A child restraint seat unit has adjustable shoulder straps coupled to an adjustable strap that extends between the child’s legs and is coupled to a contoured console that automatically separates the child’s legs into a proper position and orientation when the seat belt system is operated. The straps are adjusted by means of a motorized unit coupled to the belts and having controls on the side of the safety seat in position for easy access by an adult, but which have anti-tampering protection so the child is not able to operate the controls. The motorized unit is located on the seat so the entire seat can be moved as a unit into and out of a desired location in the vehicle.
SELF-CONTAINED MULTI-ADJUSTABLE CHILD SAFETY SEAT

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to the general art of automotive accessories, and to the particular field of child safety seats.

BACKGROUND OF THE INVENTION

[0002] Today's passenger vehicles have a seat restraint device, commonly known as a “seat belt,” for each occupant the vehicle is designed to carry. However, use of a conventional seat restraint by a small child can result in serious injury to the child in the event of a collision or other accident. To mitigate this problem, child safety seats and other devices have been developed which improve the safety afforded the child passenger. Such safety seats are typically secured to the vehicle's passenger seats directly by the vehicle's seat belts.

[0003] Car seats are designed to be coupled to the seat of an automotive vehicle and are shaped to securely receive a child or infant thereon. A car seat typically includes a seat body having a seat back and a seat pan. A pair of harnesses extend from the seat back, over the shoulders of the occupant, and are releasably coupled to a buckle connected to the seat pan to securely retain the occupant in the car seat.

[0004] To maximize the child’s safety, it is recommended that the child, in an appropriately sized child safety seat, always be placed in the center position of the rear seat of the vehicle. In this position the child’s seat is secured with the lap belt and use of the 3-point restraint system is avoided. In this central position, the child’s safety seat is secured to the vehicle by threading one end (typically the longer, male end) of the vehicle’s seat belt through the appropriate slots in the safety seat and connecting this male end with the mating female end. Typically the loose, male end of the lap belt is pulled to tighten it.

[0005] According to the Governor’s Traffic Safety Committee of the New York State Department of Transportation: “The child safety seat should be attached as tightly as possible with the vehicle’s safety belt. The seat should not move more than 1 inch toward the front of the car or side to side.” In the recommended rear, center seat position, it is very difficult for an adult to bend over and lean inward to grasp the loose end of the lap belt and then generate sufficient pulling force to satisfactorily urge the child’s seat firmly down and rearward against the vehicle’s seat back. Because of this difficult access by an adult to the rear, center seat position, only rarely is a child’s safety seat properly and safely installed.

[0006] Each shoulder harness has an effective length which can be defined as the length of the harness extending from the buckle or seat pan to the seat back of the car seat. In many existing car seats, the effective length of the harnesses cannot be easily adjusted, which requires an occupant to squeeze into or out of the harness when entering or exiting the car seat. Alternately, the effective length of conventional shoulder harness systems can be adjusted by releasing the overall tension in the harness system. However, this method for increasing the effective length of the harnesses has several drawbacks. Firstly, the tension release mechanism may be awkward to access and operate. Secondly, once the tension of the harnesses is released, the tension must then be reset or re-established when an occupant is again placed into the car seat, and it can be difficult and time consuming to set the harness to the precise desired tension.

[0007] An inherent problem with car seat restraining harnesses is the difficulty encountered in properly adjusting the harness. An improperly adjusted harness may potentially negate the safety benefits of the restraint device and may also cause injury to the child. A child in an improperly secured harness may have a tendency to slip sideways within the harness. Furthermore, the harness may rope or twist, turning the harness into a cutting edge. Also, a harness which is too loose will permit the child to slip down and forward in the direction of his/her knees and legs.

[0008] Accordingly, there is a need for a car seat having shoulder harnesses that can be adjusted to allow easy insertion and removal of the occupant without requiring resetting of the tension of the harness.

[0009] Many child car seats are formed to include several sets of shoulder belt-receiving apertures in a back wall of the car seat so that the car seat can be adapted by a user to restrain children of different sizes. To accommodate an infant, the two shoulder belts are uncoupled from other portions of the car seat harness, passed through a lowest pair of shoulder belt-receiving apertures formed in the back wall of the car seat, and then recoupled to the car seat harness.

[0010] As the infant grows, the caregiver must repeat the belt installation procedure described above using other higher sets of belt-receiving apertures formed in a higher portion of the back wall of the car seat to enlarge the child car seat harness to accommodate the growing child. Many caregivers would welcome a car seat that is adaptable to hold infants, toddlers, and juveniles and, in particular, is adaptable to adjust the size of the child-restraint harness quickly and easily to accommodate children of various sizes in the child car seat.

[0011] Furthermore, even if the seat belt system is adjustable, it must account for all areas of the child. Thus, for example, while the shoulders of the child should be securely fastened in place on the seat, the child’s lower body should also be accurately fastened in place. The inventor is not aware of any prior art child restraint seat that accurately controls both the shoulder and the lower body portion of the child.

[0012] There is a further need for a car seat which will make adjusting the seat restraint system easy and accurate.

[0013] In addition to properly securing the child in place in the seat, the seat should also ensure that the child is properly oriented in place so the protection of the seat is maximized. The inventor is not aware of any child seat restraint system that not only accurately secures all portions of the child’s body, but also properly orients the child in place in the seat.

[0014] There is a further need for a car seat which will automatically orient the child in the proper position during adjustment of the seat belt.

SUMMARY OF THE INVENTION

[0015] These, and other, objects are achieved by a child restraint seat unit that has adjustable shoulder straps coupled to an adjustable strap that extends between the child’s legs and is coupled to a contoured console that automatically separates the child’s legs into a proper position and orientation when the seat belt system is operated. The straps are adjusted by means of a motorized unit coupled to the belts and having controls on the side of the safety seat in position for easy access by an adult, but which have anti-tampering protection so the child is not able to operate the controls. The motorized
The unit is located on the seat so the entire seat can be moved as a unit into and out of a desired location in the vehicle. 

Other systems, methods, features, and advantages of the invention will be, or will become, apparent to one with skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features, and advantages be included within this description, be within the scope of the invention, and be protected by the following claims.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

The invention can be better understood with reference to the following drawings and description. The components in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention. Moreover, in the figures, like referenced numerals designate corresponding parts throughout the different views.

FIG. 1 is a perspective view of a child safety seat unit embodying the principles of the present invention.

FIG. 2 is a side elevational view of the child safety seat unit of the present invention.

FIG. 3 is a front elevational view of the child safety seat showing the console thereof connected to the straps thereof.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the figures, it can be understood that the present invention is embodied in a child automotive safety seat unit 10 that can be adjusted to exactly fit the child so a child, no matter what his or her size, will be snugly and safely held in the seat unit. The unit is also self-contained and easily adjusted as necessary.

Seat 10 includes a frame unit 20 which has a seat section 22 on which the child sits when the seat is in use and a back section 24 which supports the child’s back when the seat unit is in use. The seat section and back section can include suitable cushions such as cushion 26 and cushion 28 or the like as is commonly found on child safety seats.

A console 40 is located on the seat section and includes two arcurate cutout sections 42 and 44 which accommodate the child’s legs when the child sits on the seat unit. The cutout sections are spaced apart from each other so the child’s legs will be separated from each other when the child sits on the seat unit. This will ease the placement of the child on the seat and, as will be understood from the teaching of this disclosure, will allow the straps and buckles of the seat unit 10 to be efficiently locked and unlocked.

Seat unit 10 further includes a first strap 50 movably mounted on the seat unit to move toward and away from the back section as indicated by arrows 50F and 50S in FIG. 2. This movement allows strap 50 to be properly positioned relative to the child to properly and snugly hold the child in the seat unit. Strap 50 extends through an opening 52 defined through console 40 and has one end 54 located inside the seat section of the seat unit and a second end 56 spaced above the console. Strap 50 can also move toward and away from the console as indicated by double-headed arrow 58 in FIG. 1 so strap 50 can be further adjusted to snugly and securely accommodate a child when the seat unit is in use.

A joint element 60 is connected to second end 56 of strap 50 and releasably connects second ends 70 and 72 of shoulder straps 80 and 82 to the first strap to strap a child into the seat unit. Straps 80 and 82 are identical and each has a second end, such as second end 84 of strap 80, located inside back section 24. A cross strap 90 connects the two shoulder straps together to securely strap a child into the seat unit and includes a buckle 92 so the cross strap can be buckled and unbuckled as required to strap a child into the seat unit or to remove the child from the seat unit. The shoulder straps 80 and 82 are movably mounted on the frame unit to move toward and away from the back section as indicated by double-headed arrow 94 in FIG. 1 and by arrows 96 and 98 in FIG. 2.

Movement of the shoulder straps is controlled by a control system 100 that includes a motor unit 102 mounted on the frame unit, such as in the back section, and which is connected to the second ends of the shoulder straps and to end 54 of first strap 50 to move those straps as discussed above and as indicated by the arrows in the figures when the motor unit is activated. A power source, such as a battery 110, is mounted on the frame unit, such as in the back section, and is electrically connected to the motor unit by a control unit 120 located on the frame unit, such as on the seat section to be controlled thereby. With the exception of the motor unit being located onboard the safety seat, the exact details of the motor unit are not important to the present invention and thus will not be described or claimed, it being noted only that the motor unit can be similar to the motor unit shown and described in known literature, such as U.S. Pat. No. 7,059,676, the disclosure of which is incorporated herein by reference. An on/off switch 130 is located on the frame unit in a position that is not easily accessible to a child sitting in the seat unit and is electrically connected to the control unit 120 to lock that control unit in a set configuration so once set a child cannot tamper with the controls and move the straps of the seat unit.

While various embodiments of the invention have been described, it will be apparent to those of ordinary skill in the art that many more embodiments and implementations are possible within the scope of this invention. Accordingly, the invention is not to be restricted except in light of the attached claims and their equivalents.

What is claimed is:

1. A child automotive safety seat unit comprising:
   a seat section which includes a leg separating console which separates a child’s legs when the child sits on the seat section;
   a back section against which the child leans when the child sits on the seat section;
   a first strap having a first end movably connected to the console to move toward and away from the back section, and a second end which is spaced apart from the console when in use;
   a shoulder strap which includes two shoulder straps, each shoulder strap having a first end connected to the second end of the first strap when the first strap is in use and a second end located inside the back section;
   a motor unit located in the back section and connected to the second end of each shoulder strap and to the first strap, each shoulder strap being movably mounted on the back section to move the first end of each shoulder strap toward and away from the back section when the
motor is activated, the first strap having the first end thereof connected to the motor unit to be moved toward and away from the back section when the motor unit is activated;
a battery mounted on the seat section; and
controls mounted on the seat section and electrically connecting the battery to the motor unit to control the motor unit.

2. The child automotive safety seat defined in claim 1 further including a cross strap connecting the second straps together.

3. The child automotive safety seat defined in claim 2 further including a joint element connecting the first strap to the second straps.

4. The child automotive safety seat defined in claim 3 wherein the consol includes two C-shaped compartments which accommodate the child’s legs when in use.

5. A child automotive safety seat unit comprising:
a frame unit which includes
a seat section on which a child sits during use, and
a back section;
a consol on the seat section which separates the child’s legs from each other when the child sits on the seat section;
a first strap movably mounted on the seat section to move toward and away from the back section;
two shoulder straps each of which is movably mounted on the back section to move toward and away from the back section;
a motor unit mounted on the frame unit and connected to the first strap and to each of the two shoulder straps to move the straps when the motor unit is activated;
a battery mounted on the frame unit section; and
a control unit mounted on the frame unit and electrically connecting the battery to the motor unit.

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