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NHTSA-1998-3390-4  
NCC-20

DEPARTMENT OF TRANSPORTATION  
98 FEB 11 AM 11:14  
DOCKET SECTION

January 5, 1998

Mr. John Womack  
Acting Chief Counsel  
US Department of Transportation  
National Highway Traffic Safety Administration  
400 Seventh Street SW  
Washington, DC 20590

Subject: Britax Patents on ISOFIX

Dear Mr. Womack:

This responds to the Agency's request for clarification concerning Britax patents held with respect to ISOFIX style child restraint connectors' hereinafter referred to as "ISOFIX connectors."

If ISOFIX connectors are promulgated into a US Federal Motor Vehicle Safety Standard, Britax International plc and all its subsidiaries, hereinafter referred to as "Britax," waive all patent rights to ISOFIX connectors described in the attached patents 5,524,965, 5,487,588, and 5,466,044.

I hereby certify that as a company officer I am authorized by Britax to transmit this waiver of patent rights.

If you or your staff have any questions or need further clarifications please feel free to contact me at (803) 802-2022.

Sincerely,

Thomas C. Baloga, **President**  
Britax Child Safety

Attachments: US Patents 5,524,965, 5,487,588, and 5,466,044  
cc: George Mouchahoir, NHTSA

<sup>1</sup> ISOFIX style connectors is defined as child restraint connectors attaching in a removable fashion to nominal 6 mm horizontal round bars separated by 280 mm in the vehicle seat bight (i.e. cushion/backrest Interface area).



**United States Patent** [19]  
**Burleigh et al.**

[11] **Patent Number:** \$487,588  
[45] **Date of Patent:** Jan. 30, 1996

[54] **CHILD SAFETY SEAT**

[75] Inventors: **David W. Burleigh**, Bognor Regis, England; **Waldemar Czernakowski**, Blaustein; **Hermann Wetter**, Ulm, both of Germany

[73] Assignees: **Britax-Excelsior Limited**, England; **Britax Romer Kindersicherheit GmbH**, Germany

[21] Appl. No.: **215,808**

[22] Filed: Mar. 22, 1994

[30] **Foreign Application Priority Data**

Apr. 8, 1993 [GB] United Kingdom . . . . . 9307446

[51] Int. Cl.<sup>6</sup> . . . . . **B60N 2/28**

[52] U.S. Cl. . . . . **297/253; 297/256.14; 297/250.1**

[58] Field of Search . . . . . **297/250.1, 252, 297/253, 256.1, 256.14, 216.11, 216.1, 256.17, 130, 118, 68; 296/63, 64; 280/801.1**

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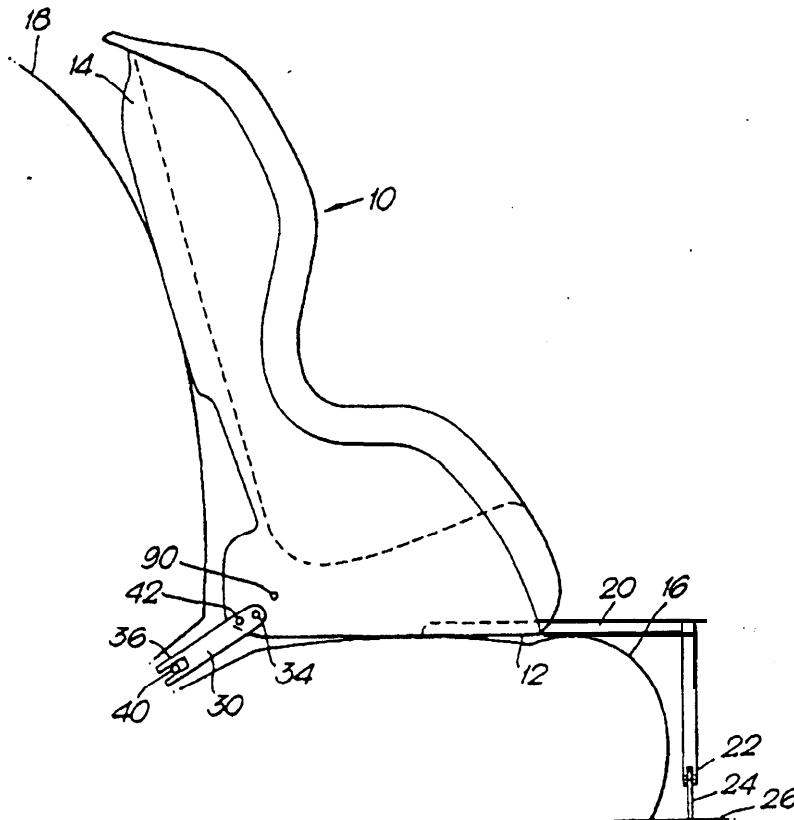
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1571 ABSTRACT

A child safety seat for use in a vehicle comprises a scat body, having a scat potion and a backrest portion. In order to connect the seat body to a motor vehicle, a pair of attachment buckles are mounted by rigid links on opposite sides of the seat body for movement between first and second positions. In the first position, the buckles project rearwardly so as to be engagable with two anchorage units which are rigidly fixed to the vehicle body so as to be accessible between the scat portion and the backrest potion of the vehicle seat. In the second position, the buckles provide support for guides for an adult scat belt.

18 Claims, 7 Drawing Sheets



# 1 CHILD SAFETY SEAT

## FIELD

This invention relates to a child safety seat for use in a vehicle of the type comprising a seat body having a seat portion and a backrest portion, and releasable coupling means for connecting the seat body to a motor vehicle.

## RELATED ART

It is well known for the coupling means of a seat of this type to comprise an adult seat belt, the child seat resting on the corresponding vehicle seat. The disadvantage of this arrangement is that, even if the adult belt is pulled very tight during installation, the resilience of both the vehicle seat and the belt will permit undesirable movement of the child seat relative to the vehicle in the event of sudden deceleration, for example during an accident. In order to overcome this disadvantage, it has been proposed to provide motor cars with anchorage units which are rigidly secured to the vehicle body at agreed locations for engagement by releasable connectors which are rigidly coupled to a child's seat. Such anchorage units will be referred to hereinafter as "standard anchorage units". The present invention is concerned with the provision of a child's seat which can be used with both of the foregoing mounting arrangements.

## SUM-MARY OF THE INVENTION

According to the invention, the releasable coupling means comprises a pair of attachment buckles mounted by means of rigid links on opposite sides of the seat body for movement between a first position in which they project rearwardly so as to be engageable with two standard anchorage units which are accessible between the seat portion and the backrest portion of the vehicle seat and a second position in which they provide support for guide means for an adult seat belt.

This arrangement has the advantage that the same load-bearing attachments to the seat body are used both when the seat is attached to standard anchorage units in a vehicle and when it is secured to the vehicle using an adult seat belt.

Preferably, releasable means are provided for securing each of the attachment buckles either in its first position or in its second position.

The guide means for adult seat belt may be integral with the attachment buckles. Alternatively the guide means may comprise a respective detachable guide unit for each attachment buckle adapted to be engaged by the latching mechanism thereof.

In one form of the invention, the final stage of the movement of the attachment buckles into their second position is arranged to apply additional tension to the adult seat belt if it is fastened before such final stage of movement is completed.

Preferably, the child's seat is provided with a third attachment buckle mounted on a projection extending forwardly and downwardly so as to be engageable with a third standard anchorage unit disposed adjacent to the front edge of the seat portion and below the top surface thereof even when the seat cushion is compressed to its maximum extent.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a forward facing child's safety seat in accordance with the invention with its attach-

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ment buckles oriented to engage with standard anchorage units;

FIG. 2 is a side view showing the seat of FIG. 1 mounted on the vehicle using standard anchorage units;

FIG. 3 is a side view of one of the attachment buckles of the seat shown in FIGS. 1 and 2 engaged with an anchorage unit which is secured to a vehicle;

FIG. 4 is a front view of the attachment buckle shown in FIG. 3

FIG. 5 is a partially broken away perspective view of the attachment buckle shown in FIGS. 3 and 4;

FIG. 6 is a perspective view of the seat shown in FIG. 1 with its attachment buckles in the orientation for use within adult seat belt;

FIG. 7 is a side view, similar to FIG. 2 but with its attachment buckles in the orientation shown in FIG. 6 and with the adult seat belt omitted;

FIG. 8 is a partially broken-away side view of a belt guide fitted to one of the rear attachment buckles of the seat shown in FIG. 6;

FIG. 9 is a cross-sectional view taken on the line 9-9 in FIG. 7;

FIG. 10 and 11 are side views, corresponding respectively to FIGS. 2 and 7, of a rearward facing child's safety in accordance with the invention; and

FIG. 12 and 13 are side views, corresponding respectively to FIGS. 2 and 7, of a forward facing child's safety seat in accordance with the invention, with attachment buckles having integral bell guides.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 and 2, a child seat 10 comprises a shell having a seat portion 12 and a backrest portion 14. The seat 10 is fitted with a conventional harness (not shown) for a child occupant.

In use, the seat 10 is positioned on a vehicle seat with its seat portion 12 resting on the seat portion 16 of the adult seat and its backrest 14 resting against the backrest 18 of the adult seat. The seat 10 has a forwardly projecting L-shaped leg 20 which is rigidly secured to the underside of the seat portion 12 and has an attachment buckle 22 on its free end. FIG. 2 shows the buckle 22 in engagement with a front anchorage unit 24 secured to the floor 26 of the vehicle closely adjacent to the front edge of the seat portion 16 of the adult seat.

The seat 10 also has a pair of buckle links 30 and 32, each of which is mounted by a respective pivot pin 34, 35 on a respective side of the seat 10 adjacent to the junction between the seat portion 12 and the backrest 14 thereof. Each of the buckle links 30 and 32 carries a buckle 36 on its free end. Each of the buckles 36 engages with a respective rear anchorage unit 40 which is accessible between the seat portion 16 and the backrest 18 of the adult seat. The buckle link 30 is secured in the orientation shown in FIGS. 1 and 2 by a screw 42 which engages in a tapped hole 44 (visible in FIG. 7). A similar screw (not shown) secures the other buckle link 32 in the orientation illustrated.

FIGS. 3 to 5 illustrate the buckle 22 and the front anchorage unit 24 in more detail. The anchorage unit 24 consists of a U-shaped rod-like member secured to the vehicle floor 26 by the ends of its limbs with its central portion 46 oriented in a generally horizontal direction transversely of the vehicle.

The buckle 22 has a main body formed from sheet metal bent into a U-shape so as to provide two mutually parallel side walls 50 and 52 having a transverse wall 54 extending therebetween. The ends of the side walls 50 and 52 to the right of the wall 54, as viewed in the drawings, are connected to the leg 20 (not shown in FIGS. 3 to 5).

Each of the side walls 50 and 52 has an open-ended slot 56 extending through an end wall 58 formed by the portion of the U-shaped body interconnecting the two side walls 50 and 52. Each slot 56 has a flared outer end 60. In use, the transverse part 46 of the corresponding anchorage unit 24 is received in the slots 56, the flared outer part 60 assisting achievement of the correct alignment during insertion.

A latch member 62 is mounted on a pivot pin 64 which extends between the side walls 50 and 52. The latch member 122 has a hook formation 66 which engages round the transverse part 46 of the anchorage unit 24. A cam surface 68 on the outer end hook part 66 displaces the hook part 66 out of the path of the transverse portion 46 during insertion.

The latch member 62 is biased into its engaged position by a compression spring 70 which engages with the transverse wall 54. An L-shaped link 72 extends through the compression spring 70 and has one end connected to a transverse pin 74 on the latch member 62 and the other to a manually operable slider 76, movement of which causes the latch member 62 to disengage.

An ejector 78 is mounted in the slots 56 in the side walls 52 and 54 and has a stem 80 projecting through the transverse wall 54. A compression spring 82, engages between the wall 54 and a flange 84 on the stem 80 so as to bias the ejector 78 outwardly. This ensures that the ejector 78 remains closely in abutment with the transverse part 46 of the anchorage unit 24 when the buckle is fastened (although for clarity of illustration it is shown spaced apart therefrom in FIG. 3). The ejector 78 serves to ensure that, when the latch 62 is released, the transverse part 46 is moved outwardly at least as far as the ramp part 68 of the hook 66.

The buckles 36 on the buckle links 30 and 32 are substantially identical to the buckle 22 on the leg 20. The two rear anchorage units 40 are similar to the front anchorage 24.

When it is desired to install the seat 10 on a vehicle seat, having a seat portion 86 and a backrest 88, which is not equipped with anchorage units such as the anchorage units 24 and 40, the screw 42 is removed and the buckle link 30 pivoted to the orientation shown in FIGS. 6 and 7. The buckle link 30 is then secured in this orientation by engagement of the screw 42 in a tapped hole 90 (visible in FIGS. 1 and 2). The buckle link 32 is moved to the orientation shown in FIGS. 6 and 7, and secured there, in a similar manner.

Referring to FIG. 8, a respective belt guide 92 is secured to the free end of each of the buckle links 30 and 32 by its respective buckle 36. Each belt guide 92 comprises a socket portion 94 for receiving the buckle 36. A pin 96 extends across the socket portion 94 for engagement by the latch 62 of the buckle 36 in a similar manner to the transverse portion 46 of the anchorage unit 24 described above. The belt guide 92 also has a guide surface 98 with projections 100 and 102 at its ends, between which an adult lap belt 104 is received, as shown in FIG. 6. Although the lap belt 104 passes behind the seat back 88, its end portions are held clear of the vehicle seat 86,88 by a sufficient distance to leave room for an adult seat buckle 106.

FIG. 9 shows a foot 110 which rests on the floor 26 of the vehicle and is attached to the free end of the leg 20 by its

buckle 22. The foot 110 has a socket 112 for receiving the buckle 22. A pin 114 extends across the socket 112 for engagement by the latch 62 of the buckle 22.

FIG. 10 shows a rearward facing child's seat having a seat 120 with a forwardly projecting L-shaped leg 20 which has an attachment buckle 22 on its free end, and a pair of buckle links 30, mounted by pivot pins 34 on respective sides of the seat 120 and carrying attachment buckles 36 on their free end. The seat 120 is attached by its buckles 22 and 36 to standard anchorage units 24 and 40 in a similar manner to the seat 10 of FIG. 2. The seat 120 has an additional belt guide 122 on the outer (forward facing) side of its backrest portion. When the seat 120 is secured in a vehicle using an adult seat belt, in a similar manner to that described with reference to FIGS. 6 and 7, each of the rear buckles 36 is fitted with a respective belt guide 92 and a foot 110 is attached to the buckle 22. The lap portion 104 of the adult belt is positioned as described above with reference to FIG. 7, while the shoulder portion 124 is lead through the additional belt guide 122. Other parts of the seat 120 shown in FIGS. 10 and 11 are denoted with the same reference numerals as corresponding parts of the seat 10 of FIGS. 1 to 9.

FIGS. 12 and 13 show a forward facing seat 130 in which the rear buckle links 30 of the seat shown in FIGS. 1 to 9 are replaced by buckle links 132 having integral belt guides 134. Other parts of the seat 120 shown in FIGS. 10 and 11 are denoted with the same reference numerals as corresponding parts of the seat 10 of FIGS. 1 to 9. The buckle links 132 are secured in their first positions (to engage with standard anchorage units 40) by respective screws 42 and the buckles 136 thereon have a similar mechanism to that shown in FIGS. 3 to 5.

When the seat 130 is to be secured using an adult seat belt (not shown), buckle links 132 are pivoted to the position shown in dotted lines in FIG. 13, where they are secured by engagement of respective first sliding catches 138 with the buckles 134. The adult seat belt is then pulled tight and fastened. Next, the buckle links 132 are pulled forwards until the buckles 134 are engaged by second sliding catches 140, thereby tensioning the adult seat belt. If necessary, adult seat belt can be tensioned further by pulling the buckle links 132 forwards until the buckles 134 are engaged by third sliding catches 142. Additional sliding catches may be provided if a greater range of adjustment is required. This also enables the belt guide 10 to be positioned as required for a variety of adult seat belt configurations, particularly adult buckle positions.

In any of the foregoing embodiments of the invention, the rear buckle links may be coupled so as to be movable between their first and second positions simultaneously.

In any of the foregoing embodiments of the invention, the seat body may consist of a seat portion, a base portion and means for reclining the seat portion relative to the base portion. The attachment buckles in accordance with the invention are secured to the base portion.

WC claim:

1. A child safety seat for use in a vehicle, comprising a seat body having a seat portion and a backrest portion, and a pair of attachment buckles mounted by means of rigid links on opposite sides of the seat body for movement between a first position in which they project rearwardly so as to be engageable with two standard anchorage units on the vehicle which are accessible between a seat portion and a backrest portion of a seat of the vehicle and a second position in which they provide support for guide means for an adult seat

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belt. releasable means for securing each of the attachment buckles either in its first position or in its second position, and additional releasable means for holding the attachment buckles in an intermediate position in which the adult seat belt is fastened, subsequent movement of the attachment buckles into their second position being arranged to apply additional tension to the adult seat belt.

2. A child safety seat according to claim 1, further comprising a third attachment buckle mounted on a projection extending forwardly and downwardly from the seat body so as to be engageable, when the child safety seat is in the vehicle, with a third standard anchorage unit disposed adjacent to the front edge of the seat portion of the seat of the vehicle and below the top surface thereof even when a seat cushion of the seat of the vehicle is compressed to its maximum extent.

3. A child safety seat according to claim 1, wherein the guide means for the adult seat belt comprises a respective detachable guide unit adapted to be engaged by each attachment buckle.

4. A child safety seat according to claim 1, wherein each attachment buckle has integral guide means for the adult seat belt.

5. A child safety seat according to claim 4, further comprising a third attachment buckle mounted on a projection extending forwardly and downwardly from the seat body so as to be engageable, when the child safety seat is in the vehicle, with a third standard anchorage unit disposed adjacent to the front edge of the seat portion of the seat of the vehicle and below the top surface thereof even when a seat cushion of the seat of the vehicle is compressed to its maximum extent.

6. A child safety seat according to claim 1, wherein each rigid link is pivotally mounted on the seat body.

7. A child safety seat according to claim 6, wherein each attachment buckle has integral guide means for the adult seat belt.

8. A child safety seat according to claim 6, wherein each attachment buckle has guide means for the adult seat belt comprising a respective detachable guide unit adapted to be engaged thereby.

9. A child safety seat according to claim 6, further comprising a third attachment buckle mounted on a projection extending forwardly and downwardly from the seat body so as to be engageable, when the child safety seat is in the vehicle, with a third standard anchorage unit disposed adjacent to the front edge of the seat portion of the seat of the vehicle and below the top surface thereof even when a seat cushion of the seat of the vehicle is compressed to its maximum extent.

10. A child safety seat for use in a vehicle, comprising a seat body having a seat portion and a backrest portion, a pair of attachment buckles mounted by means of rigid links on opposite sides of the seat body for movement between a first position in which they project rearwardly so as to be engageable with two standard anchorage units on the vehicle which are accessible between a seat portion and a backrest portion of a seat of the vehicle and a second position in which they provide support for guide means for an adult seat belt, and a third attachment buckle mounted on a projection

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extending forwardly and downwardly from the seat body so as to be engageable, when the child safety seat is in the vehicle, with a third standard anchorage unit disposed adjacent to the front edge of the seat portion of the seat of the vehicle and below the top surface thereof even when a seat cushion of the seat of the vehicle is compressed to its maximum extent.

11. A child safety seat in combination with a vehicle having a vehicle seat and two standard anchorage units rigidly mounted on the vehicle so as to be accessible between a seat portion and a backrest portion of the vehicle seat, the child safety seat comprising:

a seat body having a seat portion and a backrest portion, and

a pair of attachment buckles rigidly mounted by means of rigid links on opposite sides of the seat body for movement between a first position in which they project rearwardly so as to be engageable with said two standard anchorage units and a second position in which they provide support for guide means for an adult seat belt.

12. A child safety seat according to claim 11, wherein each rigid link is pivotally mounted on the seat body,

13. A child safety seat according to claim 11, wherein each attachment buckle has integral guide means for the adult seat belt.

14. A child safety seat according to claim 11, wherein each attachment buckle has guide means for the adult seat belt comprising a respective detachable guide unit adapted to be engaged thereby.

15. A child safety seat according to claim 11, further comprising a third attachment buckle mounted on a projection extending forwardly and downwardly from the seat body so as to be engageable, when the child safety seat is in the vehicle, with a third standard anchorage unit disposed adjacent to the front edge of the seat portion of the seat of the vehicle and below the top surface thereof even when a seat cushion of the seat of the vehicle is compressed to its maximum extent.

16. A child safety seat according to claim 11, further comprising releasable means for securing each of the attachment buckles either in its first position or in its second position.

17. A child safety seat according to claim 16, further comprising additional releasable means for holding the attachment buckles in an intermediate position in which the adult seat belt is to be fastened, subsequent movement of the attachment buckles into their second position being arranged to apply additional tension to the adult seat belt.

18. A child safety seat according to claim 17, further comprising a third attachment buckle mounted on a projection extending forwardly and downwardly from the seat body so as to be engageable, when the child safety seat is in the vehicle, with a third standard anchorage unit disposed adjacent to the front edge of the seat portion of the seat of the vehicle and below the top surface thereof even when a seat cushion of the seat of the vehicle is compressed to its maximum extent.

\* \* \* \* \*

Fig. 1

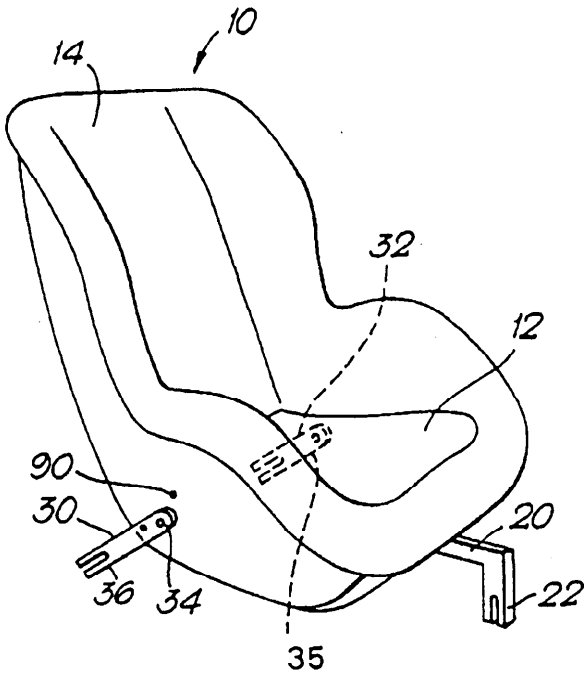
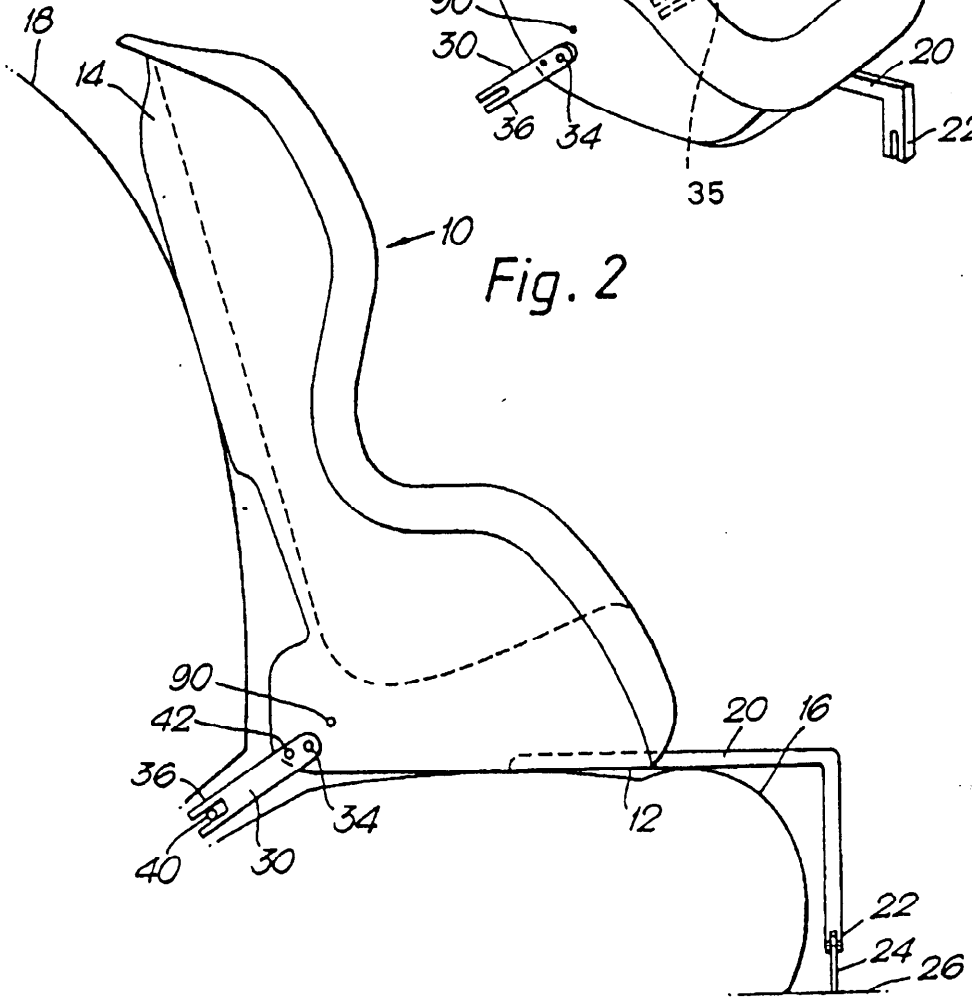
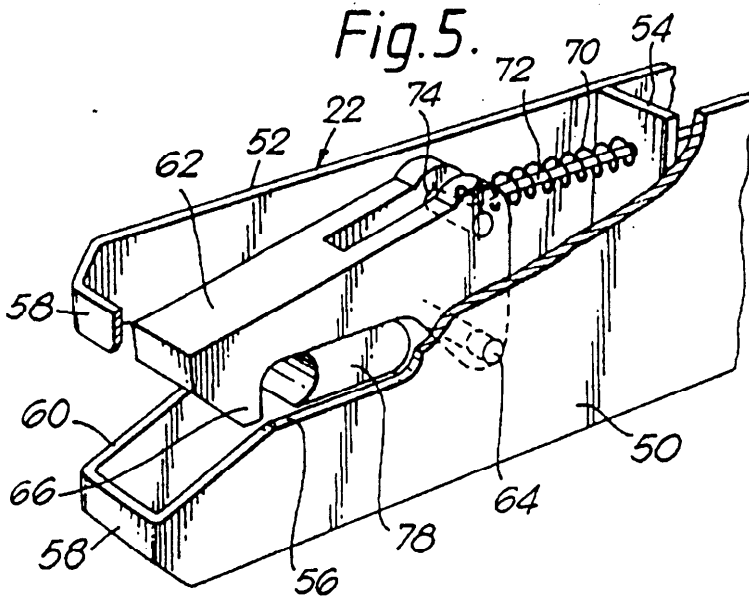
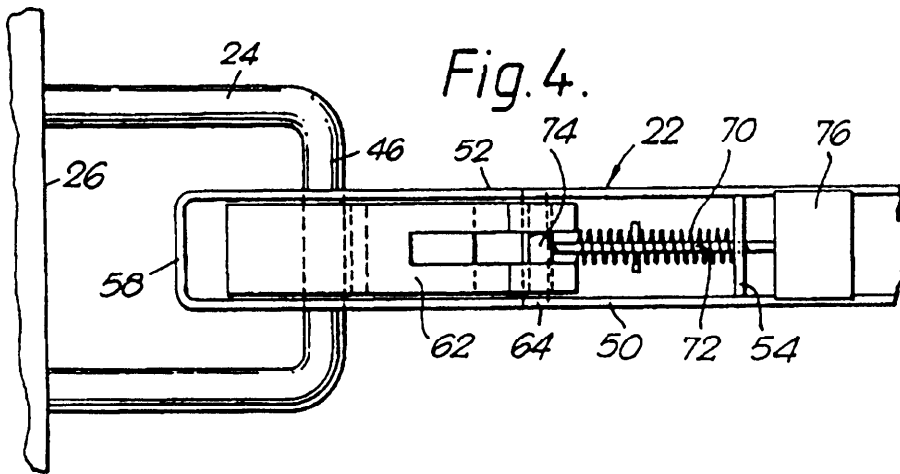
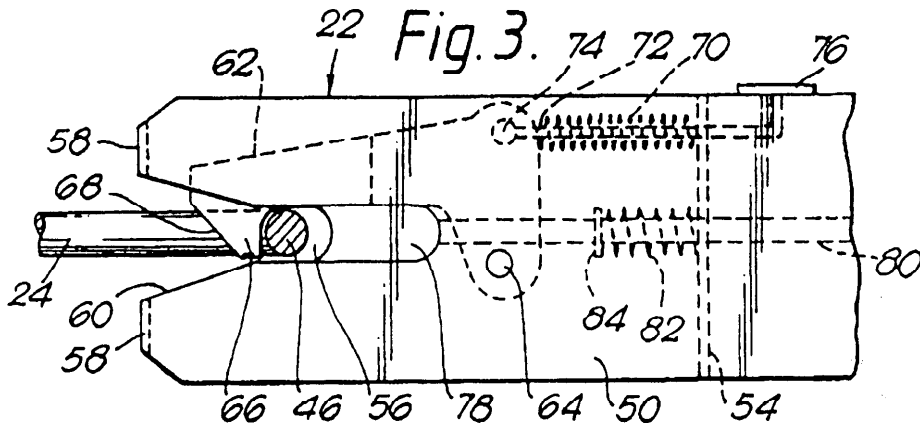
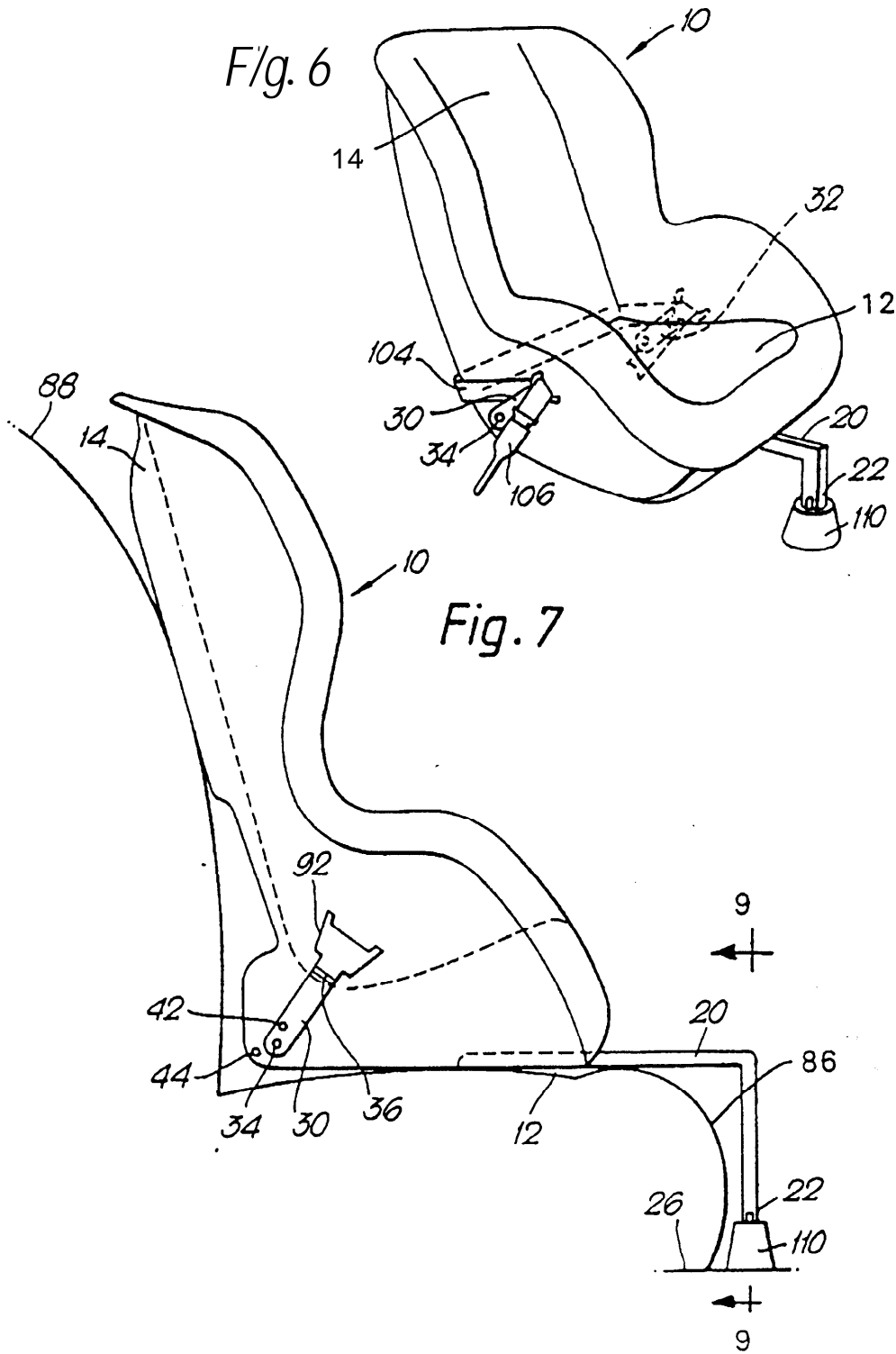


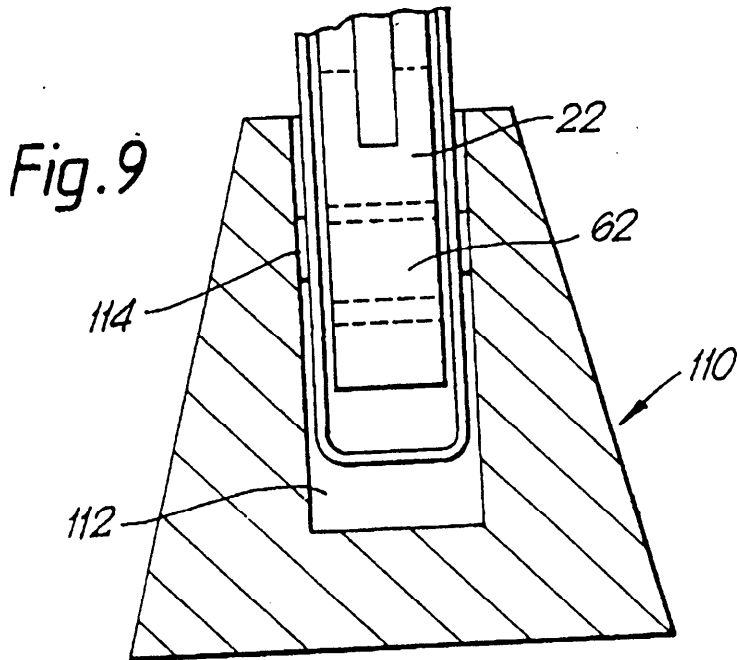
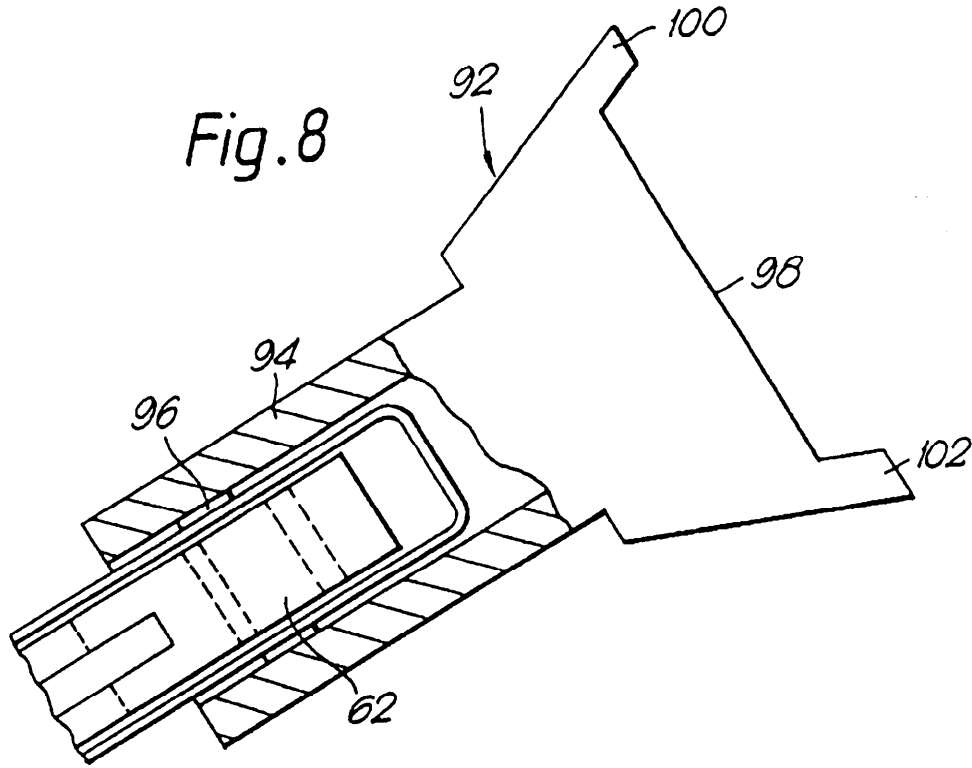
Fig. 2

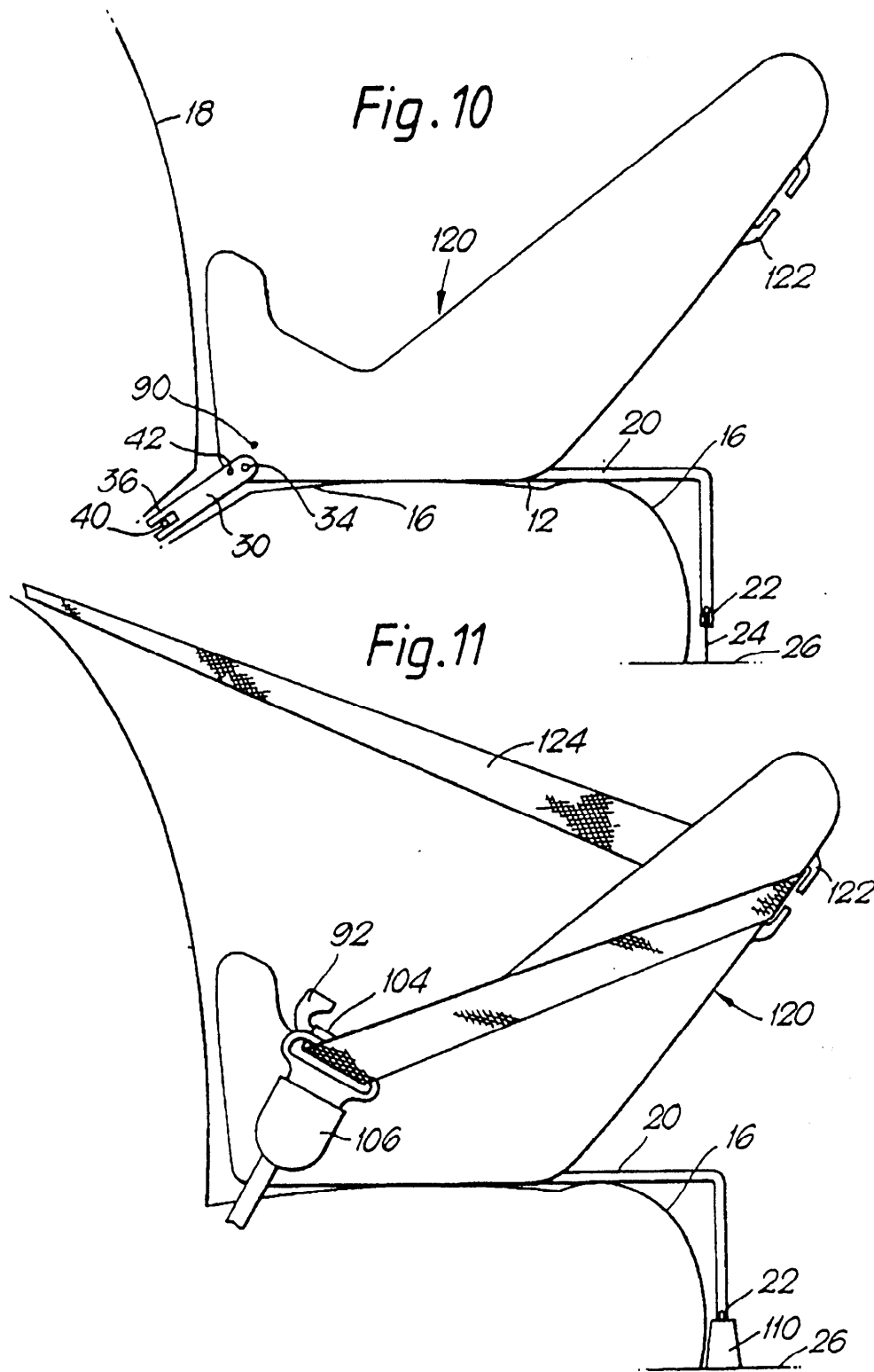


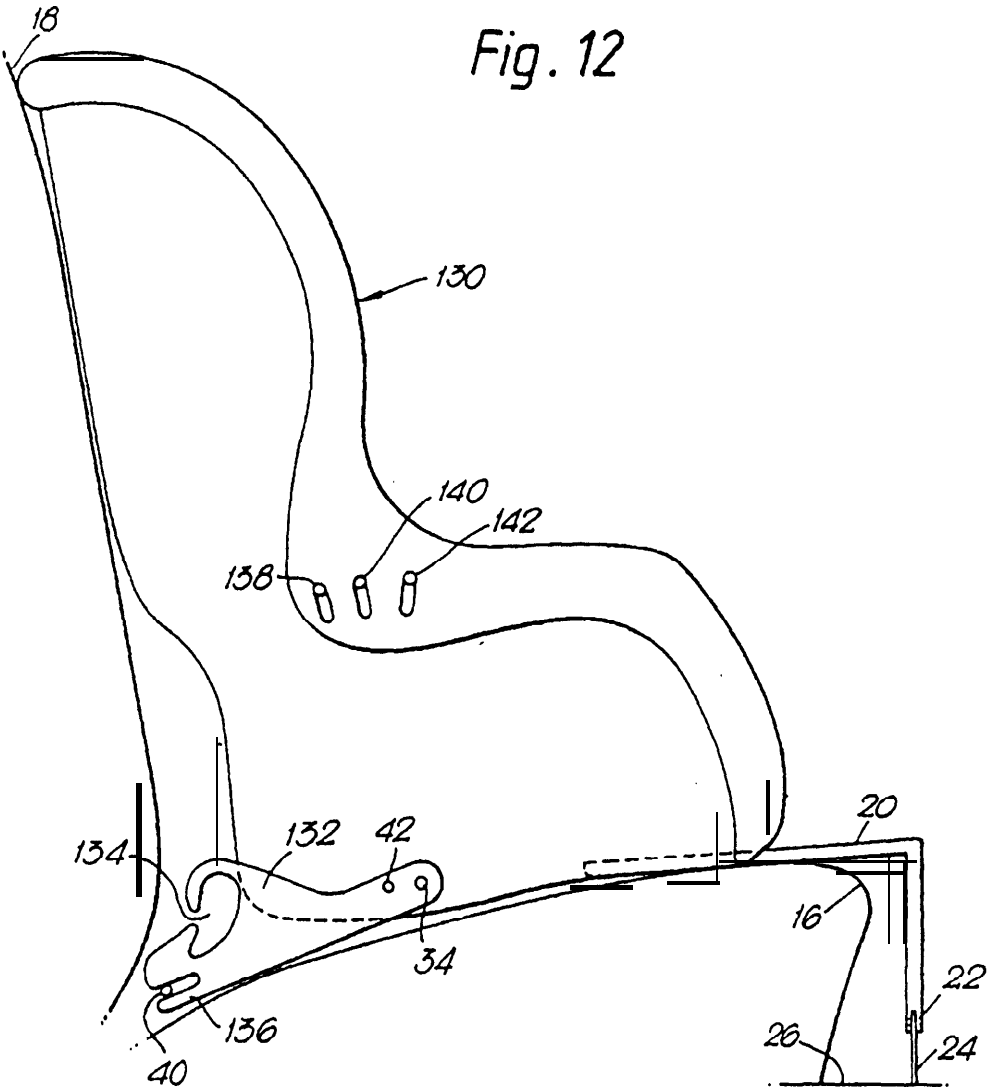


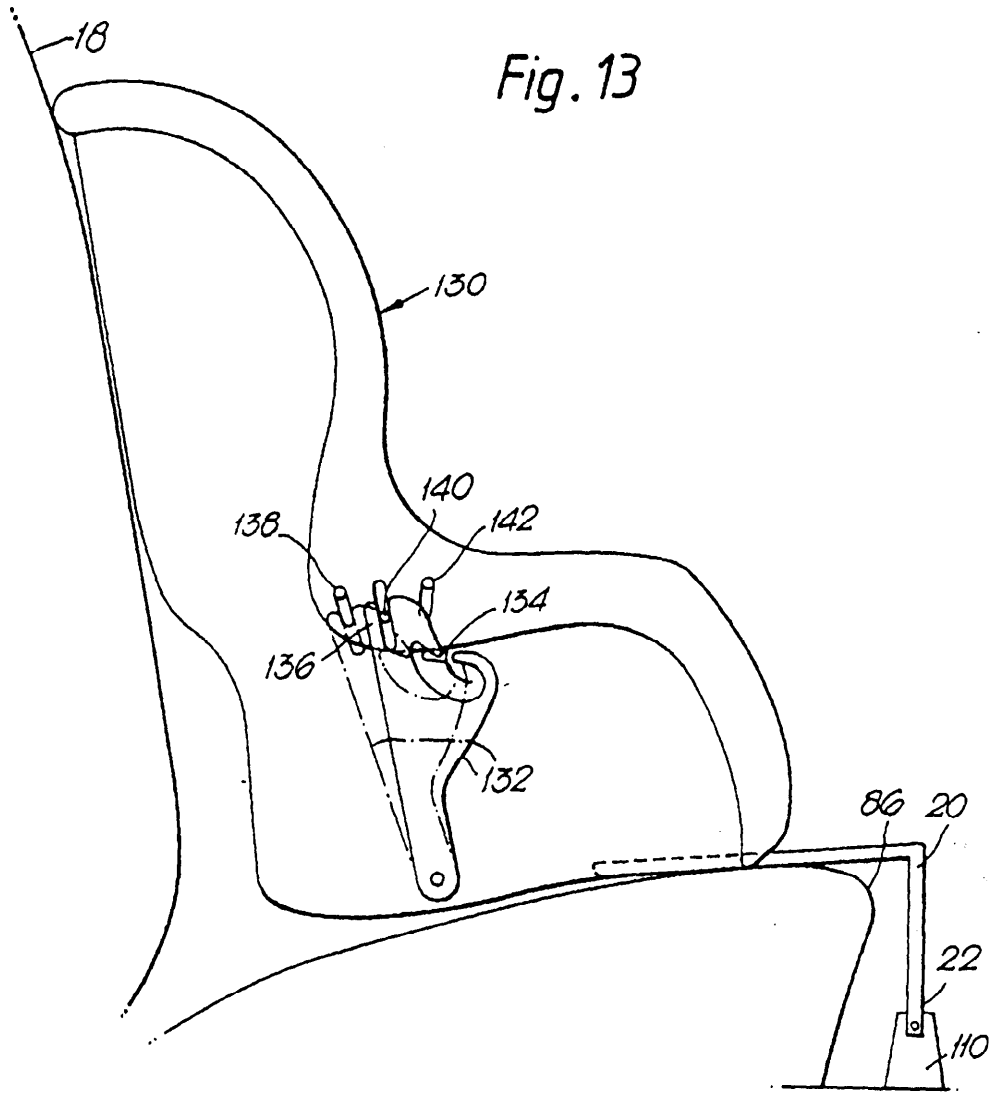














United States Patent [19]  
Barley

[11] Patent Number: 5,524,965  
[45] Date of Patent: Jun. 11, 1996

[54] CHILD SAFETY SEAT

[75] Inventor: Geoffrey W. Barley, Pitton, England

[73] Assignee: Britax-Excelsior Limited, England

[21] Appl. No.: 215,807

[22] Filed: Mar. 22, 1994

[30] Foreign Application Priority Data

Apr 3, 1993 [GB] United Kingdom ..... 9306977

(51) Int. Cl.<sup>6</sup> ..... B60N 2/28

[52] U.S. Cl. .... 297/256.16; 291/256.14;

297/252

[58] Field of Search ..... 297/256.15, 250.1,

297/256.1, 252, 256.13, 256.14, 256.16,

253, 216.11; 296/63, 64

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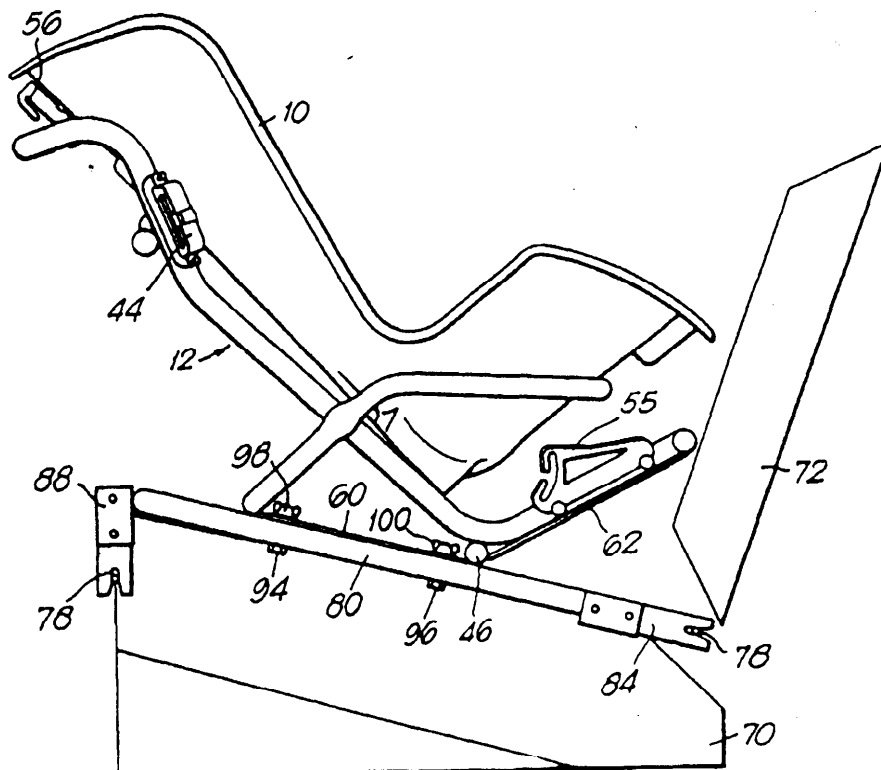
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2254548 10/1992 United Kingdom.

Primary Examiner—Milton Nelson, Jr.  
Attorney, Agent, or Firm—Davis, Bujold & Streck

[57] ABSTRACT

A child safety seat has a seat body, a support structure, a first releasable coupling for connecting the support structure to a motor vehicle and a second releasable coupling for connecting the seat body to the support structure. The support structure includes an upwardly facing abutment surface positioned above the seat portion of an adult vehicle seat and in front of the backrest portion thereof, when the first coupling is engaged. The second coupling is arranged to hold the seat body in rigid abutment with the abutment surface on the support structure either so that the seat body is facing forwardly in the vehicle or so that the seat body is facing rearwardly in the vehicle.

9 Claims, 5 Drawing Sheets



## CHILD SAFETY SEAT

## FIELD

This invention relates to a child safety seat for use in a vehicle of the type comprising a seat body, a harness for a child occupant of the seat secured to the seat body, a support structure, first releasable coupling means for connecting the support structure to a motor vehicle and second releasable coupling means for connecting the seat body to the support structure.

## RELATED ART

A seat of this type is disclosed in GB-A-2254548. The support structure is arranged to be positioned on a vehicle seat and connected thereto by an adult seat belt which serves as the first coupling means. The second coupling means is secured to a backrest portion of the seat body and engages with a portion of the support structure which abuts against the backrest portion of the vehicle seat.

The disadvantage of mounting a child seat in a vehicle by resting it on a vehicle seat and securing in place with straps arises from the inherent resilience of the springs and upholstery of the vehicle seat and also the resilience of the straps themselves. Even if the straps securing the child seat are pulled very tight during installation, such resilience will permit undesirable movement of the child seat relative to the vehicle in the event of sudden deceleration, for example during an accident. In order to overcome this disadvantage, it has been proposed to provide motor cars with standard anchorage units at agreed locations for engagement by releasable connectors which are rigidly coupled to a child's seat. The present invention is concerned with the provision of a child's seat of the type described above for attachment to such anchorage units.

## SUMMARY OF THE INVENTION

According to the invention, the support structure includes upwardly facing abutment means positioned above the seat portion of an adult vehicle seat and in front of the backrest portion thereof, when the first coupling means are engaged, and the second coupling means are arranged to hold the seat body in rigid abutment with said abutment means support structure either so that the seat body is facing forwardly in the vehicle or so that the seat body is facing rearwardly in the vehicle.

## BRIEF DESCRIPTIONS THE DRAWINGS

FIG. 1 is a perspective view from behind of a known child's seat modified for use in accordance with the invention;

FIG. 2 is a perspective view from in front of the seat shown in FIG. 1;

FIG. 3 is a scrap view of an anchorage unit for permanent attachment to a vehicle body;

FIG. 4 is a side view and having the child seat shown in FIGS. 1 and 2 mounted in a vehicle in a rearward facing orientation on a support structure in accordance with the invention;

FIG. 5 is a plan view of a support frame constituting the support structure shown in FIG. 4;

FIG. 6 is a side view, similar to FIG. 4, with the child seat in a forward facing orientation;

FIG. 7 is a side view of a buckle for securing the support structure shown in FIGS. 3-5 to a vehicle;

FIG. 8 is a plan view of the buckle shown in FIG. 7; and

FIG. 9 is a partially broken away perspective view of the buckle shown in FIGS. 7 and 8.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The child seat shown in FIGS. 1 and 2 comprises a rigid seat shell 10 mounted on a tubular metal frame 12. The seat 10 has a harness for the child consisting of shoulder straps 14 and 16, lap straps 18 and 20 and a crotch strap 22 interconnected by a buckle 24. As described in AU-B-503602, the shoulder straps 14 and 16 are connected behind the seat to an adjuster strap 26 which projects up through a locking device 28 to permit ready adjustment of the harness to fit a child user.

The seat shown in FIGS. 1 and 2 may be fitted into a car in a conventional manner and secured by an adult lap and diagonal seat belt with the child seat either facing forwards or facing rearwards. In the rearward facing orientation, the transverse frame member 53 abuts against the backrest of the adult seat and the transverse members 46 and 48 rest on the seat portion thereof. The lap portion of the adult seat belt engages in the belt guides 54 and 58 while the shoulder strap engages in a pivoting belt guide 56 mounted on the back of the backrest of the seat shell 10.

When the seat is used in the forward facing configuration, the lap strap of the adult belt passes round members 30 and 32 of the frame 12 above frame members 34 and 36 and below belt guides 38 and 40. The shoulder strap of the adult belt passes through a belt guide 42 when the seat is used on the left hand side of the car or through a corresponding belt guide 44 when the seat is used on the right hand side of the car. The transverse members 46 and 53 of the frame 12 rest on the seat portion of the vehicle seat and the upper frame ends 50 and 52 abut against the backrest thereof.

In accordance with the invention, the seat shown in FIG. 1 differs from the known seat described above in that two mounting plates 60 and 62 are secured to the bottom of the frame 12. Each of the mounting plates 60 and 62 has two front fixing holes 64 and two rear fixing holes 66 for a purpose to be explained hereinafter.

Referring to FIG. 3 and 4, one form of anchorage on which it is proposed to standardise consists of three anchorage units, two of which are accessible between the seat portion 70 and the backrest portion 72 of the adult seat and the third being disposed adjacent to the front edge of the seat portion 70 and below the top surface thereof even when the seat cushion is compressed to its maximum extent. Each anchorage unit includes a generally U-shaped rod like member 74 secured to a part 76 of the vehicle body by the ends of its limbs and with its central portion 78 oriented to extend in a general horizontal direction transversely of the vehicle (see FIG. 4).

FIG. 5 shows a support structure in accordance with the invention in the form of a support frame 80, 82 formed from a generally U-shaped frame member 80 with the ends of its limbs splayed apart from one another and interconnected by a transverse frame member 82. A respective buckle 84, 86 is mounted on each end of the transverse frame member 82. A third buckle 88 is mounted at the junction between the two limbs of the U-shaped member 80. A respective front fixing hole 90 and respective hole 92 each extends vertically through each of the limbs of the U-shaped member 80.

Reverting to FIG. 4, the child seat shown in FIG. 1 is positioned on the support structure with the plate 60 resting on the frame member 80. A respective front fixing hole 64 is in alignment with each of the front fixing holes 90 and a respective rear fixing hole 66 is in alignment with each of the rear fixing holes 92. A respective bolt 94 extends upwardly through each of the front fixing holes 90 and similar bolts 96 extend upwardly through the rear fixing holes 92. The plate 60 is secured to the bolts 94 and 96 by respective wing nuts YX. 100. Next, the support frame 80, X2 is secured to the vehicle by engagement of the huckles 84, X6 and 8X with the transverse portion 7X of their respective anchorage units 74.

When it is desired to convert the seat to its forward facing orientation, the huckles 84, X6 and 88 are first released and the support frame 80, 82 removed from the vehicle. Next, the two front wing nuts 98 and two rear wing nuts 100 are removed from their respective bolts 94, 96 and the seat 10 repositioned so that the plate 62 rests on the frame member 80 and the holes 64 and 66 therein receive the two pairs of bolts 94 and 96. The two pairs of wing nuts 9X and 100 are then replaced to secure the seat in position as shown in FIG. 6 (the pan of the frame 12 adjacent to the belt guide 54 being shown partially broken away in FIG. 3 to enable the wing nuts 98 and 100 to be seen). The support frame 80, 82 is then replaced in the vehicle, the buckles 84, 86 and 88 re-engaging with their respective anchorage units.

Since the limbs of the U-shaped member 80 are not parallel to one another, the distance between the front fixing holes YO is less than the distance between the rear fixing holes 92. Consequently it is impossible to secure the plate 60 to the support frame 80, 82 with the seat forward facing or to secure the plate 62 to the support frame 80, X2 with the seat rearward facing.

A seat of this type is used in the rearward facing orientation for babies weighing up to 10 kg and in the forward facing orientation for children weighing between 9 kg and 18 kg. Consequently, it will normally be changed from the rearward facing orientation to the forward facing orientation only once during the period of time in which it is used by a particular child. On the other hand, the entire seat and suppon frame may be fitted to and removed from a car on numerous occasions during this period of time.

FIGS. 7 to 9 illustrate the buckle 84 in more detail. A main body is formed from sheet metal bent into a U-shape so as to provide two mutually parallel side walls 110 and 112 having a transverse wall 114 extending therebetween. The ends of the side walls 110 and 112 to the right of the wall 114, as viewed in the drawings, are connected to the frame member 80 (not shown in FIGS. 7 to 9).

Each of the side walls 110 and 112 has an open-ended slot 116 extending through the end wall 118 formed by the portion of the U-shaped body interconnecting the two side walls 110 and 112. Each slot 116 has a flared outer end 120. In use, the transverse pan 78 of the corresponding anchorage unit 74 is received in the slots 116 and the flared outer part 120 assists achievement of the correct alignment during insertion.

A latch member 122 is mounted on a pivot pin 124 which extends between the side walls 110 and 112. The latch member 122 has a hook formation 126 which engages round the transverse pan 78 of the anchorage unit 74. A cam surface 128 on the outer end hook part 126 displaces the hook pan 126 out of the path of the transverse portion 78 during insertion.

The latch member 122 is biased into its engaged position by a compression spring 130 which engages with the trans-

verse wall 114. The central wire 132 of a Bowden cable 134 extends through the compression spring 130 and is connected to a transverse pin 136 on the latch member 122 so that tension in the wire 132 causes the latch member 122 to disengage.

An ejector 140 is mounted in the slots 116 in the side walls 112 and 114 and has a stem 142 projecting through the transverse wall 114. A compression spring 144, engages between the wall 114 and a flange 146 on the stem 142 so as to bias the ejector 140 outwardly. This ensures that the ejector 140 remains closely in abutment with the transverse pan 78 of the anchorage unit 74 when the buckle is fastened (although for clarity of illustration it is shown spaced apart therefrom in FIG. 7). The ejector 140 serves to ensure that, when the latch 122 is released, the transverse part 7X is moved outwardly at least as far as the ramp pan 128 of the hook 126.

The buckles 86 and 88 are substantially identical to the buckle 84. The Bowden cables 134 of the three buckles 84, 86 and 88 are connected to a common actuating member so that all three buckles are released simultaneously.

I claim:

1. A child safety seat in combination with an adult vehicle seat for a motor vehicle with a seat portion and a backrest portion the child safety seat comprising:

a suppon structure,

a seat body having first and second abutment surfaces which are alternatively engageable with the suppon structure to suppon the seat body at respective first and second angles to the support structure,

first releasable coupling means arranged to provide a rigid connection between the suppon structure and the motor vehicle,

upwardly facing abutment means on the suppon structure positioned above the seat portion of the adult vehicle seat and in front of the backrest portion thereof,

second coupling means arranged to hold the first abutment surface in rigid abutment with the suppon structure only when the seat body is facing rearwardly in the vehicle and to hold the second abutment surface in rigid abutment with the support structure only when the seat body is facing forwardly in the vehicle.

2. A child safety seat in combination with an adult vehicle seat for a motor vehicle, according to claim 1, wherein the seat body comprises a seat shell mounted on a frame.

3. A child safety seat in combination with an adult vehicle seat for a motor vehicle, according to claim 2, further comprising a harness for a child occupant of the seat, said harness being secured to the seat body.

4. A child safety seat in combination with an adult vehicle seat for a motor vehicle, according to claim 1, further comprising a harness for a child occupant of the seat, said harness being secured to the seat body.

5. A child safety seat in combination with an adult vehicle seat for a motor vehicle with a seat portion and a backrest portion, the child safety seat comprising:

a seat body including a backrest,

a suppon structure,

first releasable coupling means arranged to provide a rigid connection between the suppon structure and the motor vehicle,

upwardly facing abutment means on the suppon structure positioned above the seat portion of the adult vehicle seat and in front of the backrest portion thereof,

second releasable coupling means on the support structure.

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**first complementary coupling means on the seat body**  
**engagable by the second releasable coupling means to**  
 hold the seat body in rigid abutment with said abutment  
 means on the support structure only when the seat body  
 is facing forwardly in the vehicle and the backrest  
 thereof is at a first angle to the abutment means, and  
 second complementary coupling means on the seat body  
 engagable by the second releasable coupling means to  
 hold the seat body in rigid abutment with said abutment  
 means on the support structure only when the seat body  
 is facing rearwardly in the vehicle and the backrest  
 thereof is at a second angle to the abutment means.

6. A child safety seat in combination with an adult vehicle  
 seat for a motor vehicle, according to claim 5, wherein the  
 seat body comprises a seat shell mounted on a frame.

7. A child safety seat in combination with an adult vehicle  
 seat for a motor vehicle, according to claim 5, wherein the  
 second releasable coupling means comprises a pair of front  
 coupling formations spaced apart from one another on the  
 support structure by a first lateral distance and pair of rear  
 coupling formations spaced apart from one another on the

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support structure by a second lateral distance different from  
 the first lateral distance, the first complementary coupling  
 means comprises a first abutment surface having two pairs  
 of complementary formations positioned to engage with said  
 front and rear coupling formations when the seat body is  
 facing forwardly in the vehicle, and the second complemen-  
 tary coupling means comprises a second abutment surface  
 disposed at an angle to said first abutment surface equal to  
 the difference between said first and second angles and  
 having two pairs of complementary formations positioned  
 to engage with said front and rear coupling formations when  
 the seat body is facing rearwardly in the vehicle.

8. A child safety seat in combination with an adult vehicle  
 seat for a motor vehicle, according to claim 7, further  
 comprising a harness for a child occupant of the seat, said  
 harness being secured to the seat body.

9. A child safety seat in combination with an adult vehicle  
 seat for a motor vehicle, according to claim 8, wherein the  
 seat body comprises a seat shell mounted on a frame.

\* . . . . \*



Fig. 1.

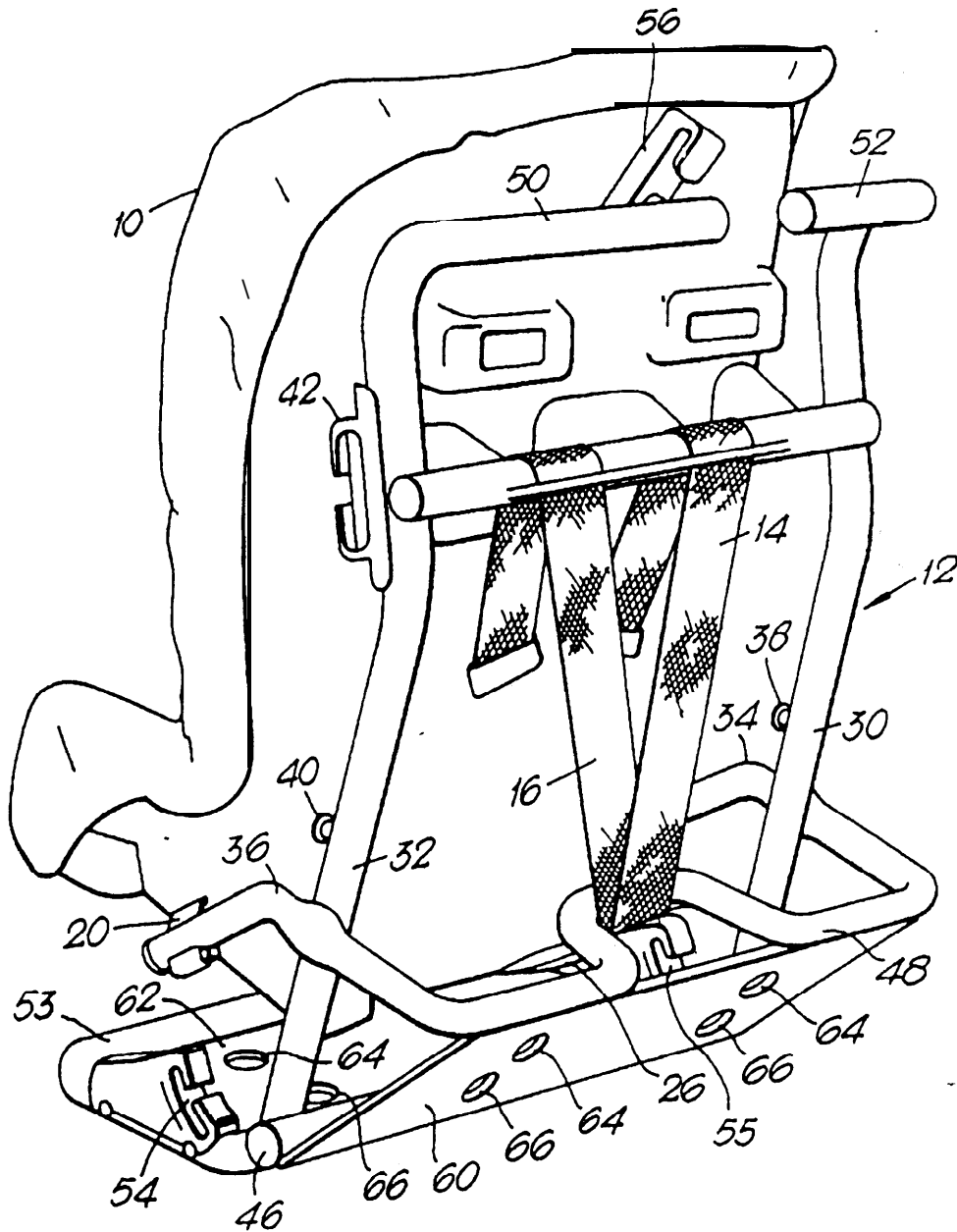


Fig.2.

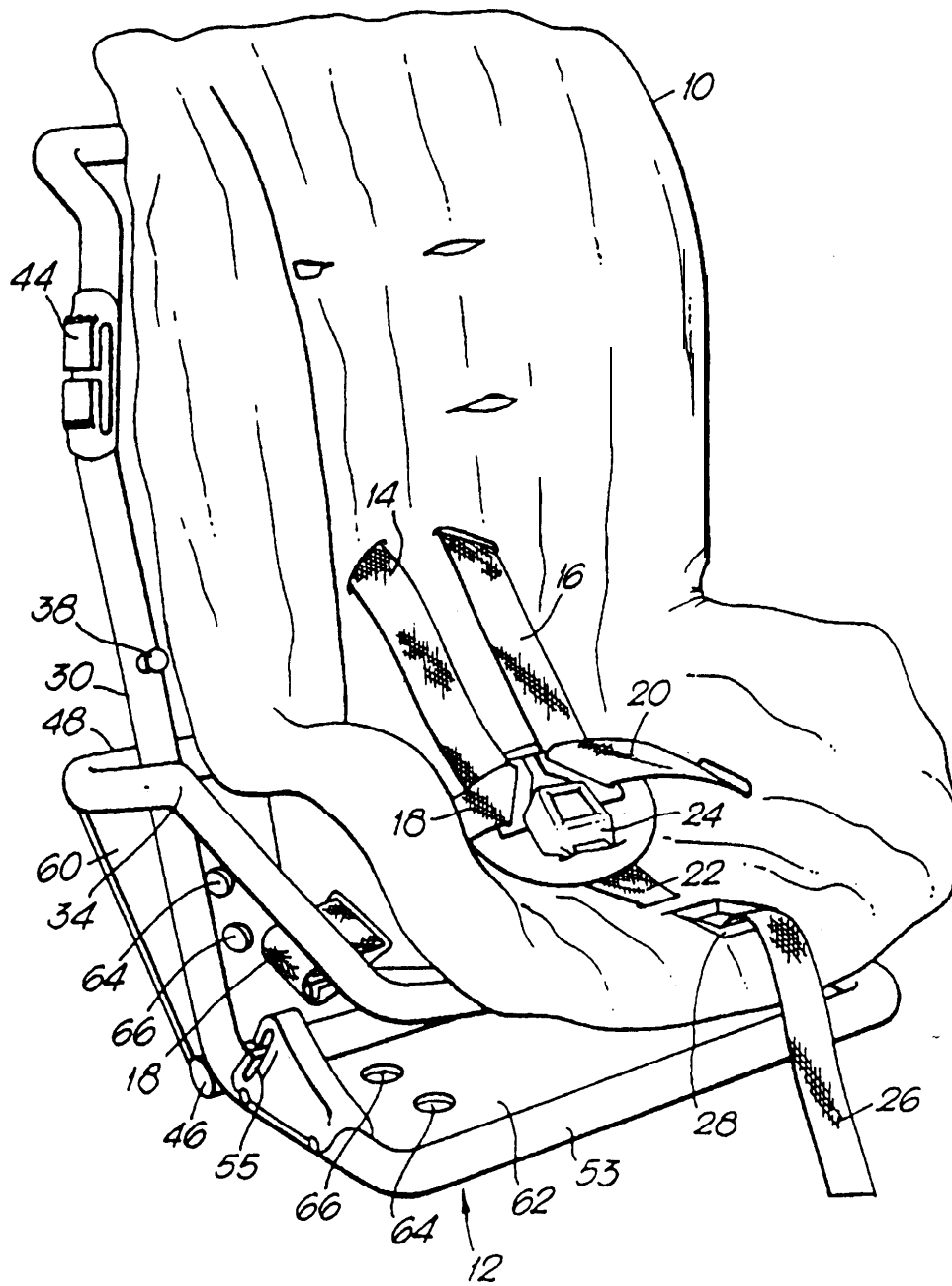


Fig.3.

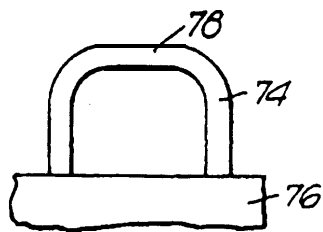


Fig.4.

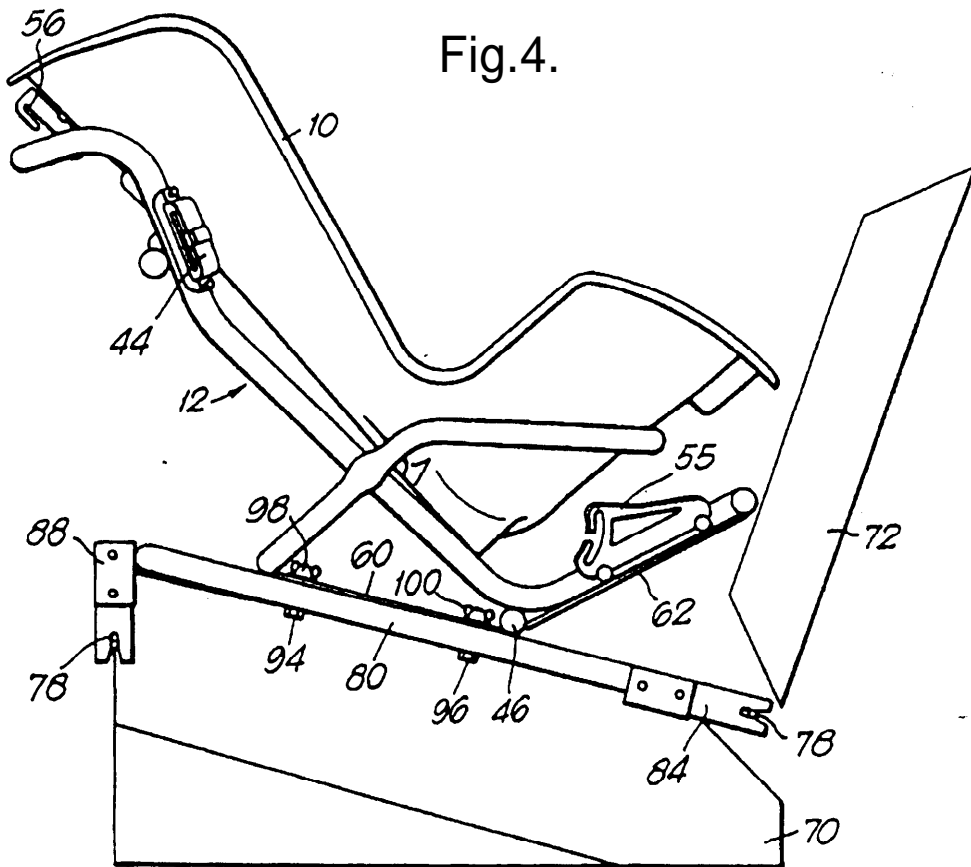


Fig. 5.

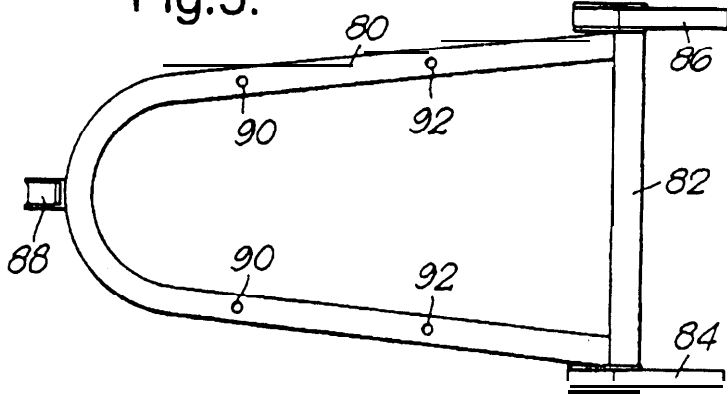
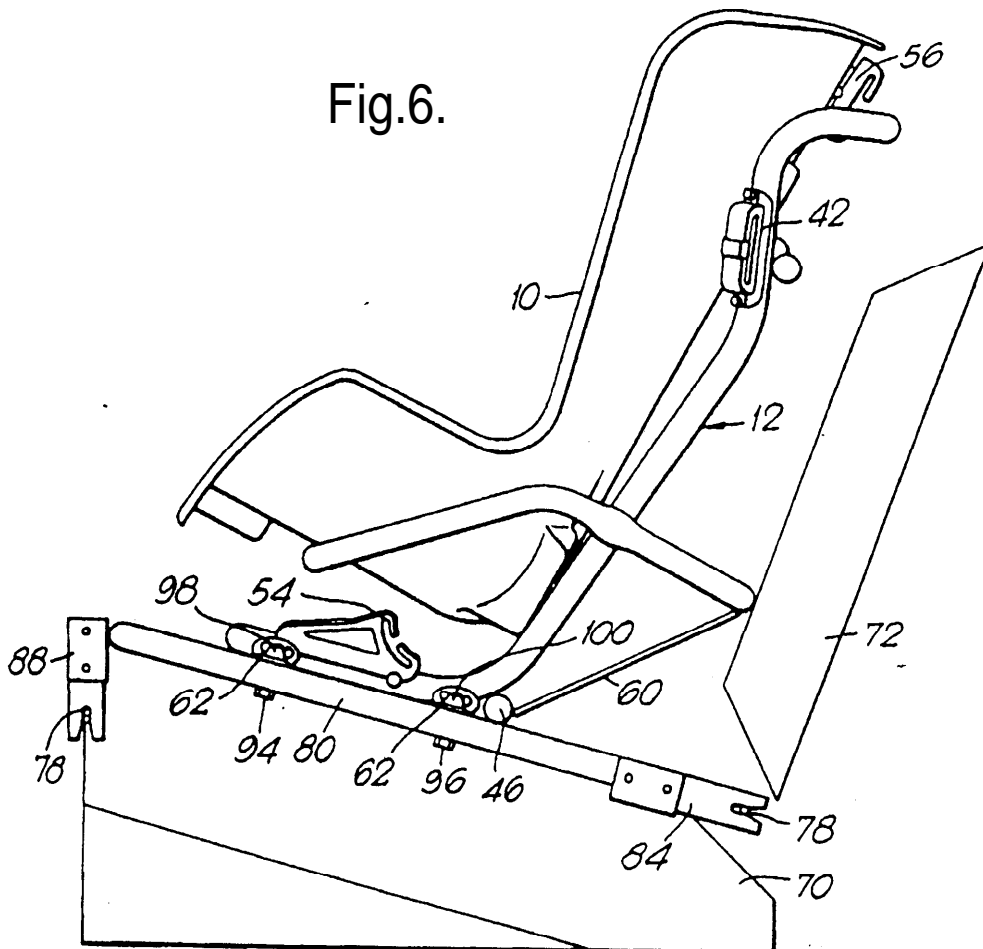
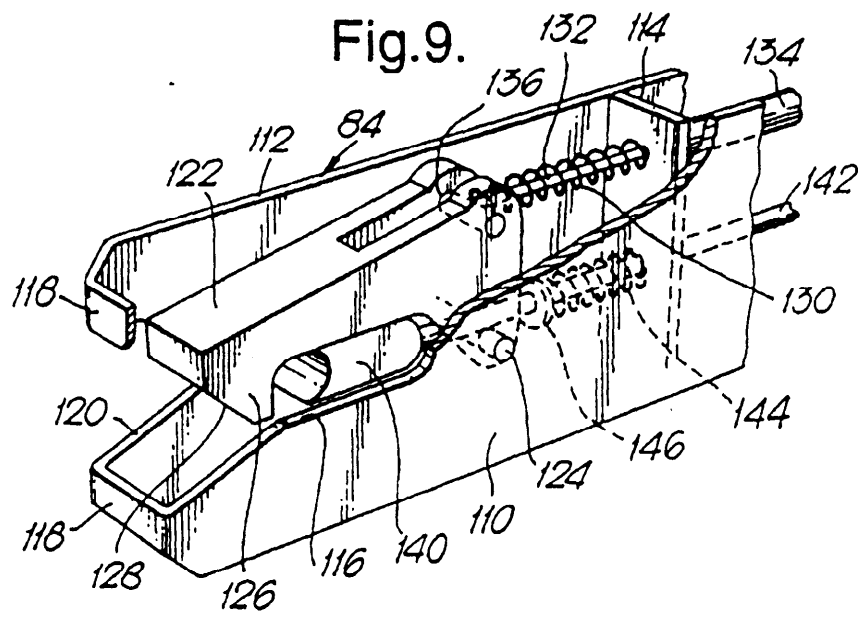
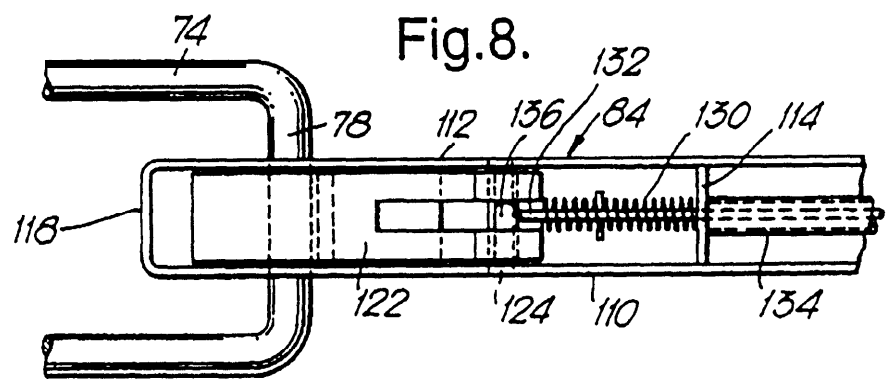
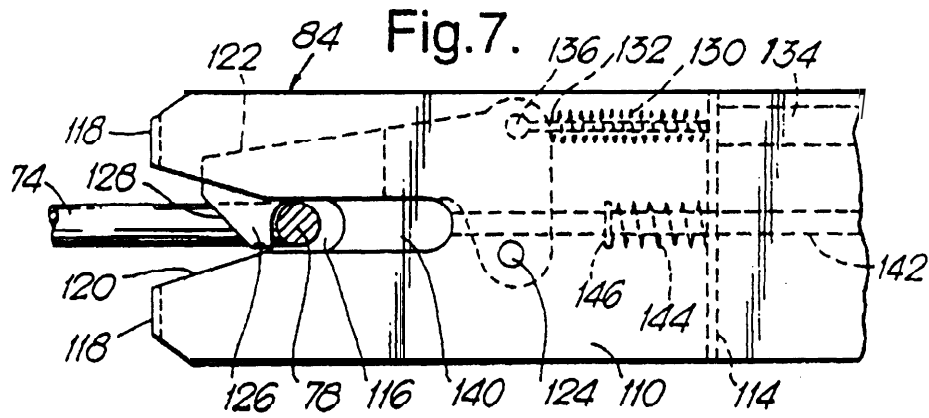


Fig. 6.







US005466044A

# United States Patent [19]

[11] Patent Number: **5,466,044**

**Barley et al.**

[45] Date of Patent: **Nov. 14, 1995**

## [54] CHILD SAFETY SEAT

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[21] Appl. No.: **300,950**

[22] Filed: **Sep. 6, 1994**

### [30] Foreign Application Priority Data

Sep. 30, 1993 [GB] United Kingdom ..... 9320169

[51] Int. Cl.<sup>o</sup> ..... **A47C 1/08**

[52] U.S. Cl. .... **297/252; 297/250.1; 297/253**

[58] Field of Search ..... **297/250.1, 216.1, 297/216.11, 252, 253, 256.15; 296/63**

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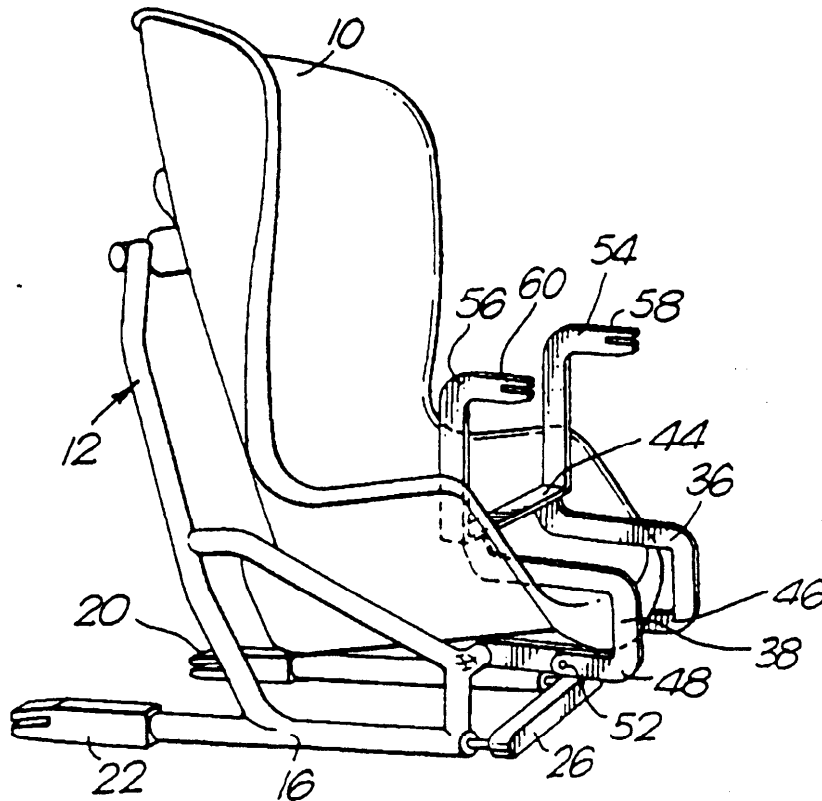
Primary Examiner—Kenneth I. Dornier  
Assistant Examiner—Milton Nelson, Jr.  
Attorney, Agent, or Finn-Davis, Bujold & Streck

### [57] ABSTRACT

*A-70*

A child safety seat for use in a vehicle, comprising a seat body (10), and two S-shaped coupling arms (X.38), each of which is pivotally mounted at one end (46, 48) to the seat body (10) below the front thereof and has a front releasable fastener (58.60) on its other end (54, 56) for attachment to a front anchorage unit located below the front edge of a vehicle seat (18). The coupling arm (36.38) is so shaped that an intermediate portion (40.42) thereof is located in front of both ends (46.48; 54, 56) thereof when the front releasable fastener (58.60) is engaged with the front anchorage unit, so as to extend round the front edge of the vehicle seat (18).

4 Claims, 3 Drawing Sheets



1  
CHILD SAFETY SEAT  
FIELD

This invention relates to a child safety seat for use in a vehicle, of the type comprising a seat body and releasable coupling means for securing the seat body to the vehicle.

RELATED ART

The disadvantage of mounting a child seat in a vehicle by resting it on a vehicle seat and securing it in place with straps arises from the inherent resilience of the springs and upholstery of the vehicle seat and also from the resilience of the straps themselves. Even if the straps securing the child seat are pulled very tight during installation, such resilience will permit undesirable movement of the child seat relative to the vehicle in the event of sudden deceleration, for example during an accident. In order to overcome this disadvantage, it has been proposed to provide motor cars with standard anchorage units at agreed locations for engagement by releasable connectors which are rigidly coupled to a child seat. Proposals under discussion at the present time involve the location of at least one such standard anchorage unit below the front edge of the vehicle seat and close to the floor of the vehicle. The present invention is concerned with the provision of a child seat of the type described above for attachment to such anchorage units.

SUMMARY OF THE INVENTION

According to the invention, in a child safety seat of the type described above, the releasable coupling means includes a coupling arm pivotally mounted at one end to the seat body below the front thereof and having a front releasable fastener on its other end for attachment to a front anchorage unit located below the front edge of a vehicle seat, the coupling arm being so shaped that an intermediate portion thereof is located in front of both ends thereof when the front releasable fastener is engaged with the front anchorage unit.

The coupling arm may be S-shaped.

It should be understood that reference to the front of the child seat means the front of the seat in relation to the direction of travel of the vehicle. If the invention is applied to a rearward facing child seat, the coupling arm would be attached to the seat body in the region of the backrest thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic side view of a child seat in accordance with their invention tilted to a vehicle seat.

FIG. 2 is a perspective view of the child seat with its support member in the orientation shown in FIG. 1.

FIG. 3 is a top view of a standard anchorage unit for permanent attachment to a vehicle body;

FIG. 4 is a side view of the child seat shown in FIGS. 1 and 2 with its support member in a position ready for removal of the child seat from the vehicle;

FIG. 5 is a perspective view similar to FIG. 2 but with the support member in the position shown in FIG. 4;

FIG. 6 is a side view of a buckle for securing the child seat shown in FIGS. 1 and 2 to a vehicle;

FIG. 7 is a plan view of the buckle shown in FIG. 6; and

FIG. 8 is a partially broken away perspective view of the buckle shown in FIGS. 6 and 7.

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DETAILED DESCRIPTION OF THE  
PREFERRED EMBODIMENT

The child seat shown in FIGS. 1 and 2 comprises a rigid seat shell 10 mounted on a tubular metal frame 12. The seat 10 has a harness (not shown) for the child which is of conventional type, consisting of shoulder straps, lap straps and a crotch strap, as described in AU-B-503603.

The support frame 12 includes a pair of horizontal members 14 and 16 which are intended in use to be located on or slightly above a vehicle seat squab 18. At their rear ends, the members 14 and 16 have respective buckles 20 and 22 on their rear ends for engagement with standard anchorage units located between the seat squab 18 and the seat back 24 of the vehicle seat. A release bar 26, extending between the front ends of the members 14 and 16, is coupled so that forward movement thereof causes the buckles 20 and 22 to disengage.

Referring to FIG. 3, one form of standard anchorage unit comprises a generally U-shaped rod-like member 28 secured to a part 30 of the vehicle body by the ends of its limbs and with its central portion 32 oriented to extend in a general horizontal direction transversely of the vehicle.

In accordance with the invention, the seat shell also has a front frame comprising two S-shaped members 36 and 38 having intermediate parts 40 and 42 interconnected by a transverse member 44. The two S-shaped members 36 and 38 are connected at their upper ends 46, 48 to the underside of the front edge of the seat shell 10 by respective pivot joints 50 and 52. At their lower ends 54, 56, each of the S-shaped members carries a respective buckle 58, 60 for engagement with standard anchorages located below the front edge of the vehicle seat squab 18. When the releasable coupling means 58, 60 are engaged, the intermediate parts 40, 42 of the S-shaped members 36 and 38 extend round the front edge of the vehicle seat squab 18 while both ends 46, 48, 54, 56 thereof are behind such front edge. The vertical parts 62 and 64 of the S-shaped members 36 and 38 adjacent to the upper ends 46 and 48, obstruct movement of the release bar 26.

Referring to FIGS. 4 and 5, when the child seat 10 is to be removed from the vehicle, the front buckles 58 and 60 are released and the S-shaped members 36 and 38 folded upwards to the positions illustrated in FIG. 4. The release bar 26 can then be pulled forwardly to cause the rear buckles 20 and 22 to disengage and allow the seat to be removed from the vehicle.

Folding up the front S-shaped members 36 and 38 as described above has two advantages. Firstly, it makes the child seat 10 more compact for storage. Secondly, the transverse member 44 obstructs access to the child seat 10 when the S-shaped members 36 and 38 are in the position illustrated in FIGS. 4 and 5, and thus reduces the risk of a user merely engaging the rear buckles 20 and 22 and leaving the front buckles 58 and 60 disconnected.

FIGS. 6 to 8 illustrate the buckle 20 in more detail. A main body is formed from sheet metal bent into an L-shape so as to provide two mutually parallel side walls 110 and 112 having a transverse wall 114 extending therebetween. The ends of the side walls 110 and 112 to the right of the wall 114, as viewed in the drawings, are connected to the frame member 14 (not shown in FIGS. 6 to 8).

Each of the side walls 110 and 112 has an open-ended slot 116 extending through the end wall 118 formed by the portion of the U-shaped body interconnecting the two side walls 110 and 112. Each slot 116 has a flared outer end 120.

In USC, the transverse part 32 (FIG. 3) of an anchorage unit 28 is received in the slots 116 and the flared outer part 120 assists achievement of the correct alignment during insertion.

A latch member 122 is mounted on a pivot pin 124 which extends between the side walls 110 and 112. The latch member 122 has a hook formation 126 which engages round the transverse part 32 of the anchorage unit 28. A cam surface 128 on the outer end hook part 126 displaces the hook part 126 out of the path of the transverse portion 32 during insertion.

The latch member 122 is biased into its engaged position by a compression spring 130 which engages with the transverse wall 114. The central wire 132 of a Bowden cable 134 extends through the compression spring 130 and is connected to a transverse pin 136 on the latch member 122 so that tension in the wire 152 causes the latch member 122 to disengage (the other end of the wire being connected to the release bar 26).

An ejector 140 is mounted in the slots 116 in the side walls 112 and 114 and has a stem 142 projecting through the transverse wall 114. A compression spring 144 engages between the wall 114 and a flange 146 on the stem 142 so as to bias the ejector 140 outwardly. This ensures that the ejector 140 remains closely in abutment with the transverse part 32 of the anchorage unit 28 when the buckle is fastened (although for clarity of illustration it is shown spaced apart therefrom in FIG. 6). The ejector 140 serves to ensure that, when the latch 122 is released, the transverse part 32 is moved outwardly at least as far as the ramp part 128 of the hook 126.

The buckles 22, 58 and 60 are substantially identical to the buckle 20. The Bowden cable 134 of the buckle 22 is connected to the release bar 26. The Bowden cable 134 of each of the other two buckles 46, and 48 are connected to a common actuating member mounted on the transverse member 40.

We claim:

1. A child safety seat in combination with a vehicle, the vehicle having:
  - a rear anchorage unit rigidly secured to the vehicle at the bottom of the backrest portion of the vehicle seat, and
  - a front anchorage unit rigidly secured to the vehicle below the front edge of the vehicle seat;
 the child safety seat comprising:
  - a seat body,
  - a rear releasable fastener projecting from the rear of the seat body for attachment to the rear anchorage unit,
  - a front releasable fastener on the other end of seat body for attachment to the front anchorage unit, and
  - a coupling arm having one end secured to the front releasable fastener and its other end pivotally attached to the seat body below the front thereof for angular movement between a first position in which the front releasable fastener engages with the front anchorage unit and an intermediate portion of the coupling arm is located in front of both ends thereof, and a second position in which both the front releasable fastener and said intermediate portion arc located in front of the seat body so as to obstruct occupancy thereof.
2. A child safety seat in combination with a vehicle according to claim 1, wherein the coupling arm is S-shaped.
3. A child safety seat in combination with a vehicle, according to claim 1, further comprising manually operable release means for the rear releasable fastener, operation of said release means being obstructed by the coupling arm when the front releasable fastener is engaged with the front anchorage unit.
4. A child safety seat in combination with a vehicle according to claim 3, wherein the coupling arm is S-shaped.



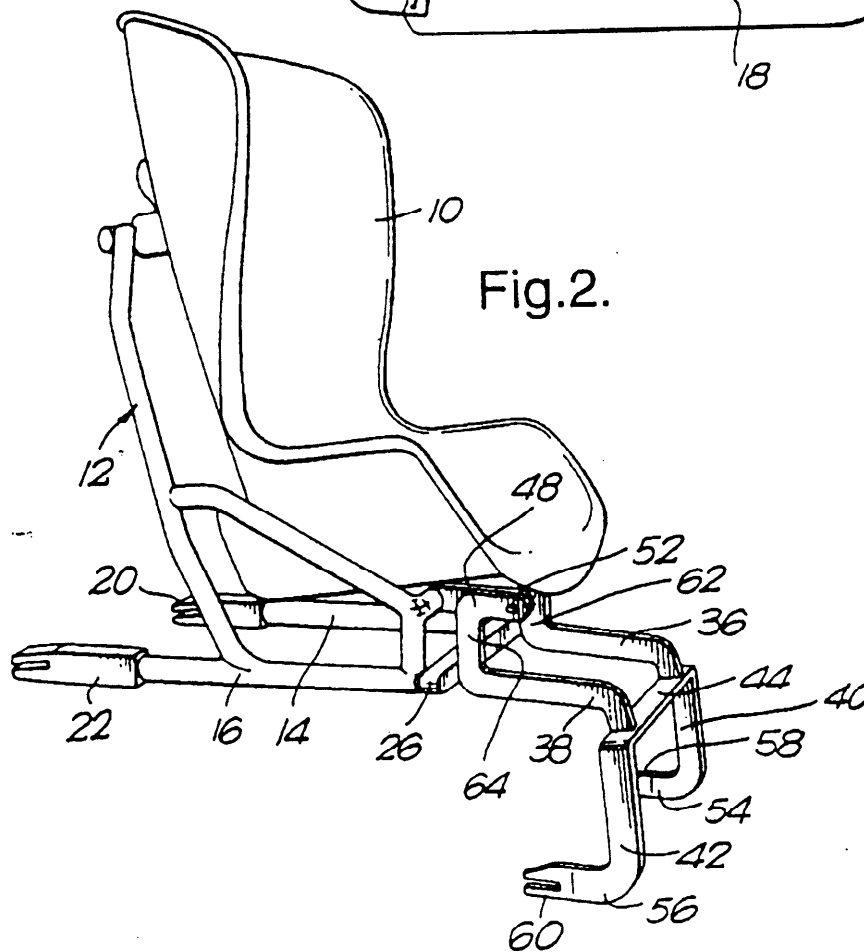
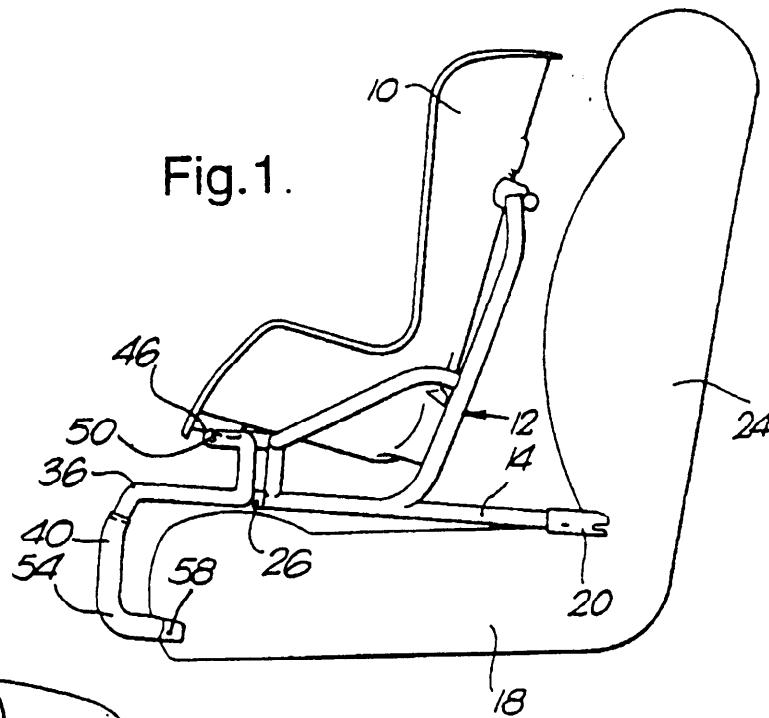


Fig.3.

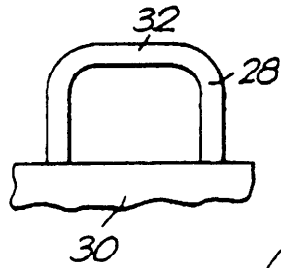


Fig.4.

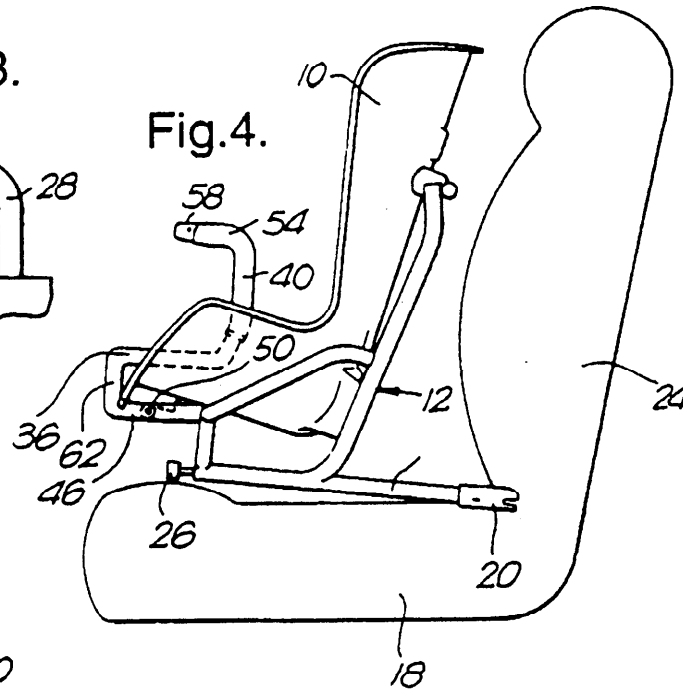


Fig.5.

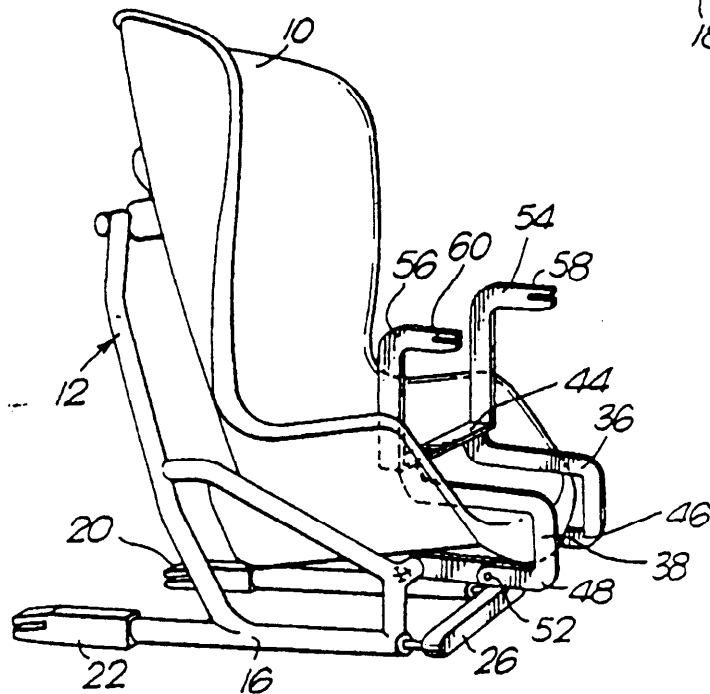


Fig. 6.

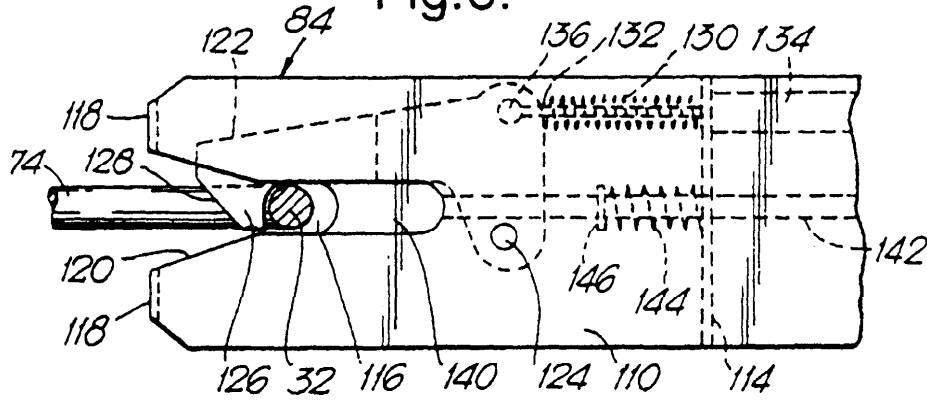


Fig. 7.

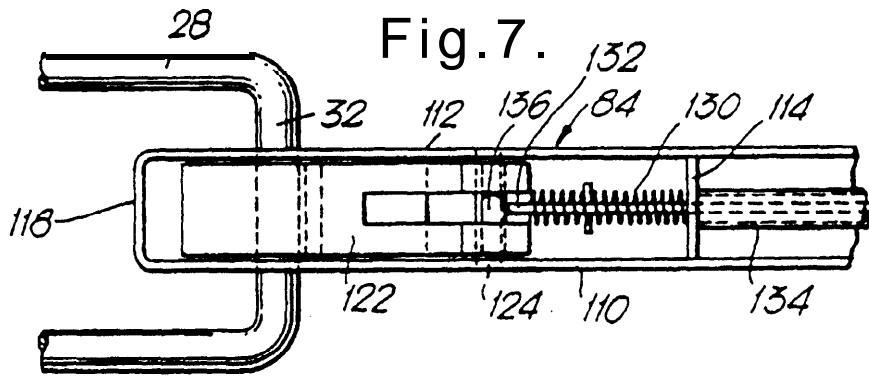


Fig. 8.

