus for the harness that will move in conjunction with the movement of the head rest on a child's car seat so that the overall length of the harness belt does not require substantial adjustment when the head rest is re-positioned.

It is a feature of this invention that the harness belt passes through a guide member that directs the path of the belt from behind the seat back through an opening in the seat back to engage the child in the car seat.

It is an advantage of this invention that the guide member is located relative to the head rest to correspond to being at the shoulder of the child seated in the car seat when the head rest is properly positioned.

It is another feature of this invention that the harness belt passes over a fixed guide bar located at the top of the seat

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frame so that the length of the harness belt does not effectively vary when the guide members are relocated with the positioning of the head rest.

It is another advantage of this invention that the vertically positionable head rest and harness will adjust positionally to the size of the child being transported on the car seat.

It is still another advantage of this invention that the fixed guide bar can be designed to increase the resistance of the harness to restrain a child during crash events.

It is still another object of this invention to provide a head rest for a car seat that moves generally vertically relative to the seat back of the car seat along a curved track.

It is still another feature of this invention that the arcuate track of movement for the head rest moves the head rest inwardly as the head rest moves upwardly.

It is yet another advantage of this invention that the curved back surface for the movement of the head rest creates a more vertical seat back angle for the older children being seated in a properly positioned car seat.

It is yet another feature of this invention that the curved track for the movement of the head rest is concave from the aspect of child seating on the car seat.

It is a further advantage of this invention that the curved track for the positional adjustment of the head rest reduces the possibility of interference between a raised head rest and the top portion of the vehicle seat on which the car seat is located.

It is still another feature of this invention that the curved track seat back surface on which the head rest moves vertically provides a more reclined back angle for a small child, while providing a more upright back angle for an older child.

It is yet another object of this invention to provide an adjustable head rest and harness apparatus for a car seat which is durable in construction, inexpensive of manufacture, care-free of maintenance, facile in assemblage, and simple and effective in use.

These and other objects, features and advantages are accomplished according to the instant invention by providing a car seat having a vertically adjustable head rest and harness support apparatus that will properly locate the position of the harness relative to the child in response to the positioning of the head rest. The head rest is movable along a curved track to provide a more reclined back angle for a small child and a more upright back angle for an older child. The harness belt is trapped in a length adjustment lock and follows a path that extends around a fixed guide bar at the top of the car seat frame then downwardly through a guide member that directs the belt through an opening in the seat back for engagement with the child. The guide member is supported on a harness control tube that engages a rack device to fix the position of the harness control tube when the position of the head rest is selected.

BRIEF DESCRIPTION OF THE DRAWINGS

The advantages of this invention will be apparent upon consideration of the following detailed disclosure of the invention, especially when taken in conjunction with the accompanying drawings wherein:

FIG. 1 is an upper, front perspective view of a base member, incorporating the principles of the instant invention, mounted on a representative vehicle seat, shown in phantom;

FIG. 2 is a left side elevational view of the base member shown in FIG. 1, the representative vehicle seat being shown in phantom;

FIG. 3 is a front elevational view of the base member shown in FIG. 1;

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FIG. 4 is an upper, front perspective view, similar to that of FIG. 1, but showing a seat member incorporating the principles of the instant invention mounted on the base member in a forward facing orientation with the seat positioned in a fully upright position, the representative vehicle seat being shown in phantom;

FIG. 5 is a left side elevational view of the seat mounted on the base member, as shown in FIG. 4, the representative vehicle seat being shown in phantom;

FIG. 6 is a front elevational view of the seat mounted on the base member, as depicted in FIGS. 4 and 5;

FIG. 7 is a left side elevational view similar to that of FIG. 5, but showing the forward facing seat member in a reclined position relative to the base member;

FIG. 8 is a front elevational view of the reclined seat member shown in FIG. 7, the representative vehicle seat being shown in phantom;

FIG. 9 is an enlarged front elevational view of the car seat incorporating the principles of the instant invention, the head rest being moved into a mid-range raised position;

FIG. 10 is a cross-sectional view of the car seat corresponding to lines 10-10 of FIG. 9 to depict the head rest adjustment mechanism and the harness support apparatus incorporating the principles of the instant invention, the head rest being moved to the fully raised position;

FIG. 11 is a rear elevational view of the car seat depicted in FIG. 9 with the seat member being moved into a reclined position, the head rest being located in the fully raised position;

FIG. 12 is a cross-sectional view of the car seat corresponding to lines 12-12 of FIG. 11;

FIG. 13 is a front elevational view of the car seat in an upright orientation with the head rest moved into a mid-range position;

FIG. 14 is a cross-sectional view of the car seat corresponding to lines 14-14 of FIG. 13, the movement of the head rest from a mid-range raised position to a fully raised position being shown in phantom;

FIG. 15 is a cross-sectional view similar to that of FIG. 14, but showing the seat member moved into a rearwardly-facing orientation, the head rest being shown in the fully raised position, although a lowermost position of the head rest would be utilized when the seat member is rear-facing due to the small size of the child;

FIG. 16 is a cross-sectional view opposite of the view shown in FIG. 14, but depicted in a perspective orientation, with the seat member being re-configured on the base member to be in a rearwardly-facing configuration and the head rest being placed in the fully raised position;

FIG. 17 is an enlarged partial perspective view of the harness control apparatus as shown in FIG. 16, the movement of the harness guide member to the lowermost position being shown in phantom;

FIG. 18 is an enlarged partial cross-sectional view of the seat member showing the harness belt path in the fully raised position as depicted in FIG. 16, the belt path corresponding to a relocation of the head rest to a mid-range position being shown in phantom;

FIG. 19 is an enlarged partial cross-sectional view of the lock mechanism for the head rest with the lock bar depicted in an unlatched orientation while moving between one notch in the control rack to another;

FIG. 20 is rear elevational view of the seat member with the protective panel removed therefrom to show the lock mechanism for the head rest, the head rest being depicted in the fully raised position; and

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FIG. 21 is a rear elevational view of the seat member similar to that of FIG. 20, but with the head rest being lowered to a mid-range position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1-8, a car seat incorporating the principles of the instant invention can best be seen. The car seat 10 can be configured in a number of different positions, as will be described in greater detail below, and is formed of a seat member 30 detachably mounted on a base member 20. As is best seen in FIGS. 1-3, the base member 20 is a separate member that is affixed to a vehicle seat 15, representatively shown in phantom, by the seat belt 17 of the vehicle. The vehicle seat belt 17 is pulled through a first side opening 22, across a seat belt latch member 23 and out through the second side opening 22 to be connected to the vehicle seat belt latch member (not shown) and pull tight to capture the base member 20 on the vehicle seat 15. The seat belt latch member 23 secures the vehicle seat belt 17 to the base member 20 and is selectively movable to release the vehicle seat belt 17 from engagement with the base member 20.

The base member is formed with a central rack member 25 having a plurality of parallel, horizontally disposed notches 26 to receive the recline latch apparatus 33, which include a transverse bar 33a that rests in one of the notches 26, on the seat member 30 to change the position of the seat member 30 on the base member 20. The base member is also formed with two pairs of opposing recline control slots 27, 28 into which retractable latch pins 65 are engagable to secure the seat member 30 to the base member 20. The lower recline control slots 27 is positioned at a forward portion of the base member 20 and is oriented generally horizontally. The upper recline control slots 28 are located at a rearward portion of the base member 20, but are oriented at an inclined angle compared to the lower recline control slots 27. As a result, the rearward portion of the seat member 30 will lower as the forward portion of the seat member 30 moves forwardly to create a reclined orientation for the seat member 30. The upright configuration of the seat member 30, corresponding to the latch pins 65 being positioned in the rearwardmost portions of the recline control slots 27, 28, is shown in FIGS. 4-6, while the recline configuration of the seat member 30, corresponding to the latch pins 65 being positioned in the forwardmost portions of the recline control slots 27, 28, is depicted in FIGS. 7 and 8.

The seat member 30 can be mounted onto the base member 20 in either a forward-facing orientation, such as is depicted in FIG. 4, or in a rearwardly-facing orientation, as is shown in FIGS. 15 and 16. The seat member 30 includes two pairs of latch pins 65 that are retractable in conjunction with the movement of the actuator handle 61 located in a forward part of the seat portion of the seat member 30. The movement of the actuator handle 61 is operable to cause a retraction of the latch pins 65 into the body of the seat member 30 until the seat member 30 is properly positioned onto the base member 20, whereupon the latch pins 65 are allowed to extend into the respective lower and upper recline slots 27, 28 to trap the seat member 30 on the base member 20. The positioning of the seat member 30 onto the base member 29 places the recline latch apparatus 33 into engagement with the recline rack 25 to prevent the latch pins 65 from sliding along the corresponding recline control slots 27, 28.

As seen in FIGS. 9-18, the seat member 30 includes a head rest 35 formed with slide members 37 that are generally vertically movable along a curved, concave path along the

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seat back 32 defined by concave curved tracks 36 formed on the back side of the seat back 32. Thus, as the head rest 35 is raised, the top portion of the head rest 35 moves inwardly toward the front of the seat member 30 providing a more upright back angle for the child as the child gets older and larger, requiring the upward movement of the head rest 35. The back portion of the seat member 30 has a control rack 38 formed into the curved track 36 and defining a plurality of vertically spaced notches 39 corresponding to different vertical positions for the head rest 35. The head rest 35 is connected to a lock mechanism 40 that engages the control rack 38. The lock mechanism 40 includes a lock bar 42 that rests in a selected notch 39 and is spring-loaded into engagement with the control rack 38. An actuation handle 44 is operatively connected to the pivot lever 43 on the lock mechanism 40 to force the lock bar 42 out of engagement with the control rack 38 to enable the head rest 35 to be moved vertically.

The lock mechanism 40 includes a pair of laterally spaced guide members 46 that define openings 47 that are oriented generally horizontally. The guide member 46 controls the position of the harness belt 50 relative to the shoulders of the child seated in the car seat 10 and raises and lowers in response to the position of the lock mechanism 40 and the attached head rest 35. Thus, when the head rest 35 is raised along the curved track 36, the guide members 46 move accordingly and position the harness belt 50 to pass from behind the curved seat back 32 through openings in the seat back 32 to the front of the seat back 32 for engagement with the child seated on the car seat 10.

The harness support apparatus 45 includes a fixed guide bar 49 mounted within the seat back 32 above the control rack 38. The harness belt 50 is trapped in a conventional length adjustment device 52 at the lower front portion of the seat member 30. From the length adjustment device 52, the harness belt 50 passes underneath the seat portion of the seat member 30 and through the structure of the seat member 30 behind the seat back 32 and the control rack 38 to the fixed guide bar 49. The harness belt 50 loops over the fixed guide bar 49 and passes downwardly to the lock mechanism 40 behind the lock bar 42 and then through the guide members 46 to exit through the outlet openings 47 to extend to the front of the seat back 32. The harness belt 50 is secured to the seat member 30 in a conventional manner. The use of the fixed guide bar 49 secured to the frame of the seat back 32 provides an opportunity to use a metal rod that will increase the resistance of the harness belt 50 to pull out of the car seat 10 during crash events. Furthermore, the amount of bending of the fixed guide rod 49 can be used to evaluate the stresses incurred during a crash event and provide a positive indicator that a car seat 10 has been subjected to a crash event.

Referring now to FIGS. 17-21, the guide members 46 define a curved path through which the harness belt 50 is fed to change the direction of the harness belt 50 from a generally vertical inlet 48 to a generally horizontal outlet opening 47 wrapped around the lock bar 42. The guide members 46 are aligned with the generally vertical openings 55 formed in the seat back 32 so that the harness belts 50 can move vertically with the head rest 35 without impediment from the seat back 32. Soft goods (not shown), i.e. the padded covering over the seating surface of the seat member 30, are formed with corresponding openings therein to allow the passage of the harness belts 50 from the outlet openings 47 over the shoulders of the child seated in the seat member 30. The lock bar 42 extends through the guide members 46 to opposing sides thereof for pivotal actuation by the actuation handle 44 at the top of the head rest. The lock bar 42 extending between the

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guide members 46 is engagable with the control rack 38 to lock the head rest 35 the desired position.

To adjust the position of the head rest 35, the actuation handle 44 is retracted into the head rest 35, as is depicted in FIG. 21 to push the pivot lever 43 through a linkage 41 to release the lock bar 42 from the notch 39 and allow the lock bar 42 to move along the control rack 38 until the desired position is attained for the head rest 35. As the guide members 46 are moved vertically with the head rest 35, the guide members 46 simply slide along the harness belt 50 as the guide members 46 move to the selected vertical position. When the lock bar 42 is re-engaged with a selected notch 39 in the control rack 38, the overall length of the harness belt 50 did not substantially change due to the looping of the harness belt 50 over the fixed guide bar 49, even though the position at which the harness belt 50 transitions from behind the seat back 32 to in front of the seat back 32 changes in response to the positioning of the head rest 35. The head rest 35 is locked into the newly selected position by retracting the actuation handle 44 into the head rest 35, as depicted in FIG. 21, to drive the lock bar 42 into a corresponding notch 39 in the control rack 38.

As is best seen in FIGS. 20 and 21, the openings 55 are somewhat trapezoidal in shape, wider at the top and narrower at the bottom, so that the guide members 46 can move laterally along the lock bar 42 to move outwardly as the head rest is raised to accommodate the wider body of a growing child. The outside edge of each opening 55 is formed with a cam flange 56 that projects generally perpendicularly to the seat back 32 and is engagable with a follower 59 mounted on the guide member 46 to force the guide member 46 laterally on the lock bar 32 in response to the selected vertical position of the head rest 35.

It will be understood that changes in the details, materials, steps and arrangements of parts which have been described and illustrated to explain the nature of the invention will occur to and may be made by those skilled in the art upon a reading of this disclosure within the principles and scope of the invention. The foregoing description illustrates the preferred embodiment of the invention; however, concepts, as based upon the description, may be employed in other embodiments without departing from the scope of the invention.

Having thus described the invention, what is claimed is:

1. A car seat for transporting a child in an automobile, comprising:

a seat member including a seat back having a front surface and a rear surface, said seat back including at least one track member and a control rack formed with a plurality of generally vertically spaced notches located on said rear surface;

a head rest extending above said seat member and including at least one slide member in register with the corresponding said track member to be engaged therewith for selective movement of said head rest relative to said seat back between a plurality of generally vertical positions;

a locking mechanism pivotally mounted on said head rest to engage said control rack to secure said head rest into a selected said vertical position, said locking mechanism including a lock bar that can be pivoted into engagement with a selected one of said notches to fix said head rest in the corresponding selected vertical position; and

said seat back being formed with a pair of laterally spaced openings therethrough, said locking mechanism including a pair of guide members mounted on said lock bar in communication with said openings and positioned along said rear surface of said seat back; and

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a fixed guide bar mounted in said seat back above said openings, said harness belt extending from an anchor point and being wrapped over said fixed guide bar and extending therefrom to the corresponding said guide member to direct said harness belt from a position behind said seat back through a generally horizontally oriented outlet in said guide member to pass through said openings in said seat back to a position in front of said seat back for support of the child positioned in said car seat, said harness being positionally adjustable in conjunction with vertical movement of said lock bar with said head rest.

2. The car seat of claim 1 wherein each of said openings are formed with a cam flange along one vertical edge thereof, each said guide member including a follower engaged with the corresponding said cam flange.

3. The car seat of claim 2 wherein said openings are trapezoidal in shape with the corresponding said cam flange being oriented at an angle to a vertical alignment, said guide members being slidably mounted on said lock bar to move laterally in response to the selected vertical position of said head rest.

4. The car seat of claim 1 further comprising an actuation device mounted on said head rest and movable therewith, said actuation device being connected to said locking mechanism to cause said locking mechanism to pivotally move said lock bar out of engagement with said selected one of said notches in said control rack and permit movement of said head rest relative to said seat back.

5. The car seat of claim 1 wherein said at least one track member is curved forming a concave configuration relative to a position forwardly of said seat back.

6. The car seat of claim 5 wherein said at least one track member comprises a pair of laterally spaced track members engaged by a corresponding pair of slide members, said control rack being located between said track members.

7. In a car seat having a seat back and a head rest supported on said seat back for generally vertical movement relative to said seat back, the improvement comprising:

said seat back including at least one curved track member forming a concave configuration relative to a position forwardly of said seat back, said seat back being formed with a pair of laterally spaced openings therethrough, each said opening being formed with a cam flange along one edge thereof that is oriented at an acute angle from a vertical orientation; and

said head rest including at least one slide member in register with the corresponding said track member for selective vertical movement of said head rest relative to said seat back, the movement of said head rest upwardly relative to said seat back affecting a forward movement of a top portion of said head rest relative to said seat back;

a fixed guide bar mounted in said seat back above said openings; and

a pair of harness belts extending from an anchor point and being wrapped over said fixed guide bar and extending therefrom through respective said openings to direct said harness belts from a position behind said seat back to a position in front of said seat back for support of the child positioned in said car seat, each said harness belt being associated with a follower engaged with the corresponding said cam flange so that said harness belts will move laterally as said head rest is moved vertically.

8. The car seat of claim 7 wherein each said follower is mounted on a guide member engaged by a corresponding said harness belt to direct the corresponding said harness belt through the corresponding said opening in said seat back.

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9. A car seat for transporting a child in an automobile and having a seat back on which a head rest is mounted for generally vertical movement relative to said seat back said seat back including harness belts positionable for support of the child within said car seat, comprising:

said seat back being formed with a pair of laterally spaced openings therethrough;

said head rest including a movable guide bar positioned in register with said openings and being vertically movable along said openings in response to a corresponding vertical movement of said head rest relative to said seat back, said movable guide bar member being operable to direct said harness belt through the openings in said seat back;

a fixed guide bar mounted in said seat back above said openings; and

said harness belts extending from an anchor point and being wrapped over said fixed guide bar and extending therefrom to said movable guide bar to be directed through said openings and extend forwardly of said seat back for engagement with the child in said car seat, such that the vertical movement of said movable guide bar redirects the positioning of the corresponding said harness belts.

10. The car seat of claim 9 wherein the engagement of said harness belts with said fixed and movable guide bars allows said harness belt to be moved vertically with said head rest without substantially changing an overall length of said harness belts.

11. The car seat of claim 10 wherein each said opening is trapezoidal in shape and formed with a cam flange along one vertical edge thereof oriented at an angle to a vertical alignment, each said guide member being slidably mounted on said movable guide bar and including a follower engaged with the corresponding said cam flange so that said guide members will move laterally in response to the vertical movement of said head rest relative to said seat back.

12. The car seat of claim 11 wherein said seat back is also formed with a control rack formed with a plurality of generally vertically spaced notches, said head rest including a locking mechanism operable to engage said control rack to secure said head rest into a selected said vertical position, said locking mechanism including said movable guide bar which is operable to engage a selected one of said notches to fix said head rest in the corresponding selected vertical position.

13. The car seat of claim 12 wherein said seat back includes a pair of laterally spaced curved track members forming a concave configuration relative to a position forwardly of said seat back, said head rest including a pair of corresponding slide members in register with the corresponding said track members to be engaged therewith for selective movement of said head rest between generally vertical positions, the move-

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ment of said head rest upwardly relative to said seat back affecting a forward movement of a top portion of said head rest relative to said seat back.

14. The car seat of claim 10 further comprising a pair of guide members mounted on said movable guide bar and being positioned in alignment with said openings to be vertically movable within said openings in response to the movement of said movable guide bar and said head rest, each said guide member being engaged with a corresponding one of said harness belts, each said guide member having an inlet oriented generally vertically and an outlet oriented generally horizontally to receive the corresponding said harness belt and direct said harness belt through the corresponding said opening in said seat back for support of the child positioned in said car seat.

15. A car seat for transporting a child in an automobile, comprising:

a seat member including a seat back having a front surface and a rear surface, said seat back including a control rack formed with a plurality of generally vertically spaced notches located on said rear surface;

a head rest movably mounted on said seat back;

a locking mechanism movably mounted on said head rest to engage said control rack to secure said head rest into a one of a plurality of selected vertical positions, said locking mechanism including a lock bar that can be pivoted into engagement with a selected one of said notches to fix said head rest in the corresponding selected vertical position, said seat back being formed with a pair of laterally spaced, trapezoid-shaped openings therethrough, said locking mechanism including a pair of guide members slidably mounted on said lock bar and being aligned with said openings; and

a fixed guide bar mounted in said seat back above said openings, each said harness belt extending from an anchor point and being wrapped over said fixed guide bar and extending therefrom to said guide members, each said guide member receiving a vertically oriented portion of the corresponding said harness belt behind said seat member to direct said harness belt in a generally horizontal direction through the corresponding said opening, said harness being positionally adjustable laterally and vertically within said openings in conjunction with vertical movement of said lock bar with said head rest.

16. The car seat of claim 15 further comprising a position control mechanism engagable with said guide members to affect lateral displacement of the guide members as the guide members are moved vertically for laterally moving said harness belts within said trapezoidal openings.

* * * * *

EXHIBIT B

(12) **United States Patent**
Hutchinson et al.

(10) **Patent No.:** **US 8,087,725 B2**
(45) **Date of Patent:** **Jan. 3, 2012**

(54) **HEAD REST AND HARNESS ADJUSTMENT FOR CHILD CAR SEAT**

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(73) Assignee: **Wonderland Nurserygoods Co., Ltd.**,
Taipei (TW)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 12/959,761

(22) Filed: **Dec. 3, 2010**

(65) **Prior Publication Data**

US 2011/0074193 A1 Mar. 31, 2011

Related U.S. Application Data

(63) Continuation of application No. 11/953,063, filed on Dec. 9, 2007, now Pat. No. 7,862,117.

(60) Provisional application No. 60/874,392, filed on Dec. 12, 2006.

(51) **Int. Cl.**
B60N 2/28 (2006.01)

(52) U.S. Cl. 297/250.1; 297/484

(58) **Field of Classification Search** 297/256.11,
297/256.1, 410, 253, 250.1, 484
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,754,999	A	7/1988	Kain	297/250
4,790,601	A *	12/1988	Burleigh et al.	297/484
4,858,997	A	8/1989	Shubin	297/487

6,030,047	A	2/2000	Kain	297/484
6,135,553	A	10/2000	Lovie	297/250.1
6,155,638	A	12/2000	Bapst	297/250.1
6,189,970	B1	2/2001	Rosko	297/250.1
6,273,509	B1 *	8/2001	Reithmeier et al.	297/410
6,398,302	B1	6/2002	Freedman	297/250.1
6,471,298	B2 *	10/2002	Carine et al.	297/483
6,491,348	B1	12/2002	Kain	297/484
6,623,074	B2	9/2003	Asbach	297/250.1
6,626,493	B2	9/2003	Kain	297/250.1
6,682,143	B2	1/2004	Amirault	297/250.1
6,688,685	B2	2/2004	Kain	297/250.1
6,779,843	B2	8/2004	Kain	297/250.1
7,021,710	B2	4/2006	Kain	297/256.11
7,669,926	B2 *	3/2010	Balensiefer	297/256.11
2004/0245821	A1 *	12/2004	Chen	297/250.1

(Continued)

FOREIGN PATENT DOCUMENTS

DE 10107874 9/2002

(Continued)

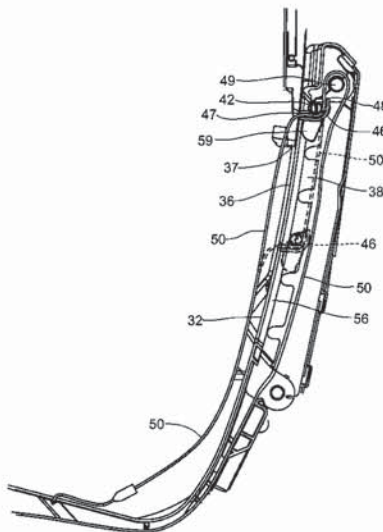
Primary Examiner — Peter R. Brown

(74) *Attorney, Agent, or Firm* — Miller Law Group, PLLC

(57) **ABSTRACT**

A car seat includes a vertically adjustable head rest and harness support apparatus that will properly locate the position of the harness relative to the child in response to the positioning of the head rest. The head rest is movable along a curved track to provide horizontal clearance with respect to the vehicle head rest when in a fully raised position. The harness belt is trapped in a length adjustment lock and follows a path that extends around a fixed guide bar at the top of the car seat frame then downwardly through a guide member that directs the belt through an opening in the seat back for engagement with the child. The guide member is supported on a harness control tube that engages a rack device to fix the position of the harness control tube when the position of the head rest is selected.

22 Claims, 17 Drawing Sheets



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U.S. PATENT DOCUMENTS

2005/0200177	A1	9/2005	Balenseifer	297/250.1	EP	1695865	8/2006
					JP	2008636	1/1990
2005/0225136	A1	10/2005	Horton	297/250.1	WO	2006015428	2/2006

FOREIGN PATENT DOCUMENTS

EP	1084900	3/2001	* cited by examiner
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Fig. 1

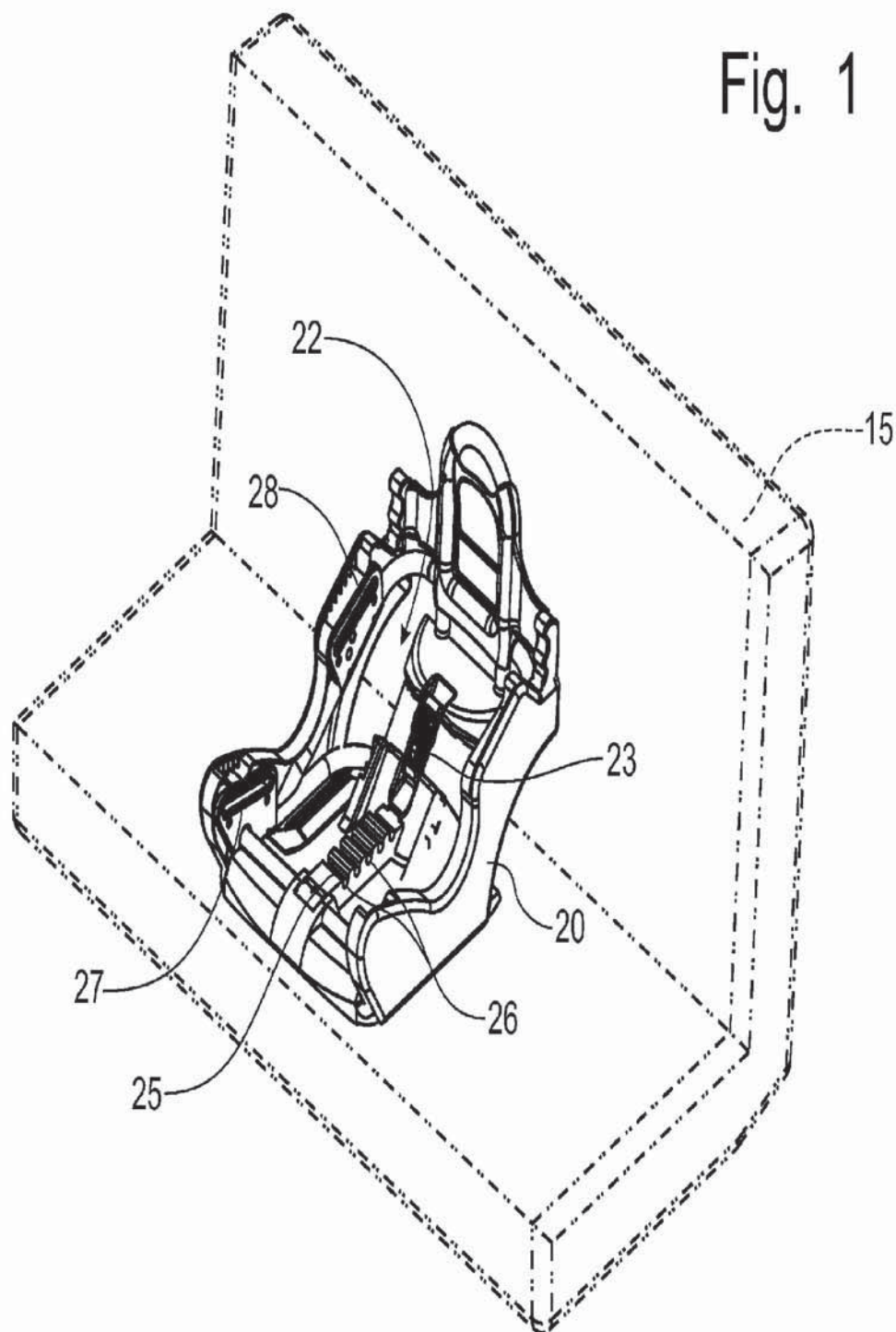


Fig. 2

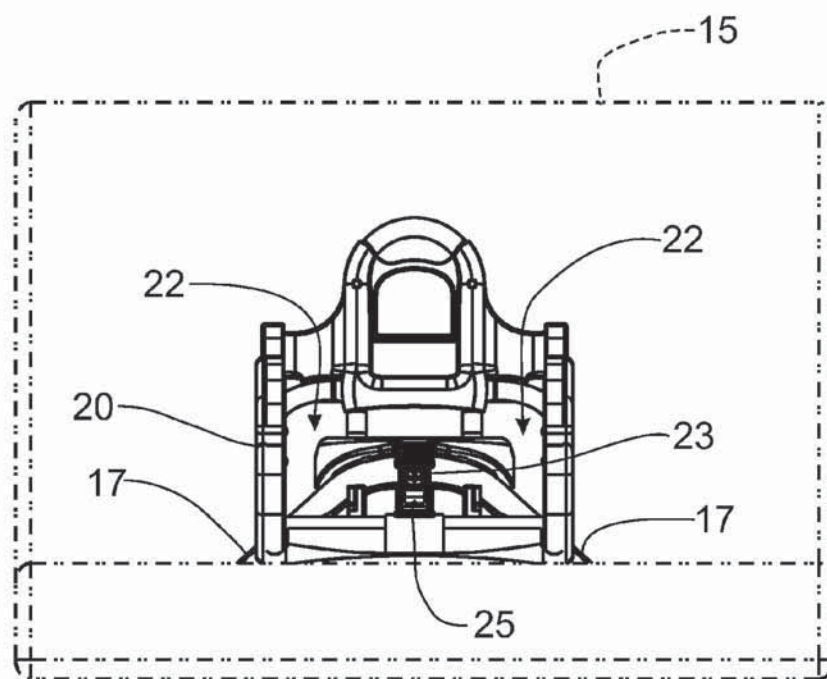
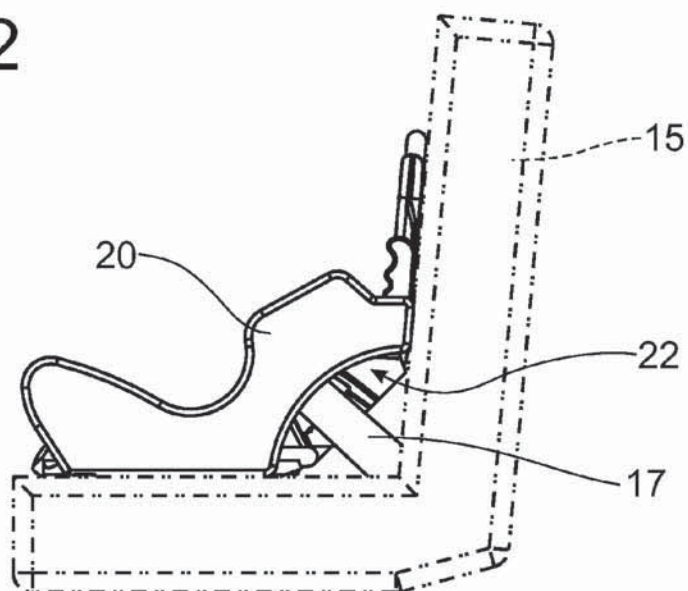


Fig. 3

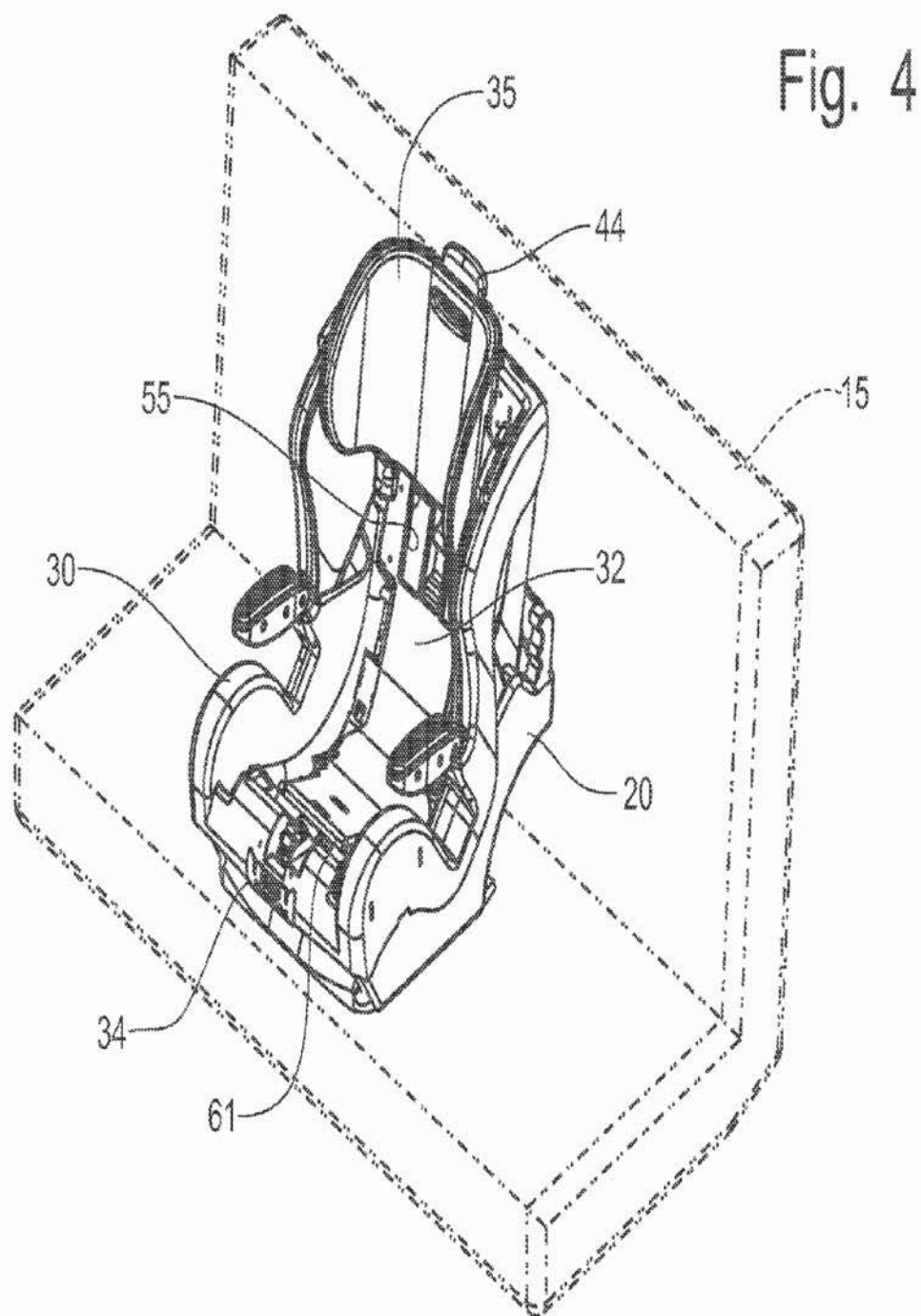


Fig. 5

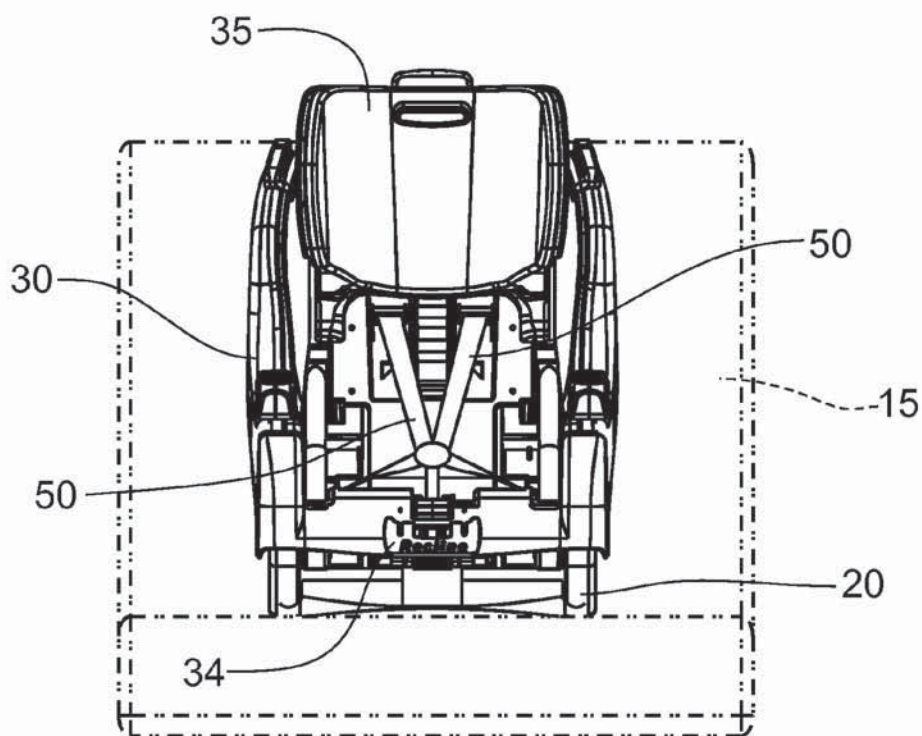
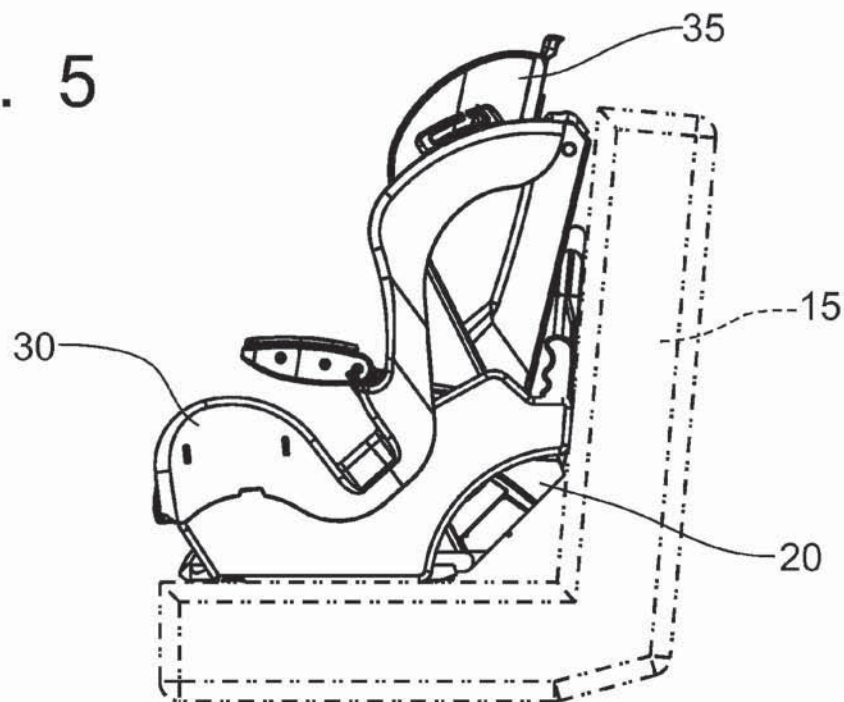


Fig. 6

Fig. 7

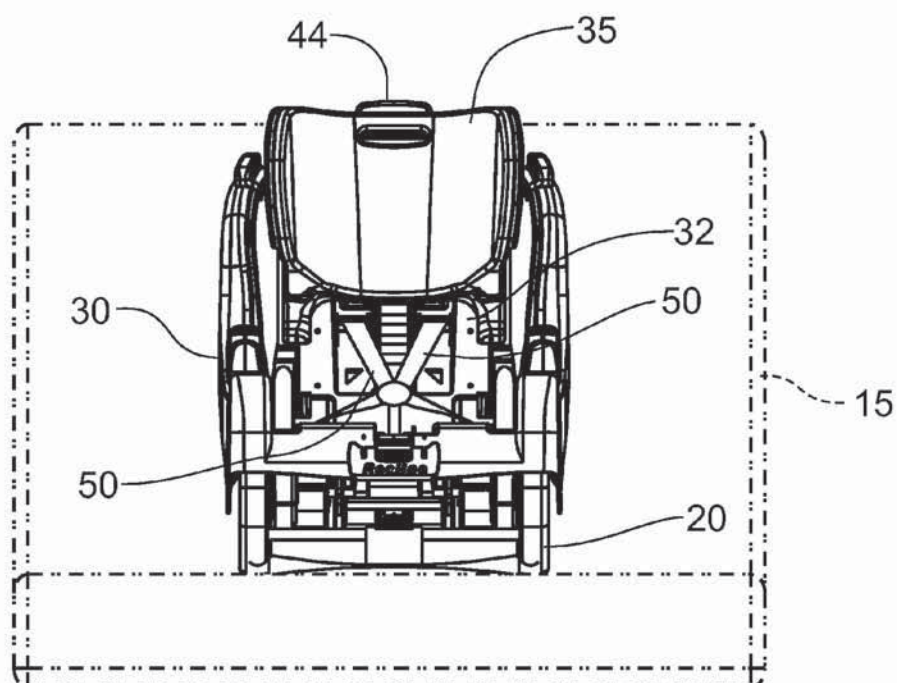
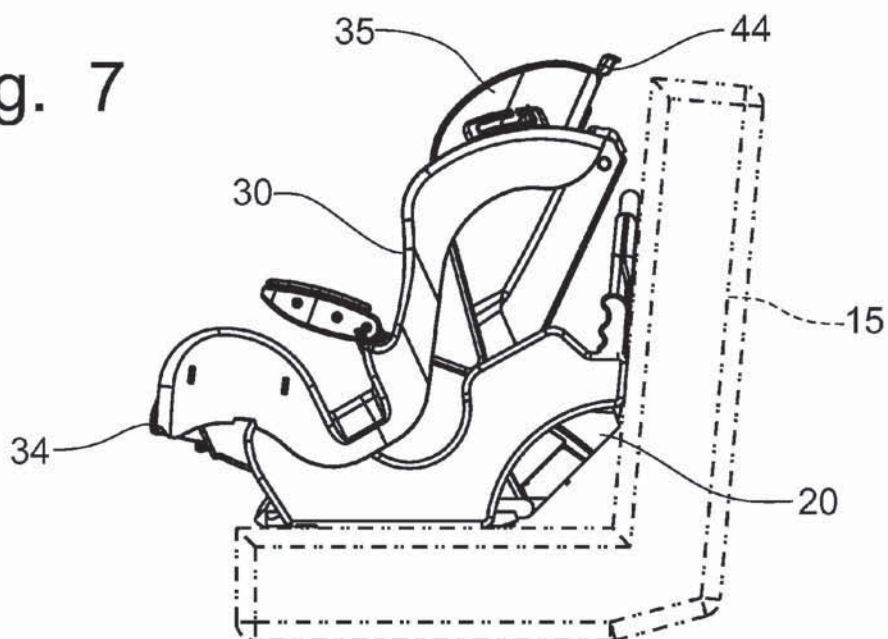


Fig. 8

Fig. 9

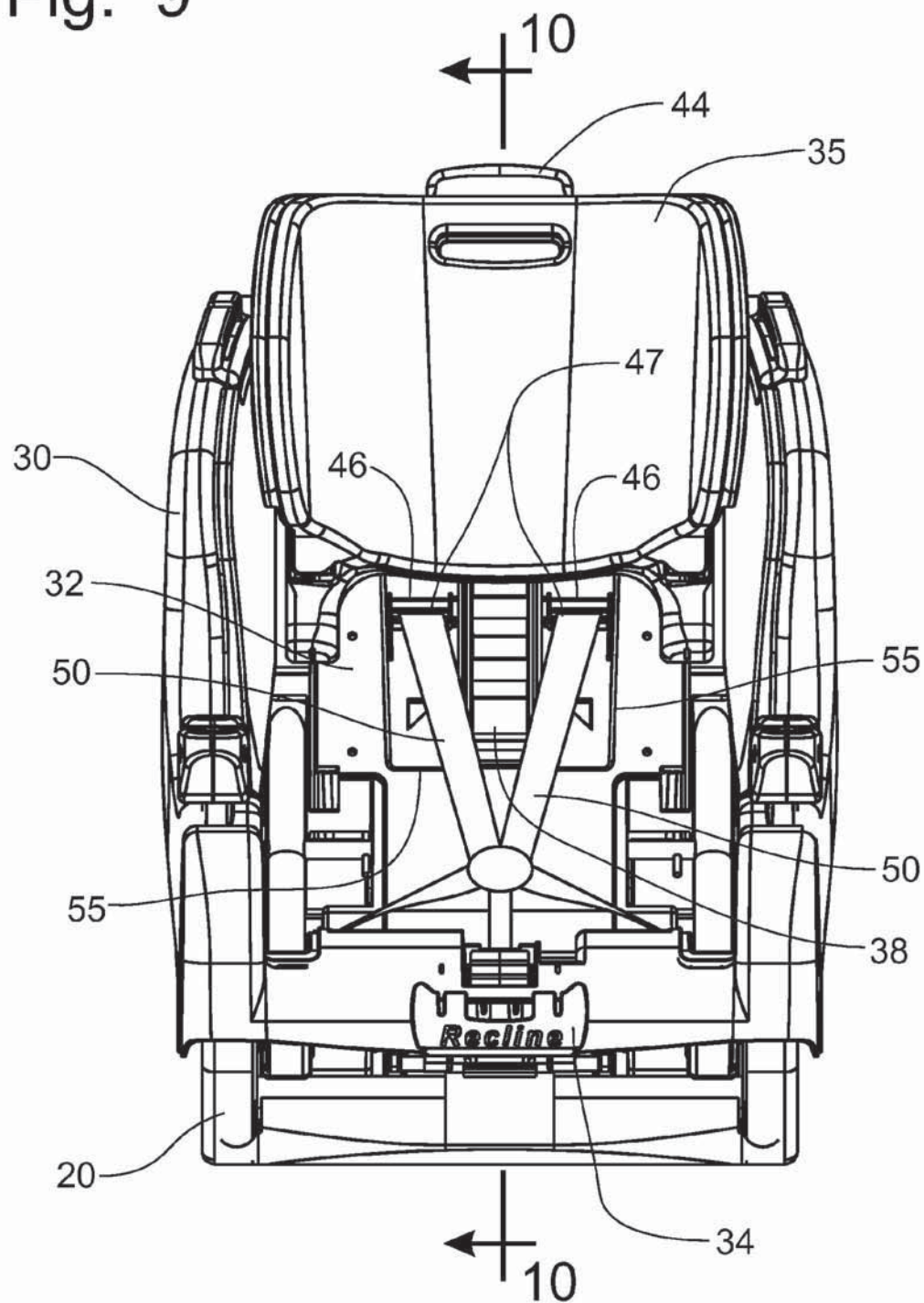


Fig. 10

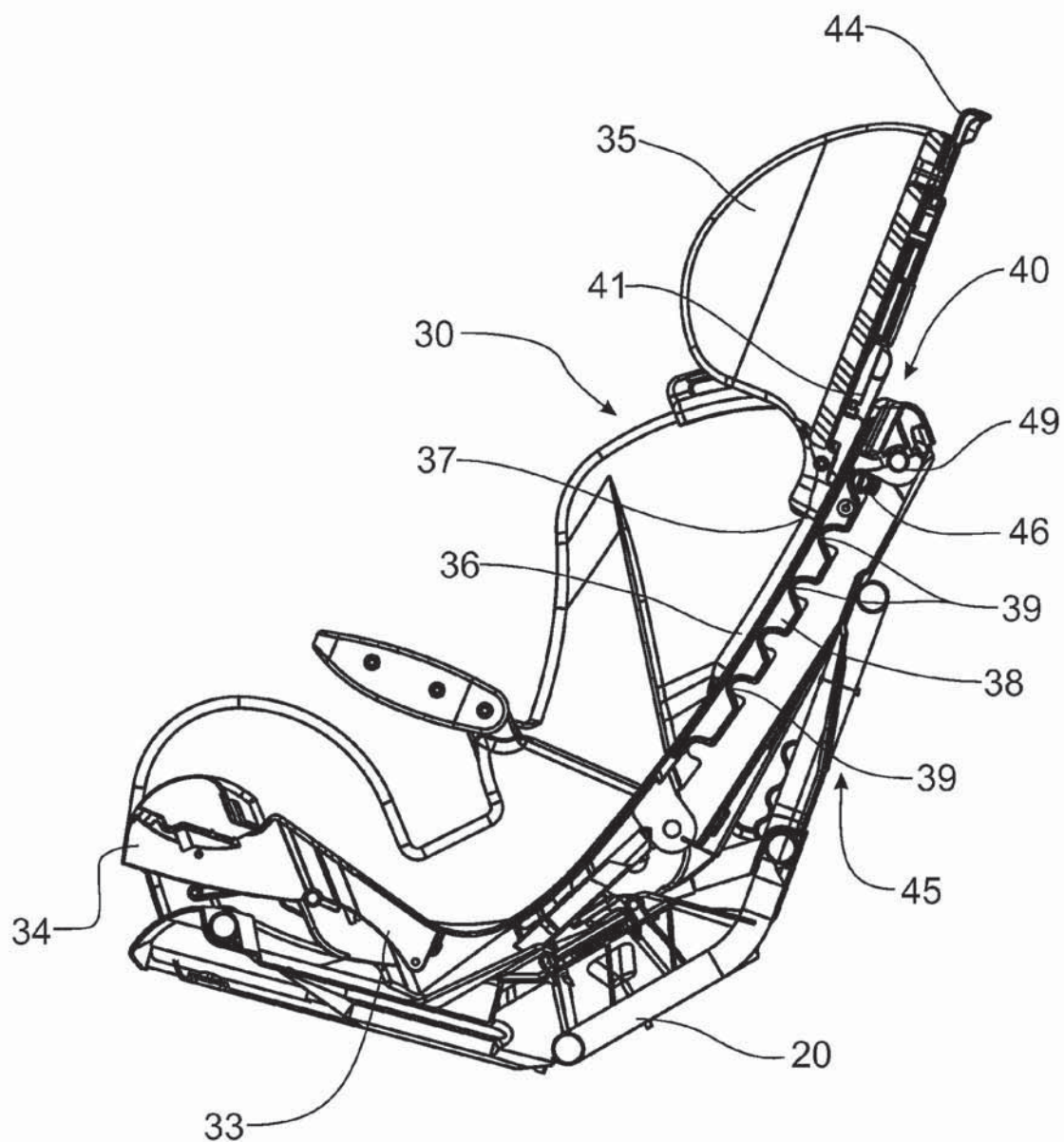


Fig. 11

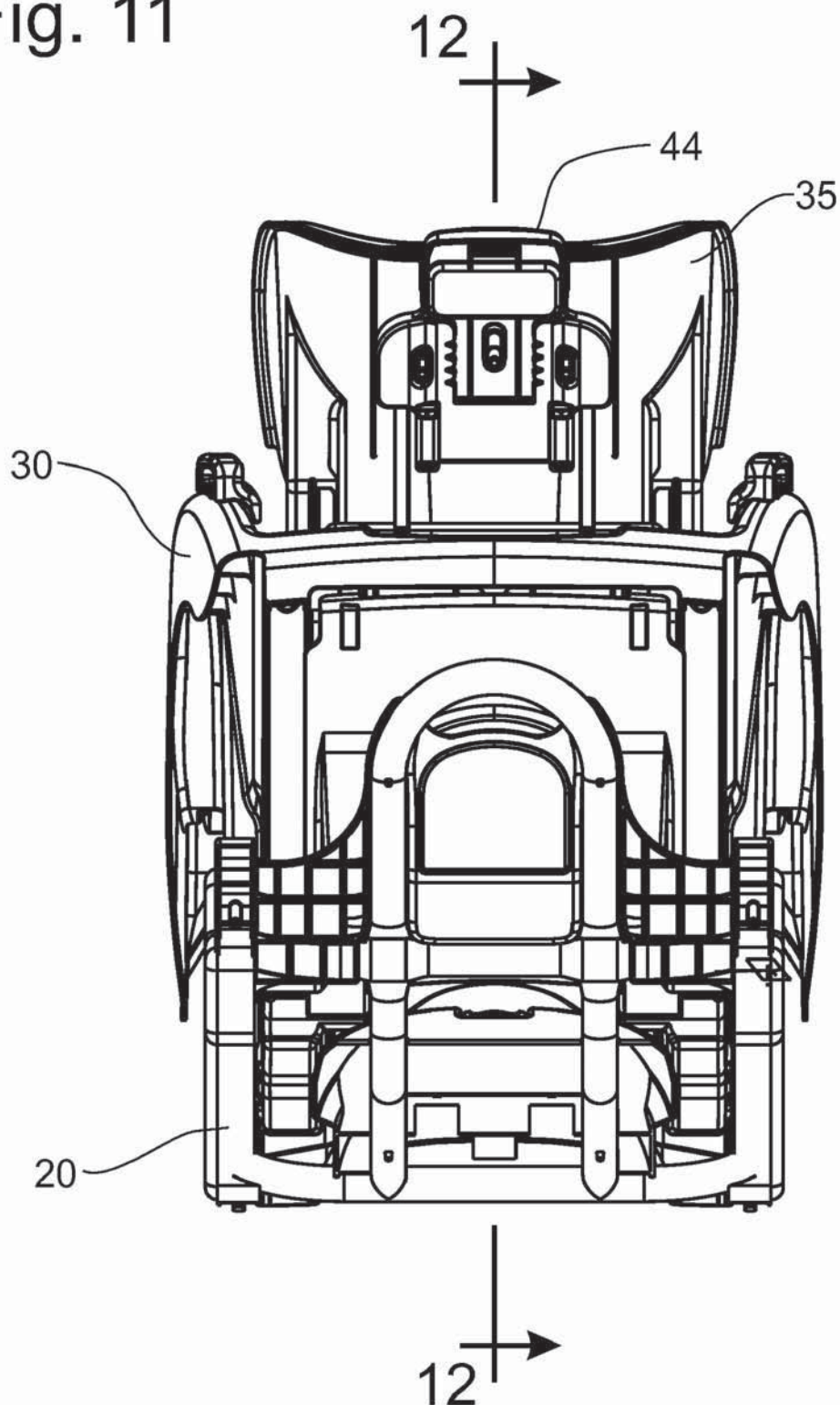


Fig. 12

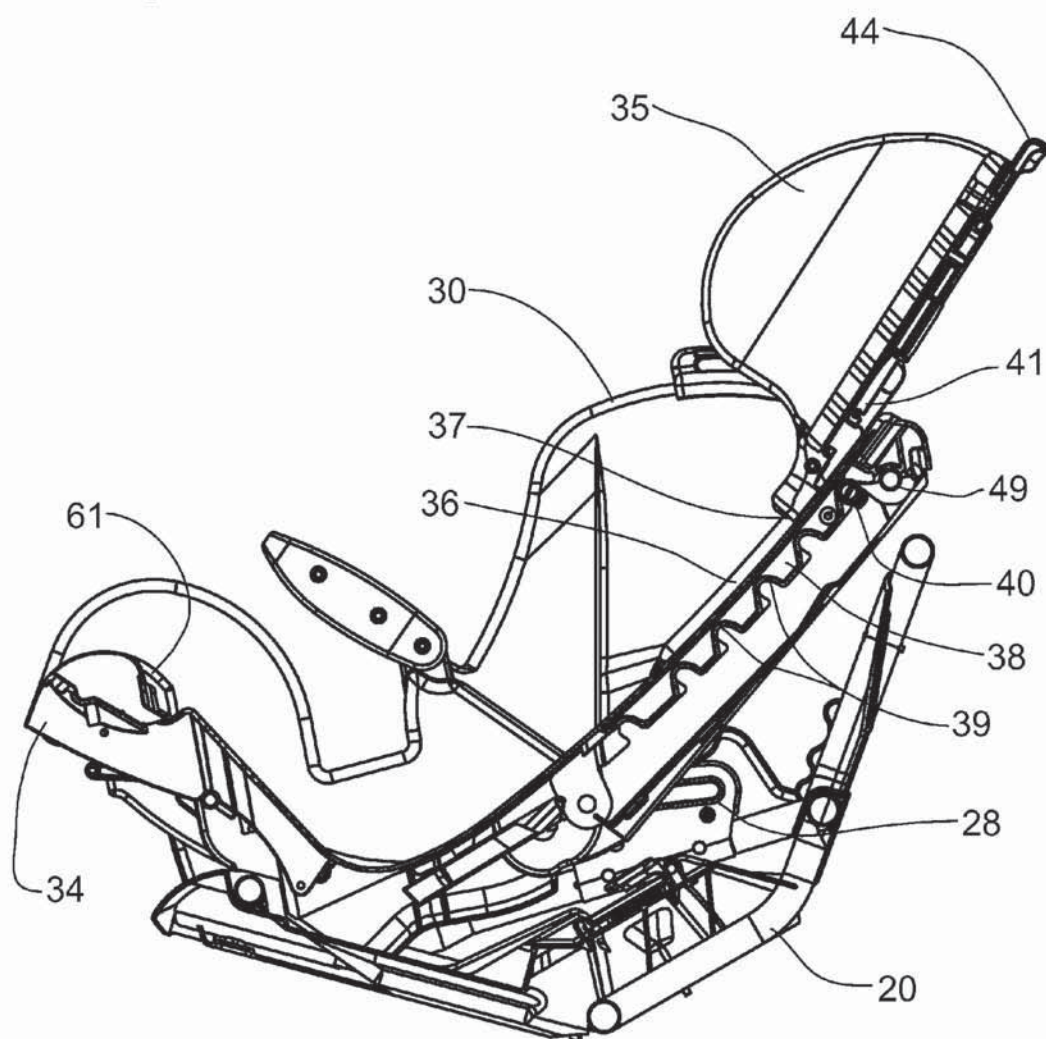


Fig. 13

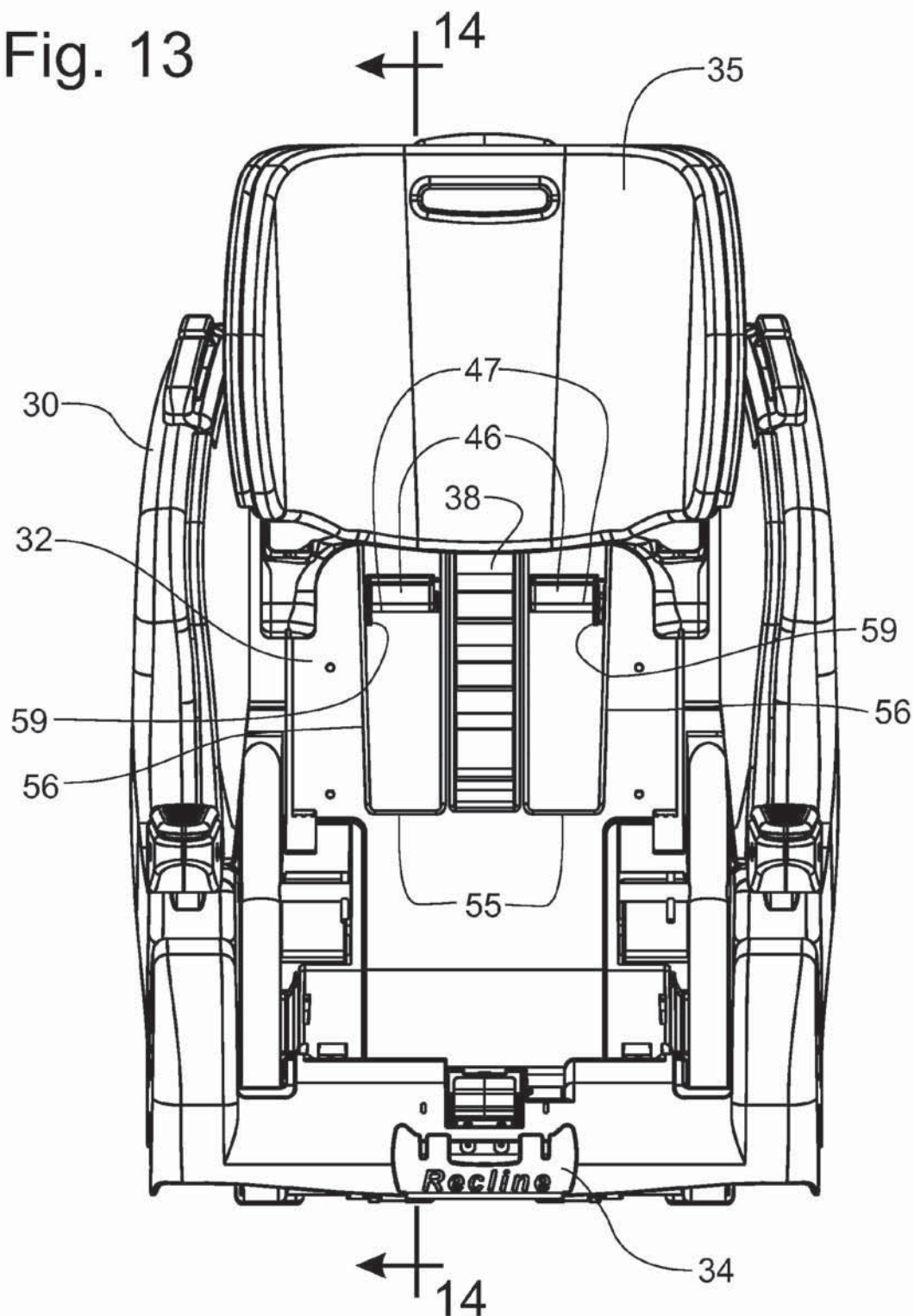


Fig. 14

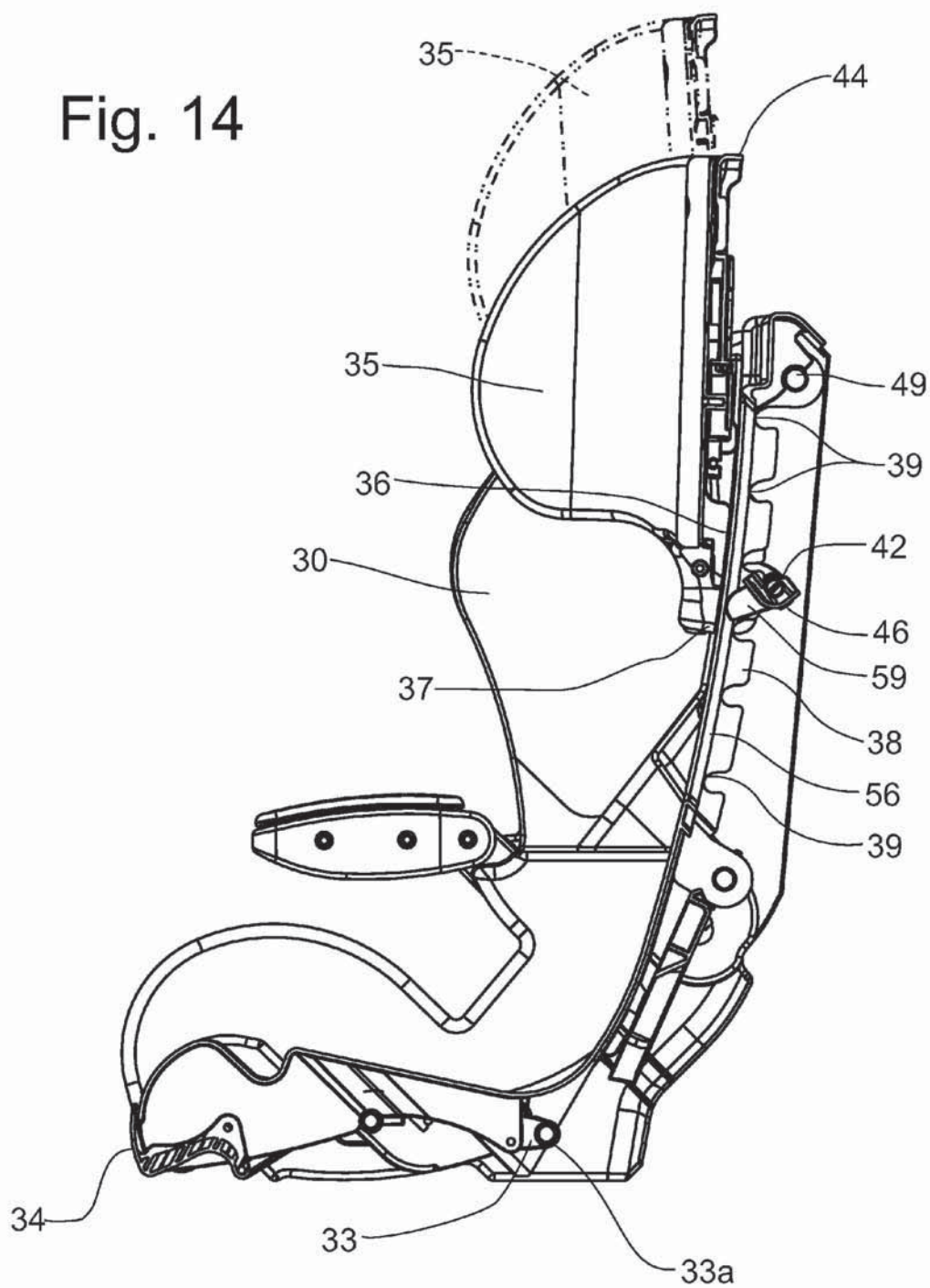


Fig. 15

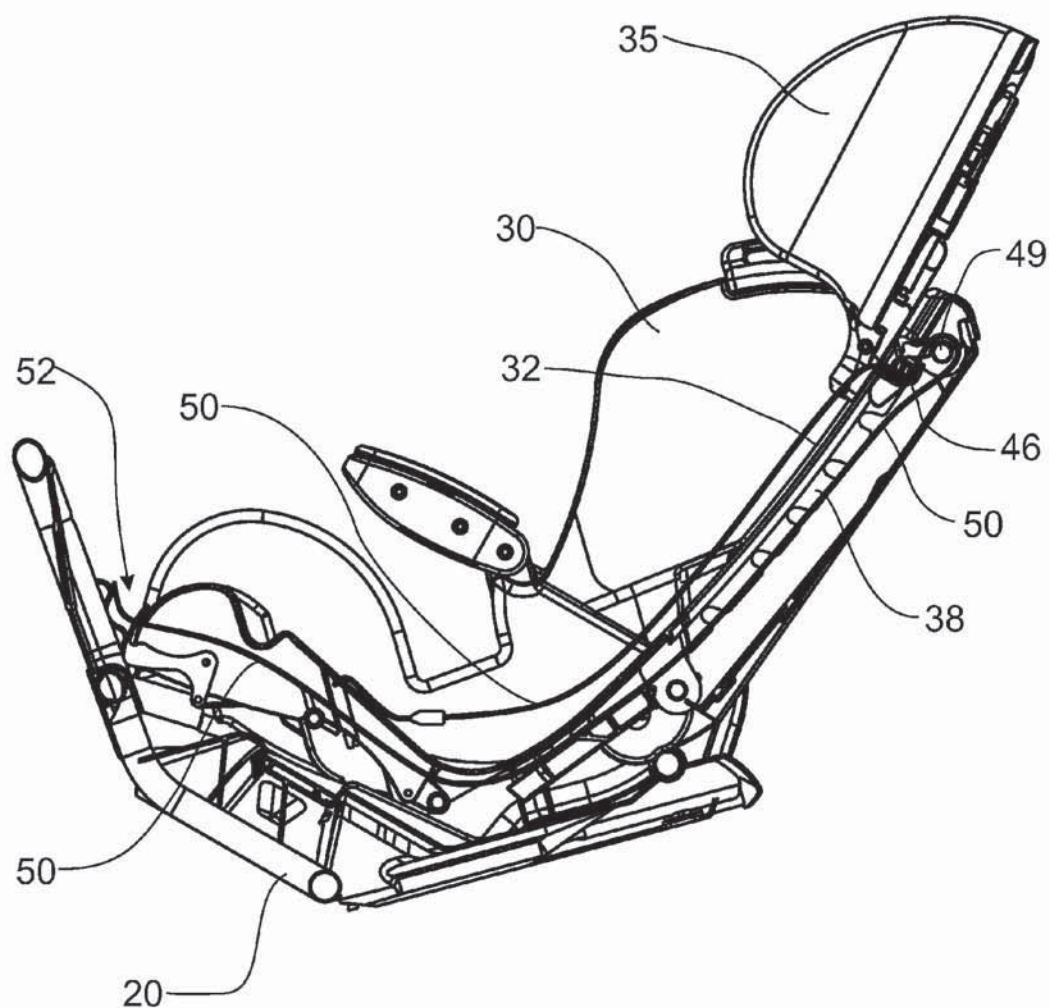
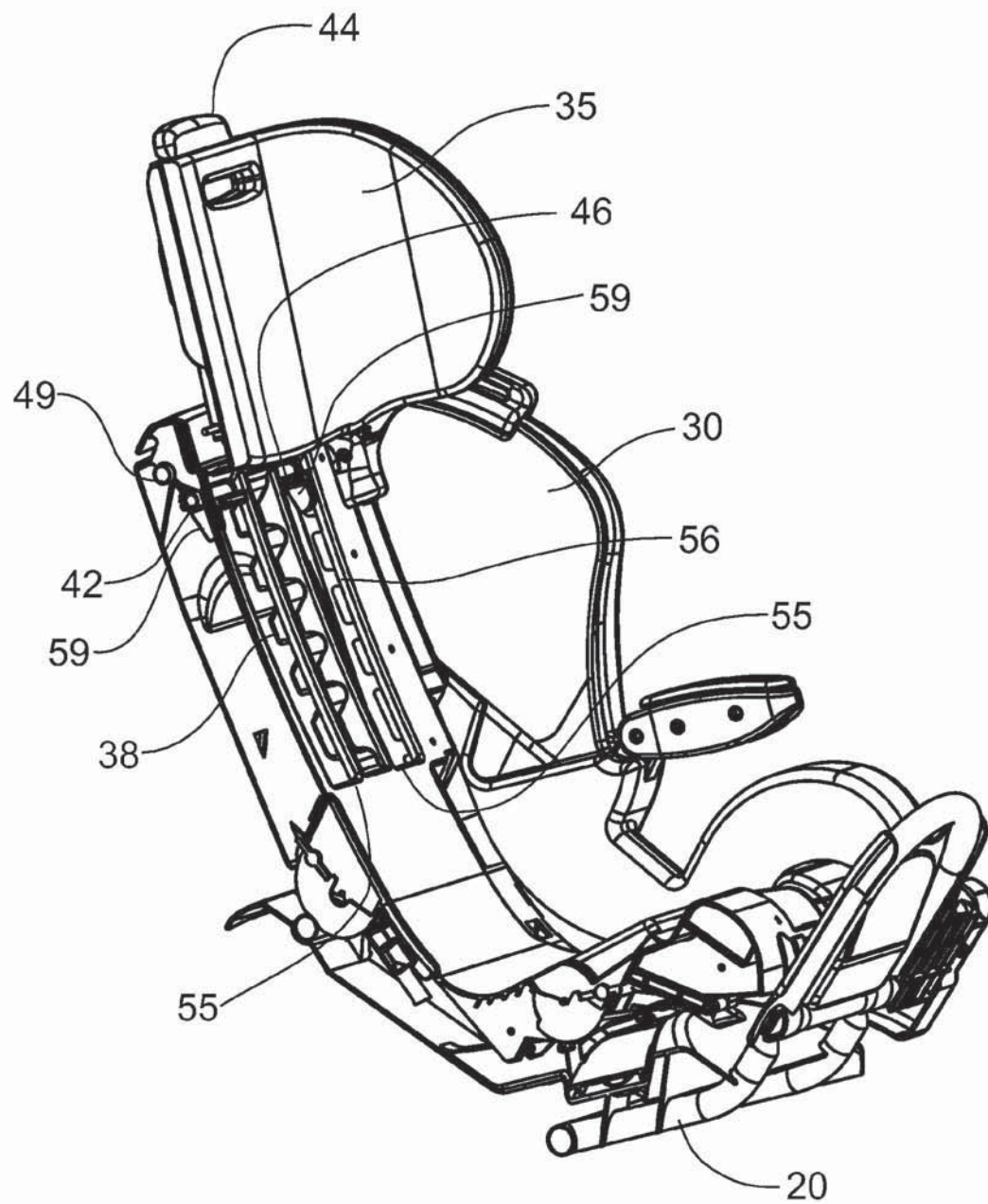


Fig. 16



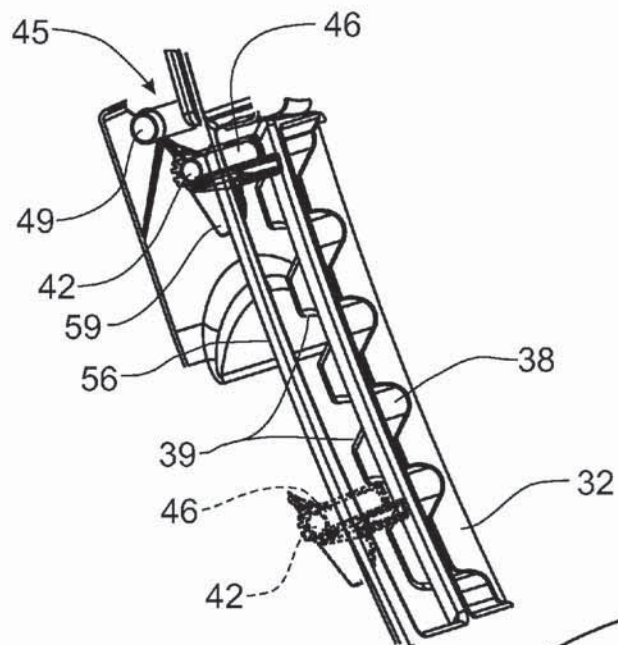


Fig. 17

Fig. 19

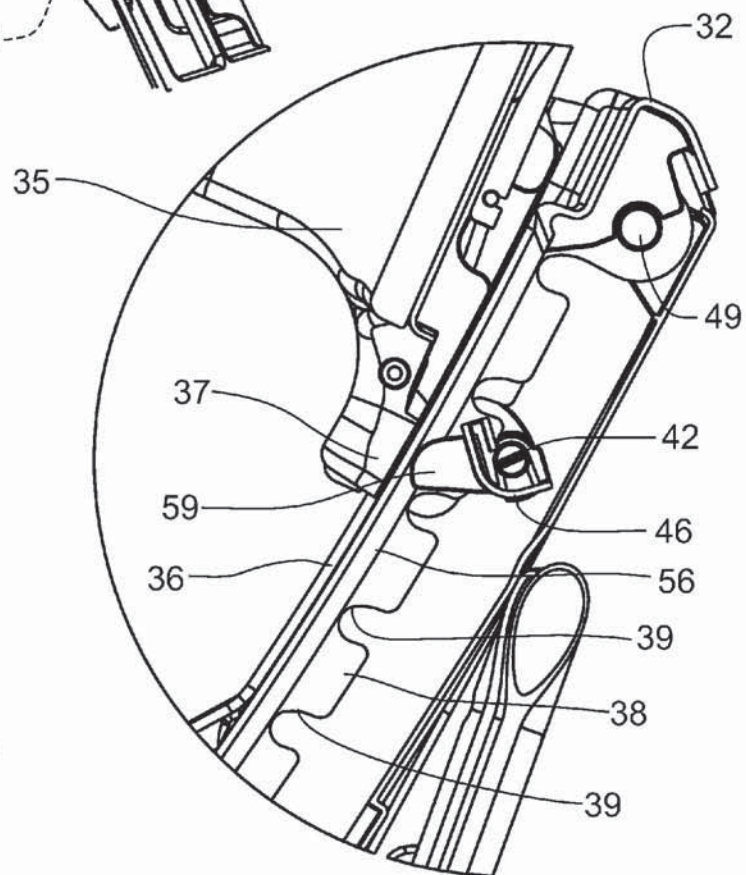


Fig. 18

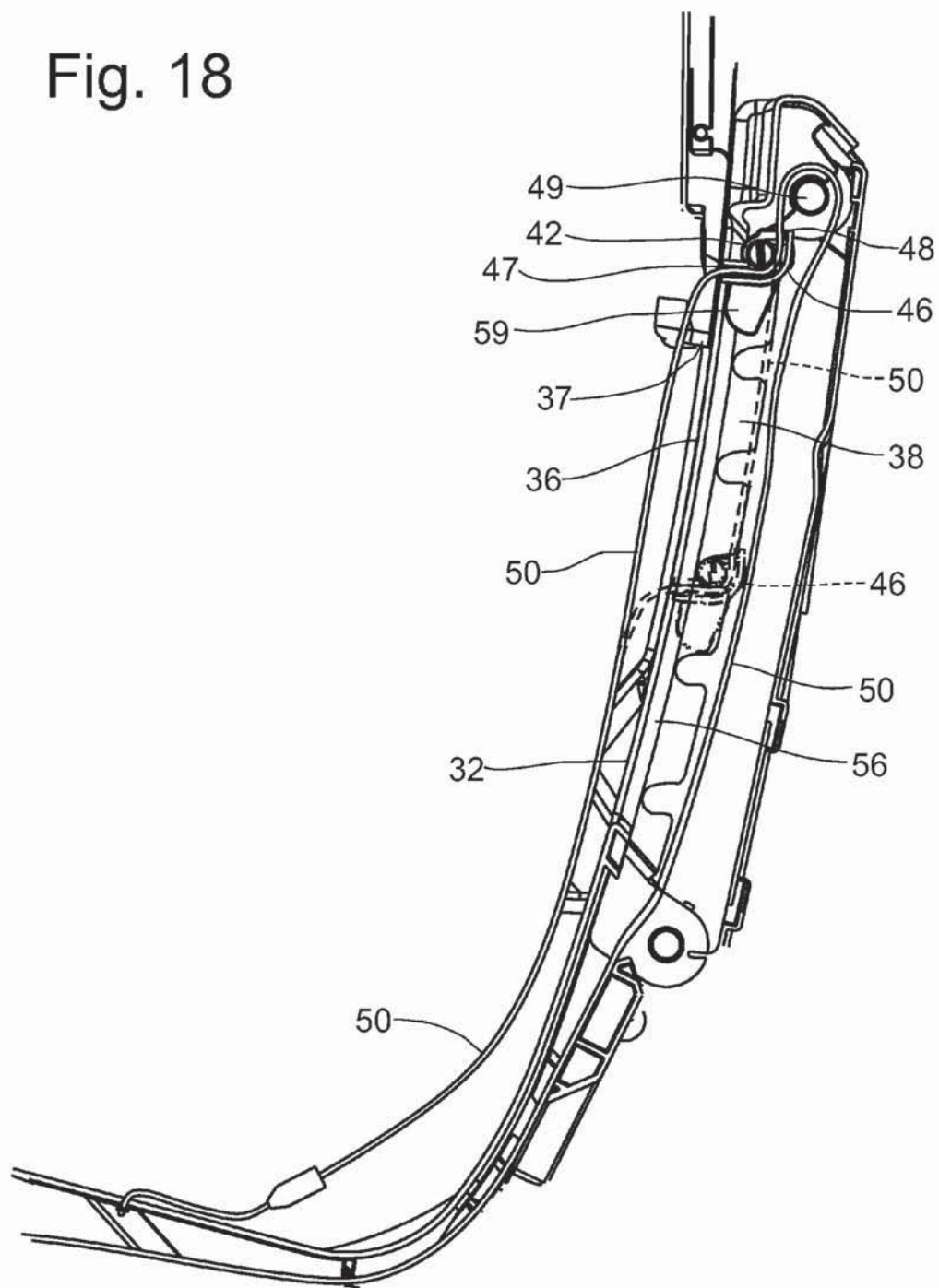


Fig. 20

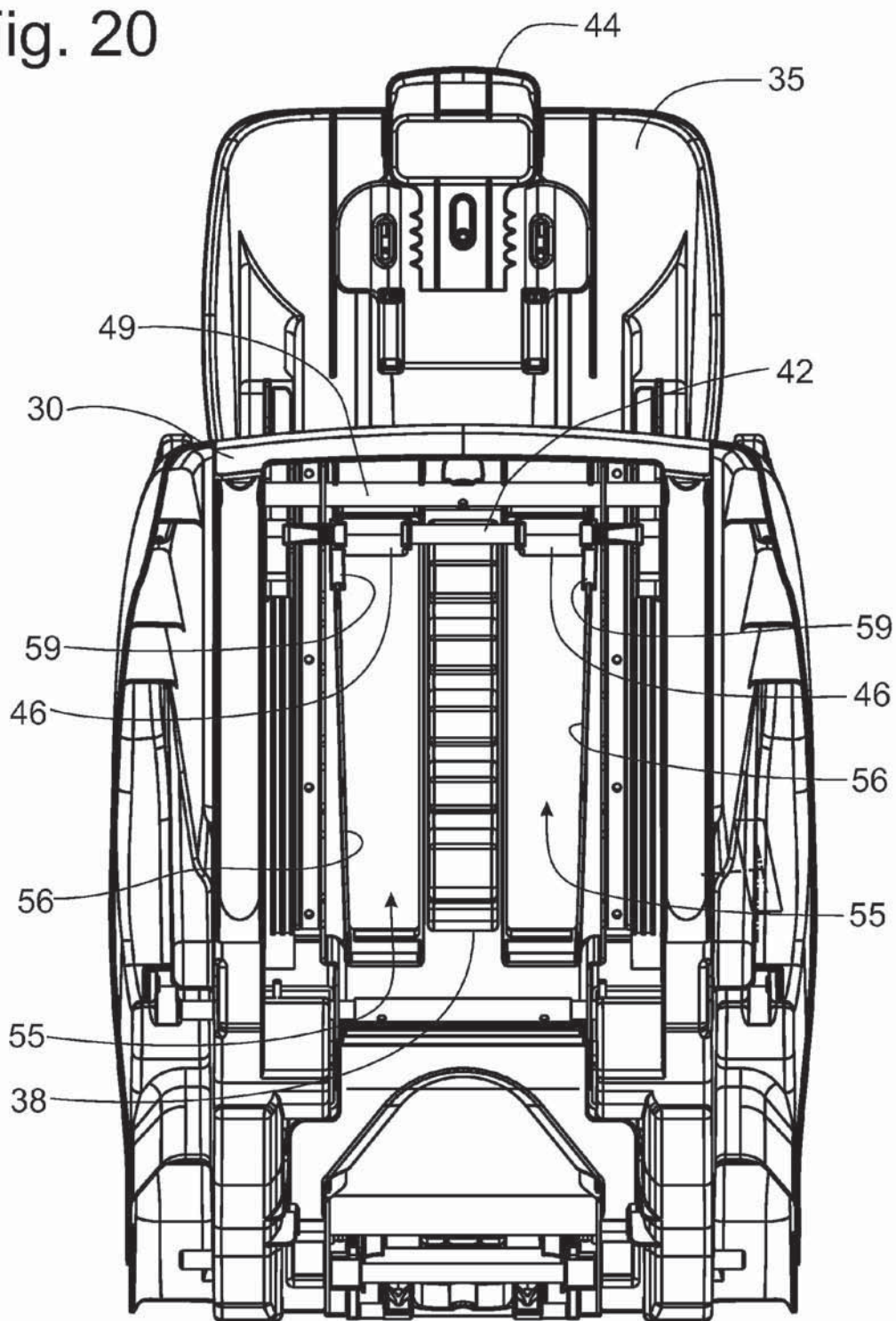
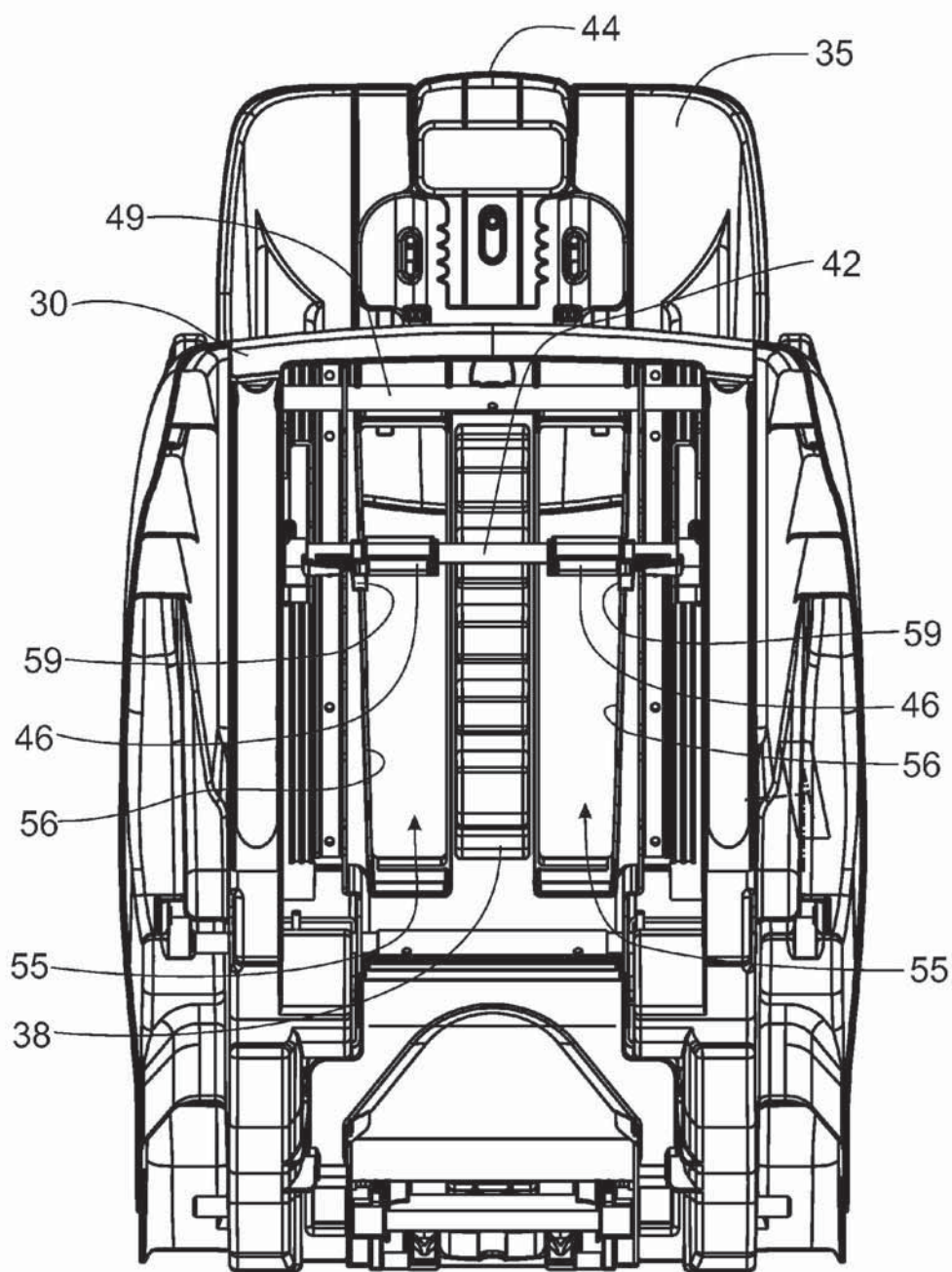


Fig. 21



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HEAD REST AND HARNESS ADJUSTMENT FOR CHILD CAR SEAT

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 11/953,063, filed on Dec. 9, 2007, and granted as U.S. Pat. No. 7,862,117, on Jan. 4, 2011, and claims domestic priority on U.S. Provisional Patent Application Ser. No. 60/874,392, filed on Dec. 12, 2006, the contents of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates generally to a car seat for use in transporting children in an automobile, and, more particularly, to a shoulder harness and head rest adjustment apparatus that can be adjusted without causing a substantial change in the length of the shoulder harness belt.

BACKGROUND OF THE INVENTION

Car safety seats for children are commercially available in a many configurations corresponding to differences in the age, weight, and size of the child being transported. Parents can choose a car seat that is not only the correct size for their child and their vehicle, but one that also suits their tastes, budget, and life style. As children grow in size and maturity level, they need different kinds of car seats. For example, a child may initially use a rearwardly facing infant car seat, then graduate to a forward facing toddler seat with an integrated harness, and finally to a belt positioning booster seat utilizing the vehicle's lap and shoulder belt system before being able to safely use the vehicle's seat belts alone.

There are many car seats on the market that can be used in multiple configurations. For instance, a forward facing car seat with an integral harness appropriate for a 20-40 pound child might accommodate a child weighing 30-100 pounds as a belt positioning booster seat with the removal of the harness and utilizing the vehicle's lap and shoulder belts. This is convenient for the care giver because it means fewer seats to purchase. Some parents choose to buy a belt positioning booster seat for their older child. Such a booster seat may be configured with a high back, such as is disclosed in U.S. Pat. No. 6,682,143, granted to Davis Amirault on Jan. 27, 2004, or can have no back at all. Older children who don't want to be seen sitting in a "baby seat" like this option and parents don't have to manage a big bulky car seat.

Currently available car seats typically have a monolithic shell, i.e. the back and seat cannot be used separately. Some car seats are designed to have a no back base option, but are configured as a separate seat fastened under the monolithic seat and back, such as is disclosed in U.S. Pat. No. 4,754,999, issued on Jul. 5, 1998, to James Kain. The problem with this configuration is the redundancy of seats; one as part of the monolithic shell, and one as a seat only.

States review and regulate restraint age limits and weight requirements. With continuing age and weight increases for recommendations in child restraint safety, a variety of restraint sizes are needed to accommodate the increasing span of children needing car seat safety restraints. The shoulder height and proper placement of belt paths are critical to the safety function of car seat restraints. As the child grows the headrest area needs to accommodate their body size and move up as they grow. Some seats are used for more than one child and the head rest area needs to move up and down to fit

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properly with each child. Purchasing new seats as the child grows is a costly alternative. Some seats on the market have up and down head rest adjustment but they are not always obvious or easy to operate. One example of a car seat having an adjustable head rest can be found in U.S. Pat. No. 6,623,074, granted to Ronald Asbach on Sep. 23, 2003, wherein the head rest is vertically movable on the seat back with the harness straps passing through the head rest to be adjustable therewith. Another example can be found in U.S. Patent Application Publication No. 2005/0225136, filed by William Horton and published on Oct. 13, 2005, in which the head rest is vertically adjustable relative to the seat back.

In these prior art devices, the overall length of the harness belt changes with the positional adjustment of the head rest and the appropriate relocating of the harness belt path to match the adjusted position of the head rest. To accommodate the changes in harness belt length, the car seat is provided with a belt length adjustment mechanism, usually located at the lower front portion of the car seat apparatus. Each time the position of the head rest is adjusted, the belt length adjustment needs to be manipulated to correct the length of the harness belt for proper fit of the harness on the child.

The movement of the head rest relative to the seat back or the bottom of the seat is accomplished in each of the different structural configurations within the above-identified prior art car seats though a linearly shape track. As the head rest is moved from a lowermost position to the highest position, the top portion of the head rest simply extends linearly away from the bottom of the car seat. When the seat is reclined, the head rest, of course, tips rearwardly, assuming that the car seat is placed into a forward facing orientation. This structural configuration can result in an interference between the top portion of the head rest and top of the vehicle seat, or the vehicle head rest at the top of the vehicle seat. Accordingly, it would be desirable to provide a head rest adjustment mechanism that would be operable to provide an improved clearance between the top of the car seat head rest and the top portions of the vehicle seat when the seat is reclined and the head rest is positionally elevated.

It would also be desirable to provide a harness support apparatus cooperable with an adjustable head rest for a car seat so that the overall length of the harness belt remains unchanged irrespective of the position at which the head rest is adjusted.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a car seat for transporting children in an automobile that has a positionally adjustable head rest cooperable with a movable harness that relocates in response to the positional adjustment of the head rest.

It is another object of this invention to provide a support apparatus for the harness that will move in conjunction with the movement of the head rest on a child's car seat so that the overall length of the harness belt does not require substantial adjustment when the head rest is re-positioned.

It is a feature of this invention that the harness belt passes through a guide member that directs the path of the belt from behind the seat back through an opening in the seat back to engage the child in the car seat.

It is an advantage of this invention that the guide member is located relative to the head rest to correspond to being at the shoulder of the child seated in the car seat when the head rest is properly positioned.

It is another feature of this invention that the harness belt passes over a fixed guide bar located at the top of the seat

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frame so that the length of the harness belt does not effectively vary when the guide members are relocated with the positioning of the head rest.

It is another advantage of this invention that the vertically positionable head rest and harness will adjust positionally to the size of the child being transported on the car seat.

It is still another advantage of this invention that the fixed guide bar can be designed to increase the resistance of the harness to restrain a child during crash events.

It is still another object of this invention to provide a head rest for a car seat that moves generally vertically relative to the seat back of the car seat along a curved track.

It is still another feature of this invention that the arcuate track of movement for the head rest moves the head rest inwardly as the head rest moves upwardly.

It is yet another advantage of this invention that the curved back surface for the movement of the head rest creates a more vertical seat back angle for the older children being seated in a properly positioned car seat.

It is yet another feature of this invention that the curved track for the movement of the head rest is concave from the aspect of child seating on the car seat.

It is a further advantage of this invention that the curved track for the positional adjustment of the head rest reduces the possibility of interference between a raised head rest and the top portion of the vehicle seat on which the car seat is located.

It is still another feature of this invention that the curved track seat back surface on which the head rest moves vertically provides a more reclined back angle for a small child, while providing a more upright back angle for an older child.

It is yet another object of this invention to provide an adjustable head rest and harness apparatus for a car seat which is durable in construction, inexpensive of manufacture, care-free of maintenance, facile in assemblage, and simple and effective in use.

These and other objects, features and advantages are accomplished according to the instant invention by providing a car seat having a vertically adjustable head rest and harness support apparatus that will properly locate the position of the harness relative to the child in response to the positioning of the head rest. The head rest is movable along a curved track to provide a more reclined back angle for a small child and a more upright back angle for an older child. The harness belt is trapped in a length adjustment lock and follows a path that extends around a fixed guide bar at the top of the car seat frame then downwardly through a guide member that directs the belt through an opening in the seat back for engagement with the child. The guide member is supported on a harness control tube that engages a rack device to fix the position of the harness control tube when the position of the head rest is selected.

BRIEF DESCRIPTION OF THE DRAWINGS

The advantages of this invention will be apparent upon consideration of the following detailed disclosure of the invention, especially when taken in conjunction with the accompanying drawings wherein:

FIG. 1 is an upper, front perspective view of a base member, incorporating the principles of the instant invention, mounted on a representative vehicle seat, shown in phantom;

FIG. 2 is a left side elevational view of the base member shown in FIG. 1, the representative vehicle seat being shown in phantom;

FIG. 3 is a front elevational view of the base member shown in FIG. 1;

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FIG. 4 is an upper, front perspective view, similar to that of FIG. 1, but showing a seat member incorporating the principles of the instant invention mounted on the base member in a forward facing orientation with the seat positioned in a fully upright position, the representative vehicle seat being shown in phantom;

FIG. 5 is a left side elevational view of the seat mounted on the base member, as shown in FIG. 4, the representative vehicle seat being shown in phantom;

FIG. 6 is a front elevational view of the seat mounted on the base member, as depicted in FIGS. 4 and 5;

FIG. 7 is a left side elevational view similar to that of FIG. 5, but showing the forward facing seat member in a reclined position relative to the base member;

FIG. 8 is a front elevational view of the reclined seat member shown in FIG. 7, the representative vehicle seat being shown in phantom;

FIG. 9 is an enlarged front elevational view of the car seat incorporating the principles of the instant invention, the head rest being moved into a mid-range raised position;

FIG. 10 is a cross-sectional view of the car seat corresponding to lines 10-10 of FIG. 9 to depict the head rest adjustment mechanism and the harness support apparatus incorporating the principles of the instant invention, the head rest being moved to the fully raised position;

FIG. 11 is a rear elevational view of the car seat depicted in FIG. 9 with the seat member being moved into a reclined position, the head rest being located in the fully raised position;

FIG. 12 is a cross-sectional view of the car seat corresponding to lines 12-12 of FIG. 11;

FIG. 13 is a front elevational view of the car seat in an upright orientation with the head rest moved into a mid-range position;

FIG. 14 is a cross-sectional view of the car seat corresponding to lines 14-14 of FIG. 13, the movement of the head rest from a mid-range raised position to a fully raised position being shown in phantom;

FIG. 15 is a cross-sectional view similar to that of FIG. 14, but showing the seat member moved into a rearwardly-facing orientation, the head rest being shown in the fully raised position, although a lowermost position of the head rest would be utilized when the seat member is rear-facing due to the small size of the child;

FIG. 16 is a cross-sectional view opposite of the view shown in FIG. 14, but depicted in a perspective orientation, with the seat member being re-configured on the base member to be in a rearwardly-facing configuration and the head rest being placed in the fully raised position;

FIG. 17 is an enlarged partial perspective view of the harness control apparatus as shown in FIG. 16, the movement of the harness guide member to the lowermost position being shown in phantom;

FIG. 18 is an enlarged partial cross-sectional view of the seat member showing the harness belt path in the fully raised position as depicted in FIG. 16, the belt path corresponding to a relocation of the head rest to a mid-range position being shown in phantom;

FIG. 19 is an enlarged partial cross-sectional view of the lock mechanism for the head rest with the lock bar depicted in an unlatched orientation while moving between one notch in the control rack to another;

FIG. 20 is rear elevational view of the seat member with the protective panel removed therefrom to show the lock mechanism for the head rest, the head rest being depicted in the fully raised position; and

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FIG. 21 is a rear elevational view of the seat member similar to that of FIG. 20, but with the head rest being lowered to a mid-range position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1-8, a car seat incorporating the principles of the instant invention can best be seen. The car seat 10 can be configured in a number of different positions, as will be described in greater detail below, and is formed of a seat member 30 detachably mounted on a base member 20. As is best seen in FIGS. 1-3, the base member 20 is a separate member that is affixed to a vehicle seat 15, representatively shown in phantom, by the seat belt 17 of the vehicle. The vehicle seat belt 17 is pulled through a first side opening 22, across a seat belt latch member 23 and out through the second side opening 22 to be connected to the vehicle seat belt latch member (not shown) and pull tight to capture the base member 20 on the vehicle seat 15. The seat belt latch member 23 secures the vehicle seat belt 17 to the base member 20 and is selectively movable to release the vehicle seat belt 17 from engagement with the base member 20.

The base member is formed with a central rack member 25 having a plurality of parallel, horizontally disposed notches 26 to receive the recline latch apparatus 33, which include a transverse bar 33a that rests in one of the notches 26, on the seat member 30 to change the position of the seat member 30 on the base member 20. The base member is also formed with two pairs of opposing recline control slots 27, 28 into which retractable latch pins 65 are engagable to secure the seat member 30 to the base member 20. The lower recline control slots 27 is positioned at a forward portion of the base member 20 and is oriented generally horizontally. The upper recline control slots 28 are located at a rearward portion of the base member 20, but are oriented at an inclined angle compared to the lower recline control slots 27. As a result, the rearward portion of the seat member 30 will lower as the forward portion of the seat member 30 moves forwardly to create a reclined orientation for the seat member 30. The upright configuration of the seat member 30, corresponding to the latch pins 65 being positioned in the rearwardmost portions of the recline control slots 27, 28, is shown in FIGS. 4-6, while the recline configuration of the seat member 30, corresponding to the latch pins 65 being positioned in the forwardmost portions of the recline control slots 27, 28, is depicted in FIGS. 7 and 8.

The seat member 30 can be mounted onto the base member 20 in either a forward-facing orientation, such as is depicted in FIG. 4, or in a rearwardly-facing orientation, as is shown in FIGS. 15 and 16. The seat member 30 includes two pairs of latch pins 65 that are retractable in conjunction with the movement of the actuator handle 61 located in a forward part of the seat portion of the seat member 30. The movement of the actuator handle 61 is operable to cause a retraction of the latch pins 65 into the body of the seat member 30 until the seat member 30 is properly positioned onto the base member 20, whereupon the latch pins 65 are allowed to extend into the respective lower and upper recline slots 27, 28 to trap the seat member 30 on the base member 20. The positioning of the seat member 30 onto the base member 29 places the recline latch apparatus 33 into engagement with the recline rack 25 to prevent the latch pins 65 from sliding along the corresponding recline control slots 27, 28.

As seen in FIGS. 9-18, the seat member 30 includes a head rest 35 formed with slide members 37 that are generally vertically movable along a curved, concave path along the

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seat back 32 defined by concave curved tracks 36 formed on the back side of the seat back 32. Thus, as the head rest 35 is raised, the top portion of the head rest 35 moves inwardly toward the front of the seat member 30 providing a more upright back angle for the child as the child gets older and larger, requiring the upward movement of the head rest 35. The back portion of the seat member 30 has a control rack 38 formed into the curved track 36 and defining a plurality of vertically spaced notches 39 corresponding to different vertical positions for the head rest 35. The head rest 35 is connected to a lock mechanism 40 that engages the control rack 38. The lock mechanism 40 includes a lock bar 42 that rests in a selected notch 39 and is spring-loaded into engagement with the control rack 38. An actuation handle 44 is operatively connected to the pivot lever 43 on the lock mechanism 40 to force the lock bar 42 out of engagement with the control rack 38 to enable the head rest 35 to be moved vertically.

The lock mechanism 40 includes a pair of laterally spaced guide members 46 that define openings 47 that are oriented generally horizontally. The guide member 46 controls the position of the harness belt 50 relative to the shoulders of the child seated in the car seat 10 and raises and lowers in response to the position of the lock mechanism 40 and the attached head rest 35. Thus, when the head rest 35 is raised along the curved track 36, the guide members 46 move accordingly and position the harness belt 50 to pass from behind the curved seat back 32 through openings in the seat back 32 to the front of the seat back 32 for engagement with the child seated on the car seat 10.

The harness support apparatus 45 includes a fixed guide bar 49 mounted within the seat back 32 above the control rack 38. The harness belt 50 is trapped in a conventional length adjustment device 52 at the lower front portion of the seat member 30. From the length adjustment device 52, the harness belt 50 passes underneath the seat portion of the seat member 30 and through the structure of the seat member 30 behind the seat back 32 and the control rack 38 to the fixed guide bar 49. The harness belt 50 loops over the fixed guide bar 49 and passes downwardly to the lock mechanism 40 behind the lock bar 42 and then through the guide members 46 to exit through the outlet openings 47 to extend to the front of the seat back 32. The harness belt 50 is secured to the seat member 30 in a conventional manner. The use of the fixed guide bar 49 secured to the frame of the seat back 32 provides an opportunity to use a metal rod that will increase the resistance of the harness belt 50 to pull out of the car seat 10 during crash events. Furthermore, the amount of bending of the fixed guide rod 49 can be used to evaluate the stresses incurred during a crash event and provide a positive indicator that a car seat 10 has been subjected to a crash event.

Referring now to FIGS. 17-21, the guide members 46 define a curved path through which the harness belt 50 is fed to change the direction of the harness belt 50 from a generally vertical inlet 48 to a generally horizontal outlet opening 47 wrapped around the lock bar 42. The guide members 46 are aligned with the generally vertical openings 55 formed in the seat back 32 so that the harness belts 50 can move vertically with the head rest 35 without impediment from the seat back 32. Soft goods (not shown), i.e. the padded covering over the seating surface of the seat member 30, are formed with corresponding openings therein to allow the passage of the harness belts 50 from the outlet openings 47 over the shoulders of the child seated in the seat member 30. The lock bar 42 extends through the guide members 46 to opposing sides thereof for pivotal actuation by the actuation handle 44 at the top of the head rest. The lock bar 42 extending between the

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guide members 46 is engagable with the control rack 38 to lock the head rest 35 the desired position.

To adjust the position of the head rest 35, the actuation handle 44 is retracted into the head rest 35, as is depicted in FIG. 21 to push the pivot lever 43 through a linkage 41 to release the lock bar 42 from the notch 39 and allow the lock bar 42 to move along the control rack 38 until the desired position is attained for the head rest 35. As the guide members 46 are moved vertically with the head rest 35, the guide members 46 simply slide along the harness belt 50 as the guide members 46 move to the selected vertical position. When the lock bar 42 is re-engaged with a selected notch 39 in the control rack 38, the overall length of the harness belt 50 did not substantially change due to the looping of the harness belt 50 over the fixed guide bar 49, even though the position at which the harness belt 50 transitions from behind the seat back 32 to in front of the seat back 32 changes in response to the positioning of the head rest 35. The head rest 35 is locked into the newly selected position by retracting the actuation handle 44 into the head rest 35, as depicted in FIG. 21, to drive the lock bar 42 into a corresponding notch 39 in the control rack 38.

As is best seen in FIGS. 20 and 21, the openings 55 are somewhat trapezoidal in shape, wider at the top and narrower at the bottom, so that the guide members 46 can move laterally along the lock bar 42 to move outwardly as the head rest is raised to accommodate the wider body of a growing child. The outside edge of each opening 55 is formed with a cam flange 56 that projects generally perpendicularly to the seat back 32 and is engagable with a follower 59 mounted on the guide member 46 to force the guide member 46 laterally on the lock bar 32 in response to the selected vertical position of the head rest 35.

It will be understood that changes in the details, materials, steps and arrangements of parts which have been described and illustrated to explain the nature of the invention will occur to and may be made by those skilled in the art upon a reading of this disclosure within the principles and scope of the invention. The foregoing description illustrates the preferred embodiment of the invention; however, concepts, as based upon the description, may be employed in other embodiments without departing from the scope of the invention.

Having thus described the invention, what is claimed is:

1. A car seat for transporting a child in an automobile, comprising:

a seat member including a seat back having a front surface and a rear surface, said seat back including a control rack formed with a plurality of generally vertically spaced engagement portions located on said rear surface to define a plurality of selected vertical positions;

a head rest movably mounted on said seat back for vertical movement relative thereto;

a locking mechanism mounted on said head rest for vertical movement therewith to engage said control rack to secure said head rest into one of the plurality of selected vertical positions, said locking mechanism including a lock bar that can be moved into engagement with a selected one of said engagement portions to fix said head rest in the corresponding selected vertical position; and

harness belts extending vertically under said head rest from a position at an upper portion of said seat back and passing through at least one opening in said seat back below said head rest for positioning in front of said seat back, said harness belts being connected to said lock bar so that said harness belts will move vertically in response to a corresponding vertical movement of said head rest.

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2. The car seat of claim 1 wherein said locking mechanism further includes at least one guide member aligned with said at least one opening, said at least one guide member being engaged with said harness belts to direct said harness belt from a position behind said seat back to a position in front of said seat back for support of the child positioned in said car seat.

3. The car seat of claim 2 wherein said at least one guide member comprises a pair of laterally spaced guide members mounted on said lock bar in communication with said at least one opening, said guide members being positioned along said rear surface of said seat back.

4. The car seat of claim 3 wherein each of said at least one opening comprises a pair of laterally spaced openings corresponding, respectively, to said guide members, each of said openings being formed with a cam flange along a vertical edge thereof, each said guide member including a follower engaged with the corresponding said cam flange.

5. The car seat of claim 4 wherein said openings are trapezoidal in shape with the corresponding said cam flange being oriented at an angle to a vertical alignment, said guide members being slidably mounted on said lock bar to move laterally in response to the selected vertical position of said head rest.

6. The car seat of claim 2 further comprising an actuation device mounted on said head rest and movable therewith, said actuation device being connected to said locking mechanism to cause said locking mechanism to pivotally move said lock bar out of engagement with said selected one of said notches in said control rack and permit movement of said head rest relative to said seat back.

7. The car seat of claim 1 further comprising a fixed guide bar mounted in said seat back above said control rack, said harness belts extending from an anchor point and being wrapped over said fixed guide bar and extending therefrom to the lock bar to direct said harness belts from a position behind said seat back to a position in front of said seat back for support of the child positioned in said car seat.

8. In a car seat for transporting a child in an automobile and including a seat back having a front surface and a rear surface, and a head rest supported on said seat back for generally vertical movement relative to said seat back, said seat back including a control rack formed with a plurality of generally vertically spaced notches located on said rear surface, the improvement comprising:

a locking mechanism movably mounted on said head rest to engage said control rack to secure said head rest into one of a plurality of selected vertical positions, said locking mechanism including a lock bar movable into engagement with a selected one of said notches to fix said head rest in the corresponding selected vertical position; and

a pair of harness belts extending vertically under said head rest and passing through said seat back below said head rest for positioning in front of said seat back, said harness belts being connected to said lock bar so that said harness belts will move vertically in response to a corresponding vertical movement of said head rest.

9. The car seat of claim 8 wherein said seat back is formed with a pair of laterally spaced openings therethrough, said locking mechanism further including a pair of guide members aligned with said openings, each said guide member being engaged with a corresponding one of said harness belts to direct said corresponding harness belt from a position behind said seat back to a position in front of said seat back for support of the child positioned in said car seat.

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10. The car seat of claim 9 wherein said guide members are mounted on said lock bar in communication with said openings, said guide members being positioned along said rear surface of said seat back.

11. The car seat of claim 9 wherein each of said openings are formed with a cam flange along one vertical edge thereof, each said guide member including a follower engaged with the corresponding said cam flange.

12. The car seat of claim 11 wherein said openings are trapezoidal in shape with the corresponding said cam flange being oriented at an angle to a vertical alignment, said guide members being slidably mounted on said lock bar to move laterally in response to the selected vertical position of said head rest.

13. The car seat of claim 8 further comprising an actuation device mounted on said head rest and movable therewith, said actuation device being connected to said locking mechanism to cause said locking mechanism to pivotally move said lock bar out of engagement with said selected one of said notches in said control rack and permit movement of said head rest relative to said seat back.

14. The car seat of claim 8 further comprising a fixed guide bar mounted in said seat back above said openings, said harness belts extending from an anchor point and being wrapped over said fixed guide bar and extending therefrom to the corresponding said guide member to direct said harness belt from a position behind said seat back through said openings in said seat back to a position in front of said seat back for support of the child positioned in said car seat.

15. A car seat for transporting a child in an automobile and having a seat back on which a head rest is mounted for generally vertical movement relative to said seat back said seat back including harness belts positionable for support of the child within said car seat, comprising:

said seat back being formed with a pair of openings there-through and a control rack formed with a plurality of generally vertically spaced notches located on said rear surface;

a locking mechanism movably mounted on said head rest to engage said control rack to secure said head rest into one of a plurality of selected vertical positions, said locking mechanism including a lock bar movable into engagement with a selected one of said notches to fix said head rest in the corresponding selected vertical position, said harness belts extending under said head rest and being connected to said lock bar so that said harness belts will move vertically in response to a corresponding vertical movement of said head rest; and

a pair of guide members mounted on said lock bar along said rear surface of said seat back and in alignment with said openings, each said guide member being engaged with a corresponding one of said harness belts to direct said corresponding harness belt from a position behind said seat back where said harness belt is configured in a generally vertical orientation extending from an upper portion of said seat back and then through said seat back below said head rest to a position in front of said seat back for support of the child positioned in said car seat.

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16. The car seat of claim 15 further comprising:

a fixed guide bar mounted in said seat back above said openings, said harness belts extending from an anchor point and being wrapped over said fixed guide bar and extending therefrom to said movable guide bar to be directed through said openings and extend forwardly of said seat back for engagement with the child in said car seat, such that the vertical movement of said movable guide bar redirects the positioning of the corresponding said harness belts.

17. The car seat of claim 16 wherein the engagement of said harness belts with said guide members and said fixed guide bar allows said harness belt to be moved vertically with said head rest without substantially changing an overall length of said harness belts.

18. The car seat of claim 15 wherein each of said openings are formed with a cam flange along one vertical edge thereof, each said guide member including a follower engaged with the corresponding said cam flange.

19. The car seat of claim 18 wherein said openings are trapezoidal in shape with the corresponding said cam flange being oriented at an angle to a vertical alignment, said guide members being slidably mounted on said lock bar to move laterally in response to the selected vertical position of said head rest.

20. The car seat of claim 19 further comprising an actuation device mounted on said head rest and movable therewith, said actuation device being connected to said locking mechanism to cause said locking mechanism to pivotally move said lock bar out of engagement with said selected one of said notches in said control rack and permit movement of said head rest relative to said seat back.

21. A car seat for transporting a child in an automobile, comprising:

a seat member including a seat back having a front surface and a rear surface, said seat back including a control rack formed with a plurality of generally vertically spaced engagement portions located on said rear surface to define a plurality of selected vertical positions;

harness belts mounted on said seat member and being positionable to support said child within said car seat;

a head rest movably mounted on said seat back;

a locking mechanism movably mounted on said head rest to engage said control rack to secure said head rest into one of the plurality of selected vertical positions, said locking mechanism including a lock bar that can be moved into engagement with a selected one of said engagement portions to fix said head rest in the corresponding selected vertical position; and

a fixed guide bar mounted in said seat back above said control rack, said harness belts extending vertically behind said seat back from an anchor point and being wrapped around said fixed guide bar to extend downwardly therefrom behind said head rest to pass under said lock bar and then forwardly from said lock bar through said seat back for engagement with said child in said car seat.

22. The car seat of claim 21 wherein said harness belts are associated with a guide mechanism mounted on said lock bar to change directions from extending from said fixed guide bar to engagement with said child in said car seat.

* * * * *

EXHIBIT C

US008123294B2

(12) **United States Patent**
Hutchinson et al.

(10) **Patent No.:** **US 8,123,294 B2**
(45) **Date of Patent:** **Feb. 28, 2012**

(54) **HARNESS STORAGE SYSTEM FOR CHILD CAR SEATS**

(56) **References Cited**

(75) Inventors: **James M. F. Hutchinson**, Mohnton, PA (US); **Michael Gillett**, Mohnton, PA (US)

(73) Assignee: **Wonderland Nurserygoods Co., Ltd.**, Taipei (TW)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 21 days.

(21) Appl. No.: **12/554,642**

(22) Filed: **Sep. 4, 2009**

(65) **Prior Publication Data**

US 2010/0060052 A1 Mar. 11, 2010

Related U.S. Application Data

(60) Provisional application No. 61/191,607, filed on Sep. 10, 2008.

(51) **Int. Cl.**

A47D 1/10 (2006.01)

A47D 15/00 (2006.01)

A47C 7/62 (2006.01)

(52) **U.S. Cl.** 297/250.1; 297/188.07; 297/481

(58) **Field of Classification Search** 297/250.1, 297/219.12, 188.07, 481, 485

See application file for complete search history.

U.S. PATENT DOCUMENTS

4,291,915	A *	9/1981	Cox	190/8
4,754,999	A	7/1988	Kain	297/256.14
5,139,311	A *	8/1992	Imai et al.	297/481
5,286,086	A *	2/1994	Gunji	297/250.1
5,458,398	A *	10/1995	Meeker et al.	297/250.1
5,567,007	A *	10/1996	Czernakowski et al.	297/250.1
6,343,837	B1 *	2/2002	Gage	297/250.1
7,926,874	B2 *	4/2011	Hendry	297/256.16
2002/0043838	A1 *	4/2002	Yanaka et al.	297/250.1
2007/0241596	A1 *	10/2007	Merrill	297/250.1
2009/0066130	A1 *	3/2009	Shafer et al.	297/256.16
2009/0127902	A1 *	5/2009	Meeker et al.	297/250.1
2010/0244516	A1 *	9/2010	Fiore et al.	297/250.1

* cited by examiner

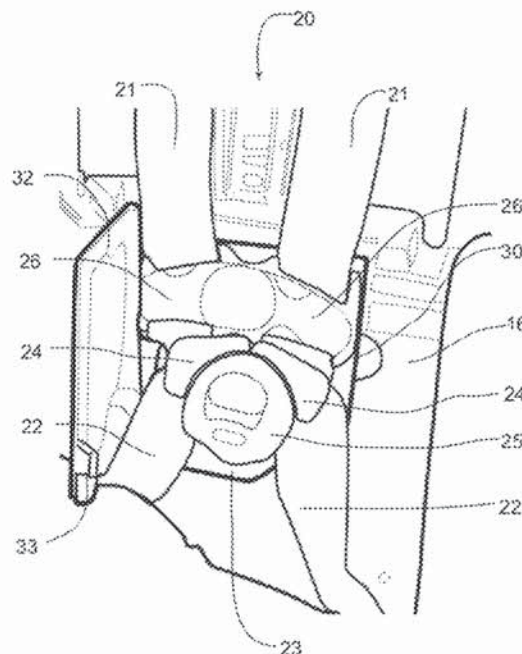
Primary Examiner — Milton Nelson, Jr.

(74) *Attorney, Agent, or Firm* — Miller Law Group, PLLC

(57) **ABSTRACT**

A car seat is formed with a harness storage cavity in the car seat shell for placement of the five-point harness to permit the conversion of the car seat into a belt positioning booster configuration without requiring the harness to be removed from the car seat shell. The headrest and back panel pads on the back rest are removed to provide access to the harness storage cavity which is covered by a hinged door. The harness buckle and the chest clip, still attached to the harness webbing, are placed into the storage cavity and the door closed to provide a flush surface on the seat back so that the child has a smooth supporting surface. The harness webbing projects out of slots to allow the webbing to lie flat beneath the headrest and back panel pads when replaced over the closed door to the storage cavity.

18 Claims, 9 Drawing Sheets



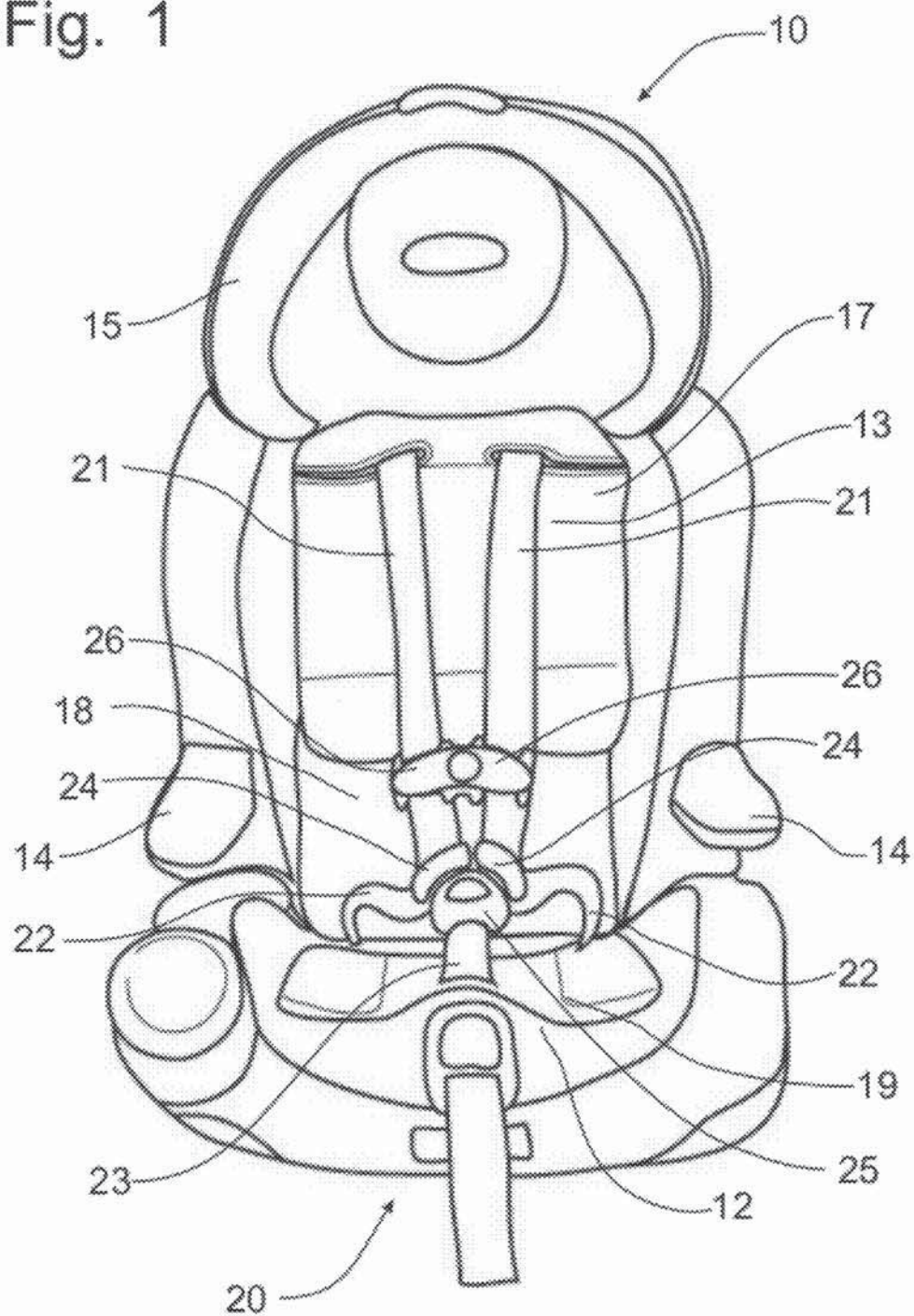
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Fig. 1



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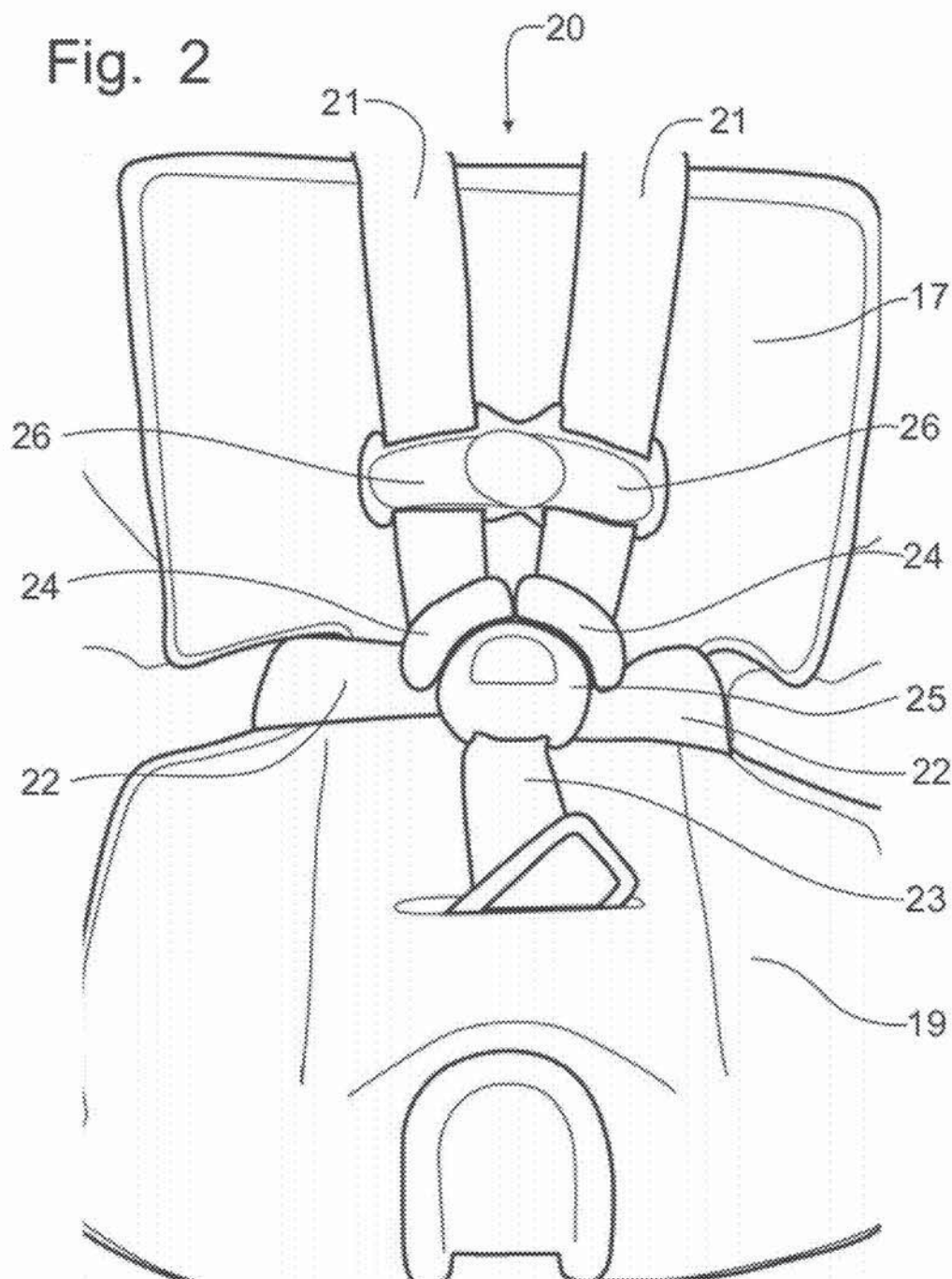


Fig. 3

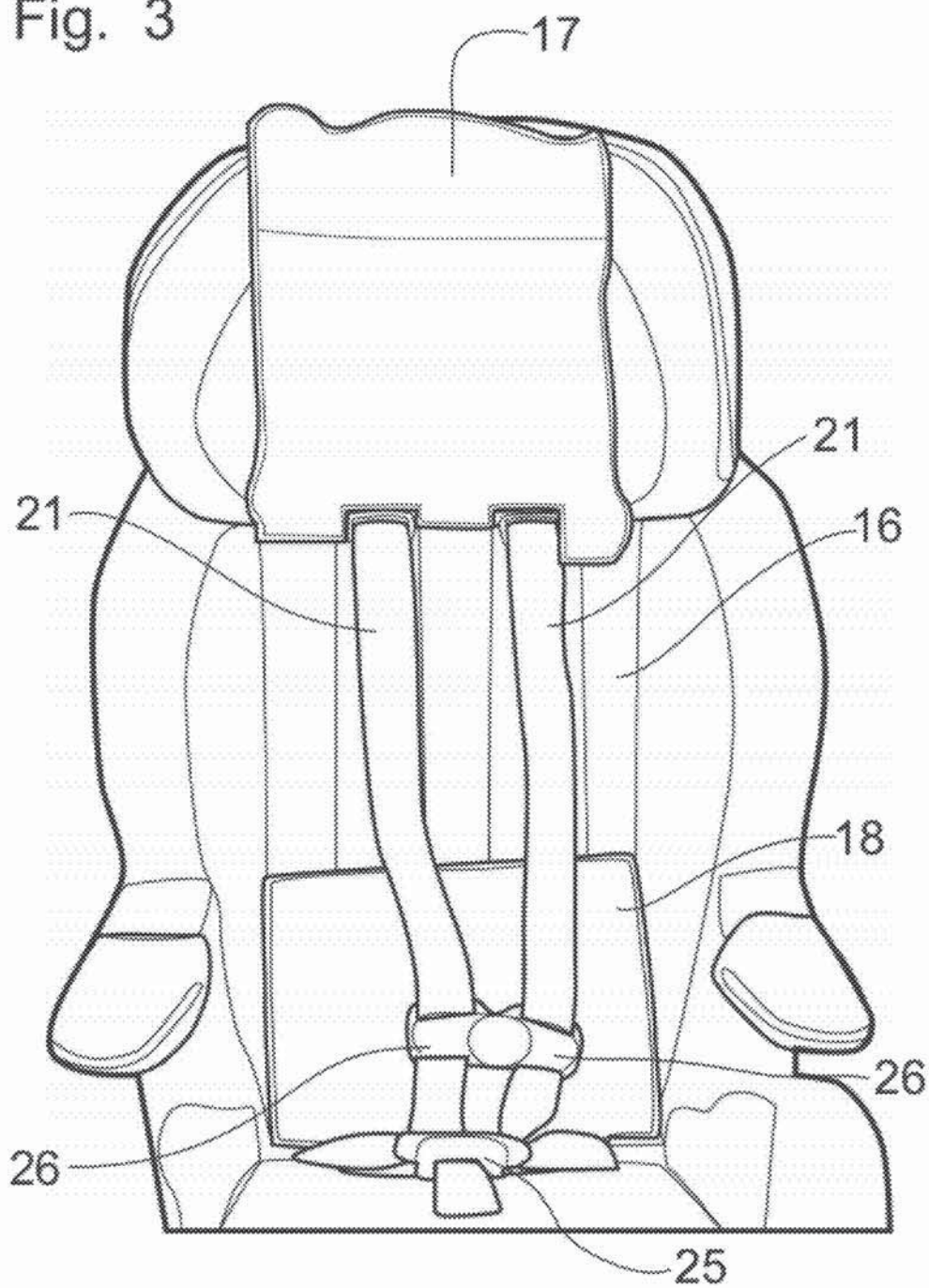


Fig. 4

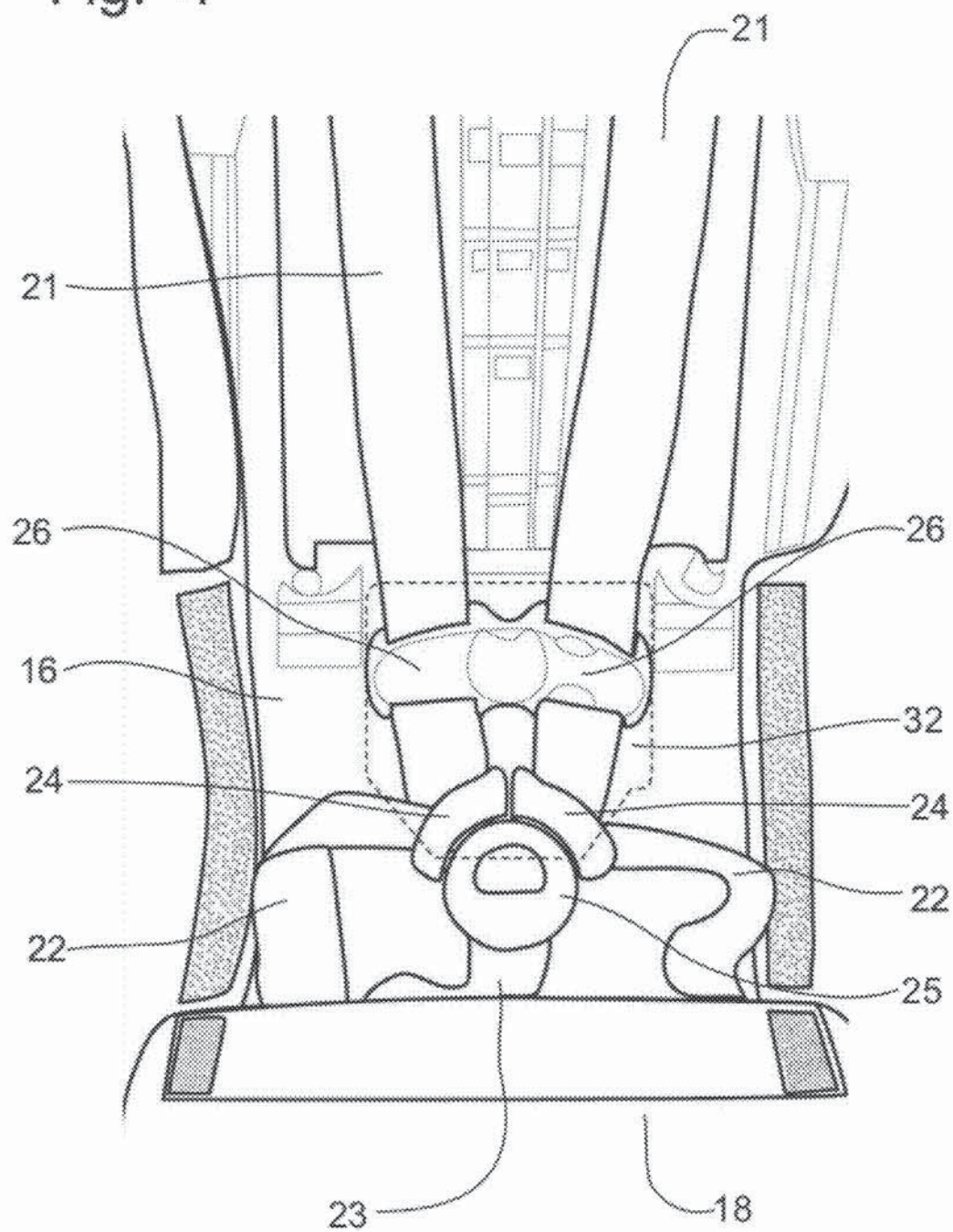


Fig. 5

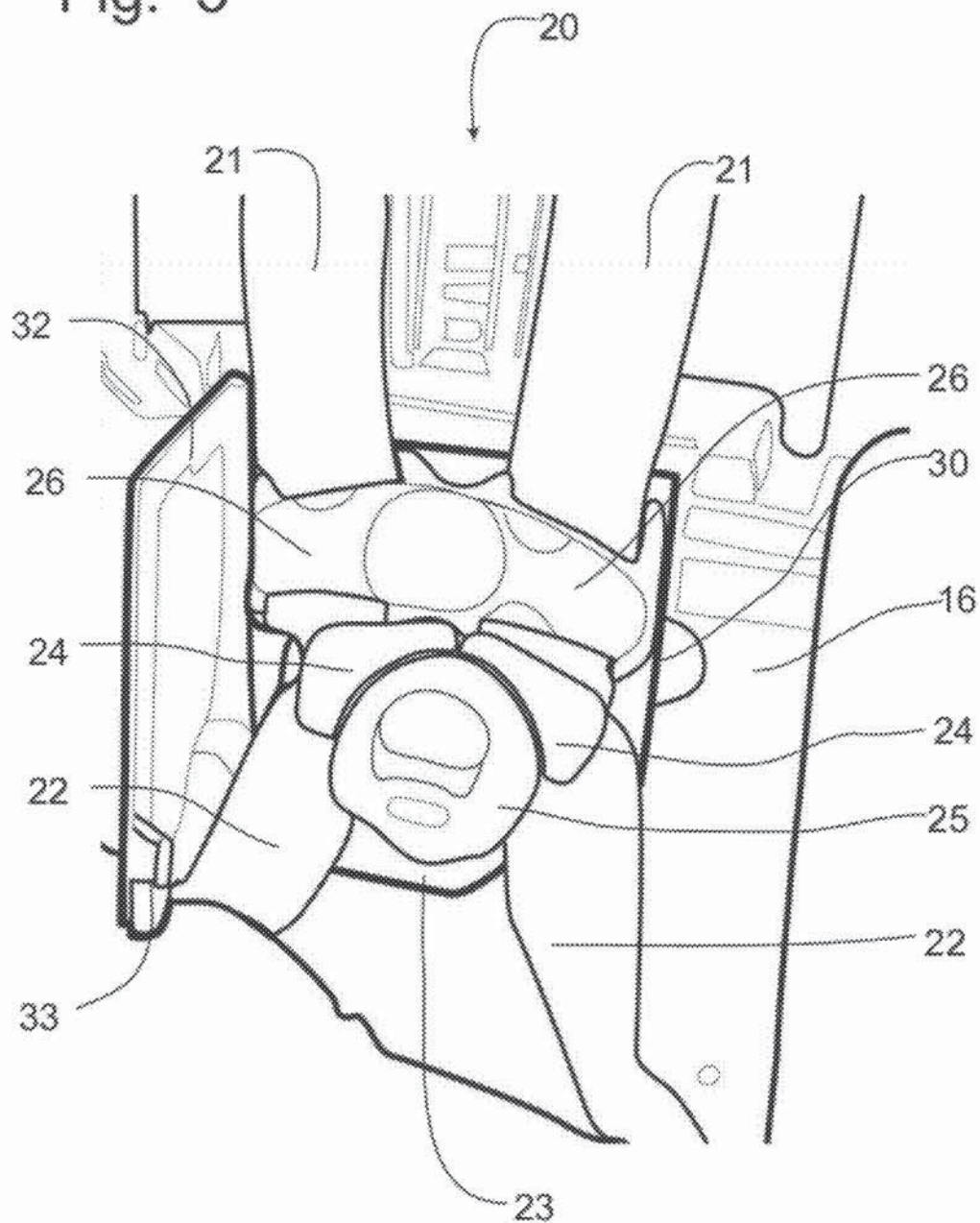


Fig. 5A

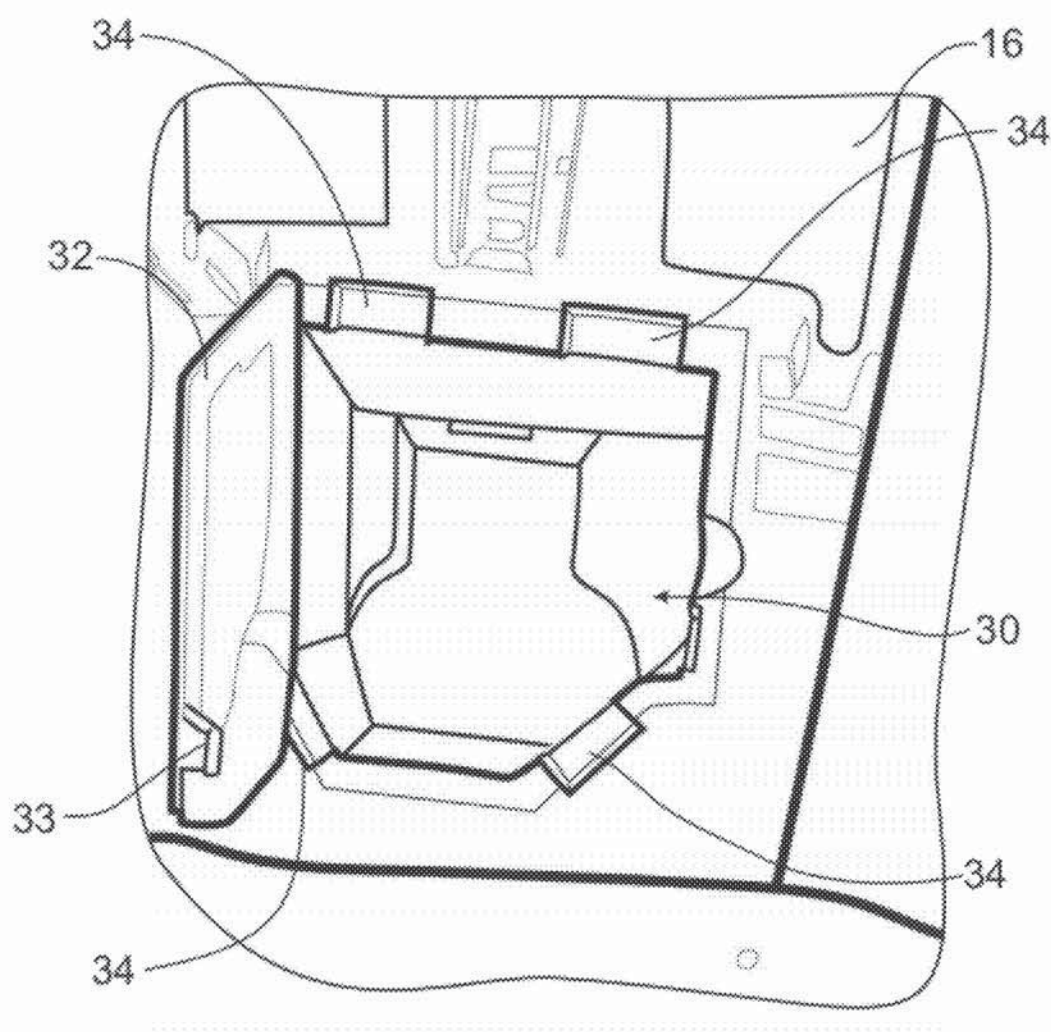


Fig. 6

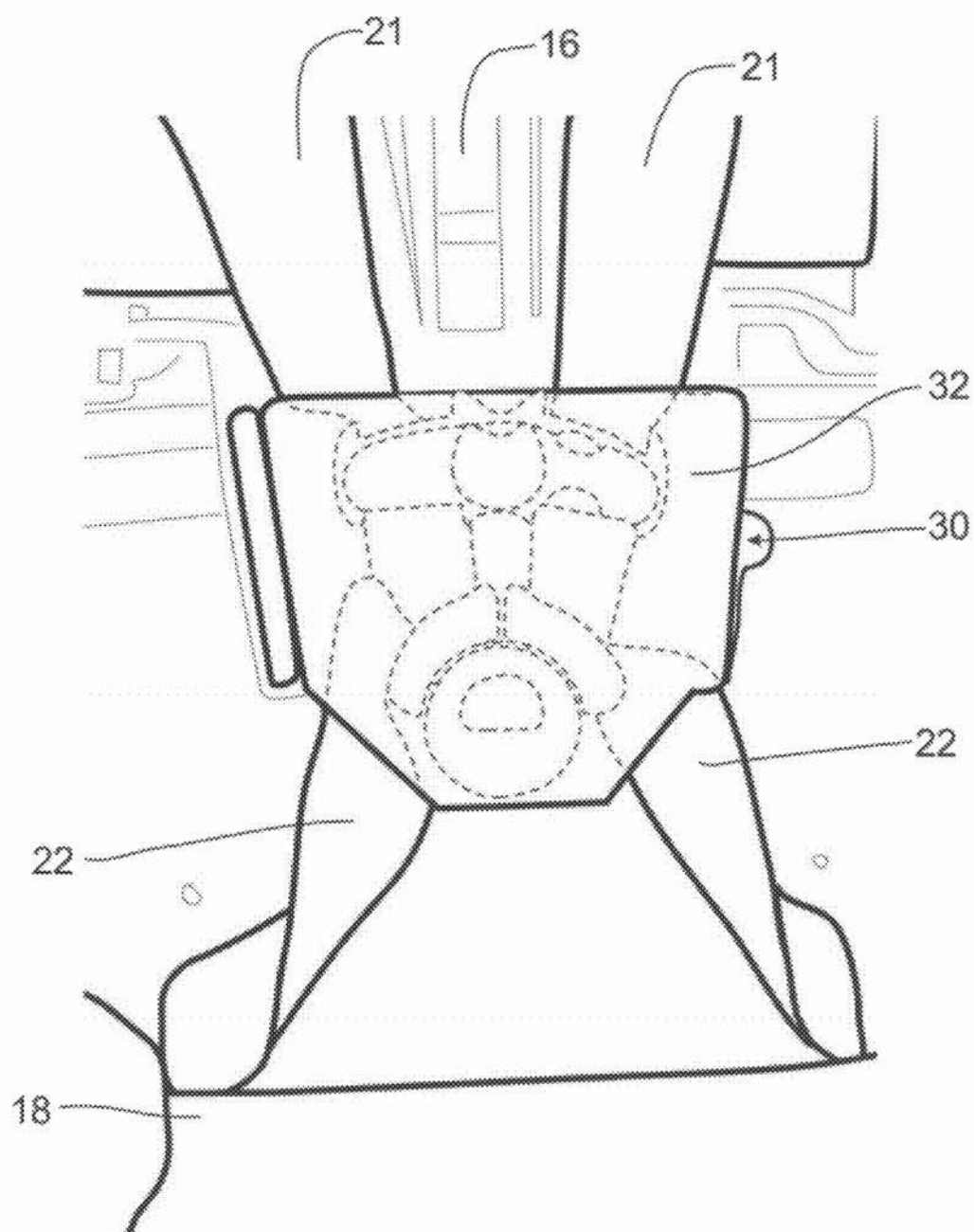


Fig. 7

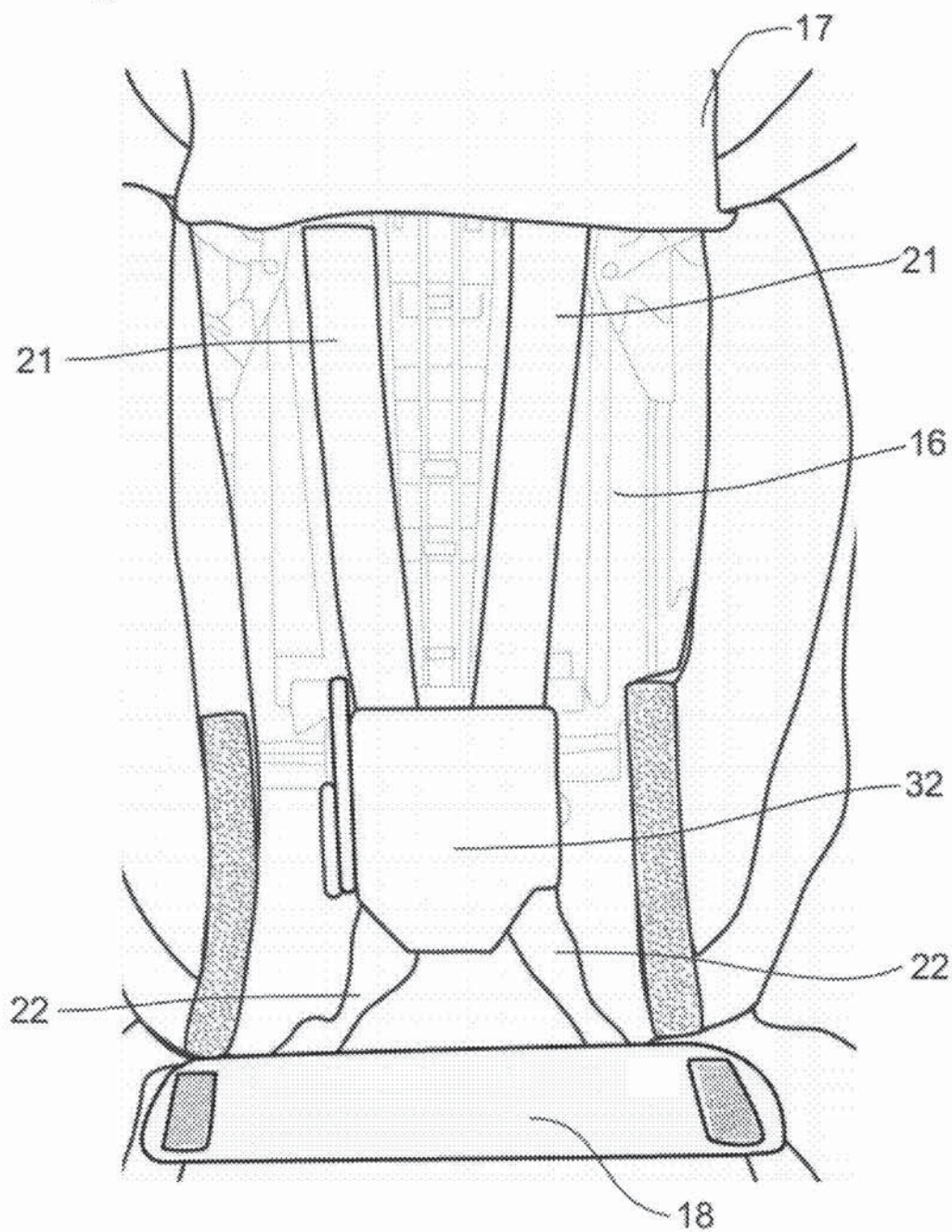
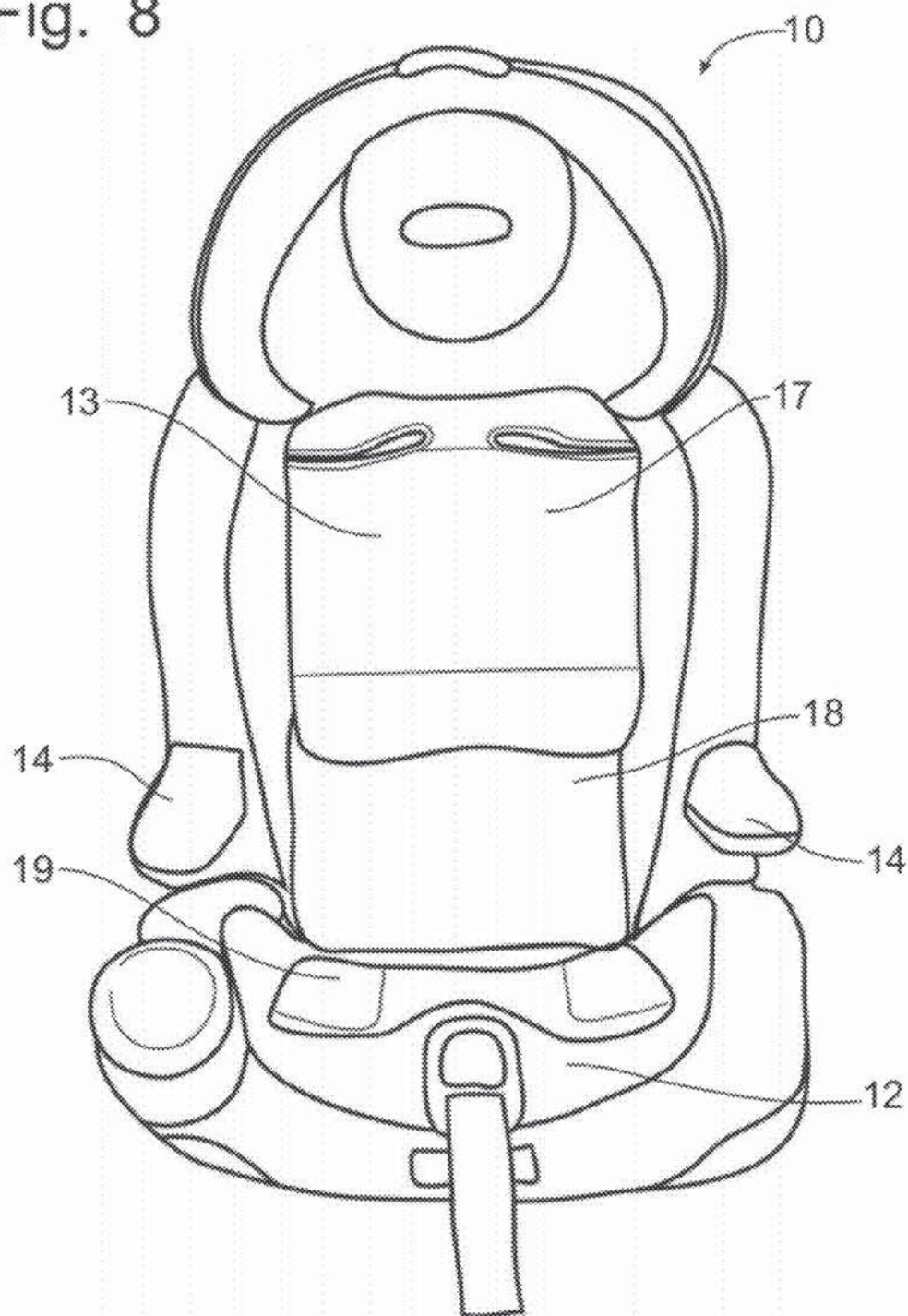


Fig. 8



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**HARNESS STORAGE SYSTEM FOR CHILD
CAR SEATS****CROSS-REFERENCE TO RELATED
APPLICATIONS**

This application claims domestic priority on U.S. Provisional Patent Application Ser. No. 61/191,607, filed on Sep. 10, 2008, the contents of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates generally to a car seat for use in transporting children in an automobile, and, more particularly, to a five-point harness storage system to allow the car seat to be converted from a car seat for small children to a belt positioning booster for larger children.

BACKGROUND OF THE INVENTION

Car safety seats for children are commercially available in a many configurations corresponding to differences in the age, weight, and size of the child being transported. Parents can choose a car seat that is not only the correct size for their child and their vehicle, but one that also suits their tastes, budget, and life style. As children grow in size and maturity level, they need different kinds of car seats. For example, a child may initially use a rearwardly facing infant car seat, then graduate to a forward facing toddler seat with an integrated harness, and finally to a belt positioning booster seat utilizing the vehicle's lap and shoulder belt system before being able to safely use the vehicle's seat belts alone.

There are many car seats on the market that can be used in multiple configurations. For instance, a forward facing car seat with an integral five-point harness appropriate for a 20-40 pound child might accommodate a child weighing 30-100 pounds as a belt positioning booster seat with the removal of the harness and utilizing the vehicle's lap and shoulder belts. This is convenient for the care giver because it means fewer seats to purchase. Currently available car seats typically have a monolithic shell, i.e. the back and seat cannot be used separately. Some car seats are designed to have a no back base option, but are configured as a separate seat fastened under the monolithic seat and back, such as is disclosed in U.S. Pat. No. 4,754,999, issued on Jul. 5, 1998, to James Kain. The problem with this configuration is the redundancy of seats; one as part of the monolithic shell, and one as a seat only.

States review and regulate restraint age limits and weight requirements. With continuing age and weight increases for recommendations in child restraint safety, a variety of restraint sizes are needed to accommodate the increasing span of children needing car seat safety restraints. The shoulder height and proper placement of belt paths are critical to the safety function of car seat restraints for use with smaller children, but when the car seat is to be utilized as a belt positioning booster, the five-point harness is cumbersome and cannot be simply left on the seat. One option to convert a car seat having a five-point harness to a belt positioning booster is to disconnect the five-point harness from the car seat shell and store the harness at a remote location. Of course, the disconnected harness can be lost, misplaced or accidentally thrown out, preventing the car seat to be reconverted back from the belt positioning booster mode to the car seat configuration.

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It would also be desirable to provide a five-point harness storage system that will permit a quick and effective conversion of the car seat into a belt positioning booster without requiring the harness to be removed from the car seat shell.

SUMMARY OF THE INVENTION

It is an object of this invention to overcome the aforementioned disadvantages of the prior art by providing a car seat that can be easily converted into a belt positioning booster configuration without requiring the removal of the five-point harness from the car seat shell.

It is another object of this invention to provide a harness storage system in a child's car seat to allow the five-point harness to be stowed out of the way without requiring the harness to be removed from the car seat shell.

It is a feature of this invention that the shell of the car seat is formed with a storage cavity into which the harness buckle and chest clip assembly can be deployed when the car seat is converted into a belt positioning booster configuration.

It is an advantage of this invention that the five-point harness does not have to be removed from the car seat shell to allow the car seat to be converted into a belt positioning booster configuration.

It is another feature of this invention that the storage cavity is constructed with a hinged door to cover the storage cavity when the car seat is in use in any configuration.

It is another advantage of this invention that the storage of the five-point harness within the car seat shell will prevent the harness from being lost in the event re-configuration of the belt positioning booster back to a car seat is needed.

It is still another advantage of this invention that the conversion of the belt positioning booster into a car seat configuration can be accomplished quickly and easily without requiring a the five-point harness to be retrieved from a remote location.

It is still another object of this invention to provide a method of converting a car seat between a car seat configuration and a belt positioning booster configuration.

It is still another feature of this invention that the method of conversion includes a re-positioning of the five-point harness into a storage cavity formed into the car seat shell to hide the harness from view.

It is yet another feature of this invention that the harness belts project out of the harness storage cavity so that the harness belts can be retained on the car seat shell.

It is yet another advantage of this invention that only the chest clip and the harness buckle are located within the harness storage cavity.

It is yet another advantage of this invention that the re-conversion of the car seat from a belt positioning booster into a car seat configuration will not risk an improper connection of the five-point harness onto the car seat shell.

It is a further feature of this invention that the five-point harness is never disconnected from the car seat shell to convert the car seat into a belt positioning booster configuration.

It is a further advantage of this invention that the closed door over the harness storage cavity provides a smooth back support surface for the child in both the car seat and belt positioning booster configurations.

It is yet another object of this invention to provide a harness storage system for a car seat shell to permit the conversion of the car seat into a belt positioning booster, which is durable in construction, inexpensive to manufacture, carefree of maintenance, facile in assemblage, and simple and effective in use.

These and other objects, features and advantages are accomplished according to the instant invention by providing

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a car seat formed with a harness storage cavity in the car seat shell for placement of the five-point harness to permit the conversion of the car seat into a belt positioning booster configuration without requiring the harness to be removed from the car seat shell. The headrest and back panel pads on the back rest are removed to provide access to the harness storage cavity which is covered by a hinged door. The harness buckle and the chest clip, still attached to the harness webbing, are placed into the storage cavity and the door closed to provide a flush surface on the seat back so that the child has a smooth supporting surface. The harness webbing projects out of slots to allow the webbing to lie flat beneath the headrest and back panel pads when replaced over the closed door to the storage cavity.

BRIEF DESCRIPTION OF THE DRAWINGS

The advantages of this invention will be apparent upon consideration of the following detailed disclosure of the invention, especially when taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a front elevational view of a car seat incorporating the principles of the instant invention, the car seat being placed in a car seat mode of operation with a five-point harness exposed for utilization to secure a small child;

FIG. 2 is an enlarged partial front elevational view of the seat portion of the car seat to depict the disconnection of the crotch harness from the car seat shell to start the conversion of the car seat into a belt positioning booster configuration;

FIG. 3 is a partial front elevational view of the car seat to depict the step of disconnecting and raising the head rest pad to permit a re-positioning of the harness webbing;

FIG. 4 is an enlarged partial front elevational view of the car seat to depict the disconnection and displacement of the back panel pad to gain access to the harness storage cavity formed into the car seat shell in the back rest;

FIG. 5 is an enlarged front elevational view of the lower part of the back rest with the back panel pad removed and the hinged door opened to permit the placement of the harness buckle and the chest clip into the opened harness storage cavity;

FIG. 5A is an enlarged front elevational view similar to that of FIG. 5 to show the harness storage cavity, the harness being broken away for purposes of clarity in depicting the harness storage cavity;

FIG. 6 is an enlarged front elevational view similar to that of FIG. 5 but with the harness buckle and chest clip stowed in the harness storage cavity with the hinged door closed to provide a smooth back rest support surface, the harness webbing projecting out of slots formed in the respective corners of the storage cavity;

FIG. 7 is a front elevational view of the car seat with the pads removed to shown the storage of the harness into the harness storage cavity before the pads are replaced; and

FIG. 8 is a front elevational view of the car seat with the conversion into the belt positioning booster configuration completed.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1-8, a car seat incorporating the principles of the instant invention can best be seen. The car seat 10 is constructed to include a generally horizontal seat member 12, a generally vertical back rest 13 projecting upwardly from the rear portion of the seat member 12, and preferably a pair of arm rests 14 on the laterally opposing

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sides of the seat member 12. The car seat 10 can also include a head rest 15 that is mounted on the upper portion of the seat back 13 and can be vertically positionally adjustable relative to the seat back 13 to accommodate and properly support growing children. The car seat 10 is generally formed with a rigid shell 16 defining the external surfaces of the car seat 10 but padding is mounted on the shell 16 to provide a soft surface on which the child is supported while seated in the car seat 10. The padding includes, among others, a head rest pad 17, a back panel pad 18 and a seat pad 19.

The car seat 10 is provided with a harness, for example a five-point harness 20 that includes a pair of generally vertically oriented shoulder straps 21 connected to the shell 16 at the back rest 13, a pair of generally horizontally oriented belt straps 22 connected to the shell 16 at the rear of the seat member 12, and a crotch strap 23 that is coupled to the shell 16 at the forward portion of the seat member 12. One skilled in the art will recognize that the shoulder strap 21 and the belt strap 22 on each respective side of the car seat 10 are formed from a single harness web that has a opposing ends connected to the seat shell 16 at appropriate locations. Each harness web forming a shoulder strap 21 and a corresponding belt strap 22 has mounted thereon a latch member 24 and a chest clip 26. The crotch strap terminates in a harness buckle 25, which can be positionally adjusted to accommodate a growing child. When fastened around a child to secure the child in the car seat 10, the chest clips 26 are connected together to interconnect the shoulder straps 21 and the latch members 24 are snapped into engagement with the harness buckle 25 to secure the shoulder straps 21 and the belt straps 22 to the crotch strap 23 and complete the five-point harness connection.

The car seat 10 is shown in FIG. 1 in its car seat configuration with the five-point harness 20 available for securing small children into the car seat 10. When the child grows to an adequate age and size, according to state regulations, the child can be positioned in a booster seat so that the child can be positioned high enough for proper engagement and support from the vehicle's seat and shoulder belts. The car seat 10 can be utilized as a belt positioning booster, but the five-point harness 20 would not be used in such a configuration and if the harness 20 were simply left on the padding behind the child, the child would have an uncomfortable seat and would not be provided with a smooth supporting surface on which the child may be secured for transportation in the vehicle.

To accommodate the five-point harness 20, the shell 16 of the back rest 13 is formed with a harness storage cavity 30 in the lower, central portion thereof, as is best seen in FIGS. 5 and 5A. The harness storage cavity 30 is formed to receive the latch members 24, the harness buckle 25 and the chest clips 26 therein. A cover 32, preferably in the form of a hinged door, though other attachment concepts, such as hook and loop fasteners, friction fit, etc., could also be applied to the cover 32 to make it selectively removable from the shell 16 to expose the harness storage cavity 30 under the cover 32. As best seen in FIGS. 5 and 5A, the door 32 is preferably formed with a deflector latch 33 that is arranged to engage the shell 16 when the door 32 is closed to secure the door 32 in place against the shell 16. The harness storage cavity 30 is also formed with slots 34 in the top and bottom areas for passage of the harness webbing members 21, 22, which will remain connected to the harness buckle 25, latch members 24 and chest clips 26, as will be described in greater detail below.

To convert the car seat from the car seat configuration shown in FIG. 1 to the belt positioning booster configuration shown in FIG. 8, the harness 20 is stored in the harness storage cavity 30. The first step, as depicted in FIG. 2, is to remove the crotch strap 23 from the forward portion of the seat shell 16.

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In the alternative, the crotch strap 23 can be lengthened and passed underneath the seat pad 19 to exit at the rear of the seat pad 19 so that the harness buckle 25 can reach the harness storage cavity 30. In most situations, the crotch strap 23 is most easily disconnected from the seat shell 16. The head rest pad 17 is then loosened from the other adjacent padding members and folded upwardly over the head rest 15, or the back of the back rest 13, as is depicted in FIG. 3. The movement of the head rest pad 17 positions the shoulder straps 21 against the back rest shell 16.

As best seen in FIGS. 3 and 4, the back panel pad 18 is loosened from the adjacent padding members and either removed, or preferably, folded over onto the seat pad 19. The removal of the back panel pad 18 results in the belt straps 22 being positioned against the back rest shell 16. The respective chest clips 26 are connected together to draw the shoulder straps 21 inwardly toward the center of the back rest 13, and the latch members 24 are clipped into engagement with the harness buckle 25.

As reflected in FIG. 5, the cover 32 over the harness storage cavity 30 is removed, or in the preferred embodiment opened against the hinges to expose the harness storage cavity 30 formed in the back rest 13. As shown in FIGS. 5 and 5A, the harness storage cavity 30 can be configured as a generally rectangular cavity having a size that will accommodate the receipt of both the connected chest clips 26 and the connected latch members 24 and harness buckle 25. Alternative, the storage cavity 30 can be formed in specific shapes to register with the shape of the connected chest clips 26 and the connected latch members 24 and harness buckle 25, so that the closure of the cover 32 would trap these harness components securely within the harness storage cavity. At the upper left and right corners and at the lower left and right corners, the storage cavity 30 is formed with slots 34 that are sized to receive and allow the passage of the shoulder straps 21 and the belt straps 22, respectively, from the harness storage cavity 30.

As a result, as best seen in FIGS. 6 and 7, the closure of the door 32 against the shell 16 hides the chest clips 26, the latch members 24 and engaged harness buckle 25 internally of the harness storage cavity 30 with the shoulder straps 21 and belt straps 22 projecting out of the storage cavity 30 at the top and bottom thereof. Tightening of the straps 21, 22, positions the shoulder straps 21 and the belt straps 22 against the shell 16. The crotch strap 23 can be rolled into the harness storage cavity 30 with the harness buckle 25 if disconnected from the seat shell 16. With the door 32 closed, the seat back again provides a smooth support surface against which a child can be seated for comfortable transportation. Replacement of the back panel pad 18 and then the head rest pad 17 completes the covering of the harness webbing and presents a clean belt positioning booster configuration devoid of the five-point harness 20, as can be seen in FIG. 8.

The re-conversion of the belt positioning booster configuration to the car seat configuration is done in the same manner as above, only to remove the harness 20 from storage in the shell 16. As noted above, the head rest pad 17 and the back panel pad 18 are disconnected from the adjacent padding members and moved aside to expose the shell 16 and the closed cover 32. The door 32 is then opened to expose the stored chest clips 26, latch members 24 and harness buckle 25, which are withdrawn from the harness storage cavity 30. The belt straps 22 are then worked around the back panel pad 18 so that the back panel pad 18 can be re-connected to the adjacent padding with the belt straps 22 on the outside of the back panel pad 18. The same re-positioning is done with the shoulder straps 21 and the head rest pad 17 replaced with the

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shoulder straps 21 on the outside of the head rest pad 17. The crotch strap 23 is then reconnected to the front portion of the seat shell 16, and all straps 21-23 adjusted in length to accommodate the child to be secured into the car seat by the now functioning five-point harness 20.

It will be understood that changes in the details, materials, steps and arrangements of parts which have been described and illustrated to explain the nature of the invention will occur to and may be made by those skilled in the art upon a reading of this disclosure within the principles and scope of the invention. The foregoing description illustrates the preferred embodiment of the invention; however, concepts, as based upon the description, may be employed in other embodiments without departing from the scope of the invention.

Having thus described the invention, what is claimed is:

1. A car seat for transporting a child in an automobile, comprising:

seat member having a first portion of a rigid shell;
a back rest projecting upwardly from a rear portion of said seat member and having a second portion of said rigid shell;

a harness including a pair of laterally spaced shoulder straps supported at one end from said rigid shell and terminating at an opposing end as belt straps supported from said rigid shell, said harness also including a crotch strap connected to said first portion of said rigid shell, said harness further including a pair of latch members, each said latch member being connected to one of said shoulder straps, said latch members being engagable with a harness buckle connected to said crotch strap; and
a harness storage cavity formed in said rigid shell and including a cover forming a smooth support over said harness storage cavity, said harness storage cavity being sized to receive said latch members and said harness buckle below said cover, said harness cavity further being formed with slots to permit said shoulder straps and said belt straps to project from said harness storage cavity when said cover is closed and said harness buckle and said latch members are positioned within said harness storage cavity.

2. The car seat of claim 1 further comprising:

a back panel pad and a head rest pad being supported on said rigid shell, each of said back panel pad and said head rest pad being selectively removable from said rigid shell; and

each said latch member being connected to one of said shoulder and the corresponding said belt strap, said shoulder straps and said belt straps being positionable behind said back panel pad and said head rest pad and against said rigid shell to permit said harness to be stored in said harness storage cavity with said shoulder straps and said belt straps projecting out of said harness storage cavity along said rigid shell.

3. The car seat of claim 2 wherein said cover is a hinged door having a latch member engagable with said rigid shell to secure said door in a closed position against said rigid shell.

4. The car seat of claim 2 wherein said harness storage cavity is located in said back rest, said harness further including a chest clip engaged with each said shoulder strap, said chest clips being engagable with one another to secure said shoulder straps together, said harness storage cavity being sized to receive said chest clips within said harness storage cavity with said latch members and said harness buckle.

5. The car seat of claim 4 wherein said chest clips are engaged and said latch members are engaged with said harness buckle before being placed into said harness storage cavity for storage therein.

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6. In a car seat having a seat back supported on a seat member and projecting upwardly therefrom, said seat member having a first portion of a rigid shell and a seat pad mounted on the rigid shell, said back rest having a second portion of a rigid shell on which a back panel pad and a head rest pad are supported, each of said back panel pad and said head rest pad being selectively removable from said rigid shell; and a harness including a pair of laterally spaced shoulder straps supported from said rigid shell, a pair of laterally spaced belt straps connected to said rigid shell, and a crotch strap connected to said rigid shell, said harness including a pair of latch members, each said latch member being connected to one of said shoulder straps and to a corresponding said belt strap, both said latch members being engagable with a harness buckle connected to said crotch strap, the improvement comprising:

a harness storage cavity formed in said rigid shell and including a cover forming a smooth support when closed over said harness storage cavity, said harness storage cavity being sized to receive said latch members or said harness buckle, said shoulder straps and said belt straps are positionable behind said back panel pad and said head rest pad and against said rigid shell to permit said latch members or said harness buckle to be stored in said harness storage cavity with said shoulder straps and said belt straps projecting out of said harness storage cavity along said rigid shell.

7. The car seat of claim 6 wherein each said shoulder strap and a corresponding belt strap are formed from a single piece of webbing having one of said latch members mounted thereon, each said piece of webbing forming a shoulder strap and corresponding belt strap further including a chest clip mounted on said shoulder strap for engagement with the chest clip on the opposing said shoulder strap to secure said shoulder straps together.

8. The car seat of claim 7 wherein said harness storage cavity is sized to receive said chest clips within said harness storage cavity with said latch members.

9. The car seat of claim 8 wherein said chest clips are engaged and said latch members are engaged with said harness buckle before being placed into said harness storage cavity for storage therein.

10. The car seat of claim 6 wherein said harness storage cavity being formed with slots to permit the passage of said shoulder straps and said belt straps from said harness storage cavity.

11. The car seat of claim 10 wherein said cover is a hinged door having a latch member engagable with said rigid shell to secure said door in a closed position against said rigid shell.

12. A child car seat for transporting a child in an automobile having a vehicle belt comprising:

a seat member and a back rest connected to said seat member;

a harness including a pair of laterally spaced shoulder straps supported from said back rest and a crotch strap supported on said seat member, a pair of latch members mounted on said shoulder straps, respectively, and a harness buckle connected to said crotch strap; and

a harness storage cavity formed as a recess in said child car seat and including a cover forming a smooth support over said harness storage cavity, said harness storage cavity being sized to receive at least one of said harness buckle and said latch members below said cover, said child car seat being convertible between a car seat configuration in which said latch members are connectable to said harness buckle for securing said child on said

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child car seat, and a belt positioning booster configuration in which at least said latch members or said harness buckle are stored within said harness storage cavity with said shoulder straps and said belt straps projecting out of said harness storage cavity through slots formed in said harness storage cavity when said cover is closed and said harness buckle and said latch members are positioned within said harness storage cavity so that said child can be secured to the child seat via the vehicle belt.

13. A method of converting a car seat from a car seat configuration into a belt positioning booster configuration, said car seat having a first portion of a rigid shell and a seat pad mounted on the first portion of said rigid shell, a back rest having a second portion of said rigid shell on which a back panel pad and a head rest pad are supported, each of said back panel pad and said head rest pad being selectively removable from said rigid shell; and a harness including a pair of laterally spaced shoulder straps connected to said rigid shell, a pair of laterally spaced belt straps connected to said rigid shell, and a crotch strap supported from said rigid shell, said harness including a pair of latch members, each said latch member being connected to one of said shoulder straps and a corresponding said belt strap, both said latch members being engagable with a harness buckle connected to said crotch strap, comprising the steps of:

storing said harness buckle and said latch members in a harness storage cavity formed as a recess in said rigid shell, including the steps of:

opening a cover to provide access to said harness storage cavity;

placing said latch members and said harness buckle into said harness storage cavity; and

closing said cover over said harness storage cavity to conceal said harness buckle and latch members behind said cover; and

locating all of said straps projecting from slots formed in said harness storage cavity between said pads and said rigid shell to conceal said harness behind said pads.

14. The method of claim 13 wherein said locating step includes the steps of:

repositioning said shoulder straps and said belt straps behind said head rest pad and said back panel pad to be located against said rigid shell.

15. The method of claim 14 wherein said locating step further includes the step of:

disconnecting said crotch strap from said first portion of said rigid shell; and

positioning said crotch strap within said harness storage cavity with said harness buckle.

16. The method of claim 14 wherein said harness further includes a chest clip attached to each said shoulder strap, said storing step further including the step of:

setting said chest clips into said harness storage cavity with said latch members and said harness buckle.

17. The method of claim 16 wherein said storing step further includes the steps of:

attaching said chest clips together before said setting step; and

connecting said latch members to said harness buckle before said placing step.

18. The method of claim 17 wherein said shoulder straps and said belt straps project from said harness storage cavity through slots formed in said harness storage cavity beneath said cover.

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