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TITLE OF THE INVENTION

Child Safety Seat for Automobile

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to a child safety seat for an automobile which is mounted on an original seat of an automobile for safely seating a child in the automobile, and more particularly, it relates to an improvement in a reclining mechanism of such a child

10 safety seat for an automobile.

Description of the Background Art

 There is a child safety seat for an automobile which comprises a reclining mechanism for keeping a child in a comfortable position when it falls asleep on the seat, for

15 example. Such a seat typically has a reclinable backrest portion. When this safety seat is mounted frontward on an original seat of the automobile and the angle of the backrest portion is adjusted, however, the backrest portion interferes with that of the original seat of the

20 automobile. Therefore, the position for mounting the child safety seat on the original seat of the automobile must be changed every time the angle of the backrest portion is adjusted. In order to avoid such a trouble in adjustment of the angle of the backrest portion, there has

25 been proposed a child safety seat for an automobile



comprising a reclining mechanism having the following structure:

5 This type of child safety seat comprises a base which is fixed to an original seat of an automobile, and a seat body which is movably held by the base. The base is provided with a guide rail arcuately extending in a vertical plane, while the seat body is provided with a guide member which is guided to move along the guide rail. Thus, it is possible to change the angle of inclination of the seat body without interfering with the original seat of the automobile.

10 The aforementioned seat body is provided with backrest and seat portions in a fixed manner. When the seat body is inclined to adjust the angle of the backrest portion, therefore, a forward end of the seat portion is also raised up.

In such a state, however, the knees of the child are drawn up to apply a relatively large load on its hips, although the child can recline the upper half of its body on the backrest portion.

SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to prevent a front end of a seat portion from being raised upon adjustment of an angle of a backrest portion in a child safety seat for an automobile having the latter



reclining structure described above.

A child safety seat for an automobile according to the present invention comprises a seat body forming a backrest portion, a seat portion which is rotatably
5 mounted on the seat body, and a base movably holding the seat body. The base and the seat body are coupled with each other by a relative movement guiding mechanism which is formed by combination of a guide rail arcuately extending in a vertical plane and a guide member guided to
10 move along the guide rail. The relative movement guiding mechanism further comprises means for selectively fixing the guide member on a plurality of positions of the guide rail. The mechanism further comprises coupling means for coupling the base and the seat portion with each other to
15 maintain the seat portion in a substantially constant inclination regardless of movement of the seat body.

According to the present invention, the seat body moves along an arcuate track with respect to the base. When the angle of the backrest portion is adjusted while
20 the base is fixed to an original seat of an automobile, therefore, the seat body will not interfere with a backrest portion of the original seat of the automobile.

According to the present invention, further, the seat portion is rotatably mounted on the seat body, while the
25 base and the seat portion are coupled with each other by

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the coupling means so that the seat portion is maintained in a substantially constant inclination. Thus, the seat portion is maintained in a substantially constant inclination regardless of the angle of the backrest portion as adjusted.

According to the present invention, as hereinabove described, the seat portion can be maintained in a substantially constant inclination regardless of the angle of the backrest portion, whereby the forward end of the seat portion is not raised up to force the child into an uncomfortable position upon adjustment of the angle of the backrest portion. Thus, the child can recline its body on the backrest portion, to take a nap in a comfortable position.

The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a longitudinal sectional view schematically showing a child safety seat 1 for an automobile according to an embodiment of the present invention as viewed from a side portion;

Fig. 2 is a longitudinal sectional view corresponding



to Fig. 1, showing a seat body 3 in a position different from that shown in Fig. 1 with respect to a base 6;

Fig. 3 is an enlarged view showing a part of a guide rail 8;

5 Fig. 4 is a sectional view taken along the line IV - IV in Fig. 3;

Fig. 5 is an enlarged view showing a part of a guide member 9;

10 Fig. 6 is a sectional view taken along the line VI - VI in Fig. 5;

Fig. 7 is a sectional view taken along the line VII - VII in Fig. 5;

15 Fig. 8 is a sectional view showing the guide rail 8 and the guide member 9 which are in engagement with each other;

Fig. 9 is a sectional view showing a locking member 18 which is provided in relation to the guide member 9;

20 Fig. 10 is a sectional view showing a structure for controlling movement of the locking member 18 shown in Fig. 9; and

Fig. 11 is a sectional view schematically showing a structure for maintaining a seat portion 5 in a substantially constant inclination as viewed from a front portion of the child safety seat 1 for an automobile.

25 DESCRIPTION OF THE PREFERRED EMBODIMENTS



Figs. 1 and 2 are longitudinal sectional views schematically showing a child safety seat 1 for an automobile according to an embodiment of the present invention. A cushion member, a cover member etc. which
5 are generally provided in such a child safety seat 1 are not shown in these figures.

This safety seat 1 comprises a seat body 3 forming a backrest portion 2, a seat portion 5 which is mounted on the seat body 3 to be rotatable about a pivot portion 4,
10 and a base 6 movably holding the seat body 3. The base 6 is fixed to an original seat (not shown) of an automobile through a safety belt which is already provided on the original seat or the like.

As hereinabove described, the seat body 3 and the
15 base 6 movably holding the same are coupled with each other by a relative movement guiding mechanism 7. The relative movement guiding mechanism 7 is formed by combination of a guide rail 8 and a guide member 9. According to this embodiment, the guide rail 8 is provided
20 on the base 6, and the guide member 9 is provided on the seat body 3.

The guide rail 8 is formed by an arcuate portion 10 arcuately extending in a vertical plane, and a linear portion 11 linearly extending from one end of the arcuate
25 portion 10. Fig. 3 shows a part of the guide rail 8 in an

enlarged manner, and Fig. 4 shows a sectional view taken along the line IV - IV in Fig. 3. The guide rail 8 has a U-shaped section as a whole, with extensions 12 provided on both sides thereof.

5 Fig. 5 shows a part of the guide member 9 in an enlarged manner, and Figs. 6 and 7 show sectional views taken along the lines VI - VI and VII - VII in Fig. 5 respectively.

10 The guide member 9 arcuately extends in correlation with the arcuate portion 10 of the aforementioned guide rail 8. As shown in Fig. 6, a principal part 13 of the guide member 9 has a lateral C-shaped section, to engage with the extensions 12 of the guide rail 8 as shown in Fig. 8. Thus, the guide member 9 can move along the guide
15 rail 8.

 An end 14 of the guide member 9 has a section shown in Fig. 7, not to engage with the guide rail 8. While such an end 14 is adapted to reinforce the seat body 3, it is not particularly necessary to form the same.

20 Such a relative movement guiding mechanism 7 comprises means for selectively fixing the guide member 9 on a plurality of positions of the guide rail 8. According to this embodiment, the selective fixing means is provided by the following structure:

25 Referring to Fig. 9, the guide rail 8 has a plurality

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of engaging holes 15, 16, ... which are distributed along its longitudinal direction. On the other hand, the guide member 9 holds a locking member 18 provided with an engaging projection 17 which is inserted in any one of the engaging holes 15, 16, The locking member 18 is movably guided in a guide case 19 which is fixed to the guide member 9, and urged by a spring 20 to move in a direction for inserting the engaging projection 17 in any one of the engaging holes 15, 16, The locking member 18 is provided with an engaging pin 21. As shown in Fig. 10, the engaging pin 21 passes through a slot 22 which is provided in the guide case 19, to outwardly project from the guide case 19.

In order to allow the aforementioned movement of the locking member 18, the structure shown in Fig. 10 is employed. Referring to Fig. 10, a cam member 23 is arranged to be movable along the guide member 9. The cam member 23 is partially received in a hole 24 which is formed in the guide member 9, to be movable in a range of extension of the hole 24. The cam member 23 is provided with a cam surface 25, which is in an inclined state, for engaging with the aforementioned engaging pin 21.

An operation for making the aforementioned cam member 23 move along the guide member 9 is provided by an operating member 26. As shown in Figs. 1 and 2, the

operating member 26 is positioned on a forward end of the seat body 3 under the seat portion 5. This operating member 26 is horizontally movably held by a guide sleeve 27 which is fixed to the seat body 3. The operating
5 member 26 is coupled with the aforementioned cam member 23 by a wire 28. The wire 28 is covered with an outer tube 29, which is fixed to the guide sleeve 27 and the guide member 9 respectively.

When an operator frontwardly pulls the operating
10 member 26, this movement is transmitted to the cam member 23 through the wire 28. Thus, the cam member 23 frontwardly moves similarly to the operating member 26. Due to this movement of the cam member 23, the engaging pin 21 positioned on the cam face 25 is upwardly displaced
15 as shown by a phantom line in Fig. 10. Consequently, the locking member 18 shown in Fig. 9 disengages the engaging projection 17 from the engaging hole 15, for example, against elasticity of the spring 20. Thus, the guide member 9 is movable with respect to the guide rail 8.
20 During this movement, the force applied to the operating member 26 may be removed. When the engaging projection 17 is aligned with any one of the engaging holes 15, 16, ..., the locking member 18 is displaced to insert the same in the corresponding one of the engaging holes 15, 16, ...
25 along elasticity of the spring 20. Due to such



displacement of the locking member 18, the engaging pin 21 engaging with the cam face 25 forces the cam member 23 into the state shown in Fig. 10, so that the operating member 26 is returned to its original state in response.

5 Coupling means for coupling the base 6 and the seat portion 5 is provided in order to maintain the seat portion 5 in a substantially constant inclination regardless of the aforementioned movement of the seat body 3. According to this embodiment, the coupling means is
10 formed by the aforementioned linear portion 11 of the guide rail 8 and a coupling member 30 which is fixed to the seat portion 5. Fig. 11 shows the relation between the guide rail 8 and the coupling member 30 as viewed from a front portion of the child safety seat 1. An engaging
15 portion 31 is provided on a lower end of the coupling member 30, to engage with the extensions 12 of the guide rail 8. The engaging portion 31 has a lateral C-shaped section, similarly to the principal part 13 of the guide member 9. This engaging portion 31 is movable along the
20 linear portion 11 of the guide rail 8, while the coupling member 30 maintains the seat portion 5 and the linear portion 11 of the guide rail 8 at a substantially constant distance. Thus, it is possible to maintain the seat
25 portion 5 in a substantially constant inclination regardless of the aforementioned movement of the seat body



3 along an arcuate track, as understood from Figs. 1 and 2
by contrast with each other.

While the present invention has been described with
reference to the embodiment shown in the drawings, some
5 modifications are available within the scope of the
present invention.

For example, the positional relation between the
guide rail 8 and the guide member 9 forming the relative
movement guiding mechanism 7 may be reversed so that the
10 guide rail 8 is provided on the seat body 3 and the guide
member 9 is provided on the base 6. Further, the guide
member 9 may be divided into a plurality of portions, to
move along the guide rail 8 respectively.

The linear portion 11 of the guide rail 8 forming a
15 part of the coupling means for maintaining the seat
portion 5 in a substantially constant inclination may be
provided by a member which is independent of the arcuate
portion 10 of the guide rail 8. While this coupling means
comprises the coupling member 30 which slides along the
20 linear portion 11 of the guide rail 8, the same may
alternatively be replaced by a mechanism formed by a
plurality of links which couples the seat portion 5 and
the base 6 with each other, for example.

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WHAT IS CLAIMED IS:

1. A child safety seat for an automobile,
comprising:

- a seat body (3) forming a backrest portion (2);
a seat portion (5) being rotatably mounted on said
5 seat body (3);
a base (6) movably holding said seat body (3),
said base (6) and said seat body (3) being coupled
with each other by a relative movement guiding mechanism
(7) being formed by combination of a guide rail (8) having
10 a portion (10) arcuately extending in a vertical plane and
a guide member (9) being guided to move along said guide
rail (8),
said relative movement guiding mechanism (7)
comprising means (15, 16, 17, 18) for selectively fixing
15 said guide member (9) on a plurality of positions of said
guide rail (8); and
coupling means (30) for coupling said base (6) and
said seat portion (5) with each other for maintaining said
seat portion (5) in a substantially constant inclination
20 regardless of movement of said seat body (3).

2. A child safety seat for an automobile in
accordance with claim 1, wherein said guide rail (8) is





provided on said base (6), and said guide member (9) is provided on said seat body (3).

3. A child safety seat for an automobile in accordance with claim 2, wherein said guide rail (8) has a portion (11) linearly extending from an end of said arcuately extending portion (10), said coupling means comprising a coupling member (30), being mounted on said seat portion (5), having an engaging portion (31) being movable while engaging with said linear portion (11).

4. A child safety seat for an automobile in accordance with claim 1, wherein said guide rail (8) has a U-shaped section as a whole with extensions (12) being provided on both sides thereof, said guide member (9) having a lateral C-shaped section for engaging with said extensions (12).

5. A child safety seat for an automobile in accordance with claim 1, wherein said selectively fixing means comprises a plurality of engaging holes (15, 16) being provided to be distributed longitudinally along said guide rail (8), and a locking member (18) having an engaging projection (17) being movably held by said guide member (9) to be selectively inserted in any one of said

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engaging holes (15, 16) by its movement.

6. A child safety seat for an automobile in accordance with claim 5, further comprising a spring (20) for urging said locking member (18) to move in a direction for inserting said engaging projection (17) in any one of
5 said engaging holes (15, 16).

7. A child safety seat for an automobile in accordance with claim 6, further comprising a cam member (23) being engageable with a part of said locking member (18) and movable in a direction perpendicular to that of
5 movement of said locking member (18) for driving said locking member (18) in a direction for disengaging said engaging projection (17) from said any one of said engaging holes (15, 16), and an operating member (26) for providing an operation for driving said cam member (23).

8. A child safety seat for an automobile in accordance with claim 7, wherein said operating member (26) is positioned under said seat portion (5).

9. A child safety seat for an automobile in accordance with claim 8, further comprising a wire (28) for coupling said operating member (26) and said cam member (23) with each other.

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10. A reclining seat comprising a body (3) defining
a backrest portion (2) of the seat mounted to a base
(6) for relative movement, thereto for adjusting the
angle of the backrest portion to the base, a seat
5 portion (5) mounted to said body for movement relative
thereto, and coupling means (30) coupling said seat
portion with said base for maintaining said seat
portion at a substantially constant inclination to
said base regardless of the angle to which the
10 backrest portion is adjusted.

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