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(54) **A tension regulator for a safety belt of a seat, in particular a child safety seat**

(57) A tension regulator (19) for a safety belt (9) of a seat (1), in particular a child safety seat, is provided with a metal body (32) having a contrast cross member (37) and with a slider (33), which is also made of metal; the slider (33) has a retention cross member (53), wound on which is a strap (10) of the safety belt (9), and is slidable

with respect to the body (32) for exerting a nipping action on said strap (10) between the retention cross member (53) and the contrast cross member (37); the body (32) has a guide cross member (49), which defines, with the contrast cross member (37), a passage (48) that can be engaged by the strap (10) for keeping the strap (10) folded on an edge (60) of said contrast cross member (37).

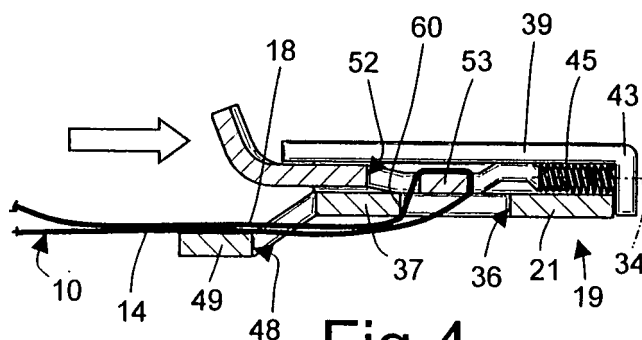


Fig.4

Description

[0001] The present invention relates to a tension regulator for a safety belt of a seat, in particular to a regulator for a safety belt of a static type of a child safety seat.

[0002] Belts are known comprising a first strap and a second strap connected to one another by a tension regulator defined by a buckle. The first strap is fixed to the regulator, whilst the second strap passes in a series of openings made in the regulator and has a free end that can be pulled manually so as to slide along the regulator and set the belt in tension.

[0003] For example, the patent No. EP0040062 illustrates a regulator, which is fixed, at one end thereof, to the first strap and comprises a plate and a covering, which is made of plastic material and comprises a transverse edge, which is movable under the thrust of a spring in order to nip the second strap of the belt against a contrast cross member of the plate and keep the belt stationary after the tensile force has been increased by pulling the end of the second strap.

[0004] The known solutions of the type just described are far from satisfactory, in so far as the nipping action exerted by the movable transverse edge is not sufficient to withhold the belt when the tension of the belt is relatively low or else when the two portions of strap are not parallel for reasons of installation. In fact, in these conditions, the second strap of the belt remains in a position substantially aligned with the slit defined by the transverse movable edge and the contrast cross member, without forming substantially any angle or fold around the contrast cross member, so that the second strap is able to slide in said slit in spite of the fact that it is subjected to the nipping action.

[0005] In addition, the solution illustrated in EP0040062 envisages an additional cross member, which projects laterally from the covering in order to be able to displace the movable transverse edge against the action of the spring and slacken the grip exerted by the nipping action, so that it has a relatively high number of components and requires long times and high costs for production and assembly.

[0006] In addition, the plastic material used for structural parts, guide parts, and/or retention parts in the regulators of a known type is often subject to failure.

[0007] The aim of the present invention is to provide a tension regulator for a safety belt of a seat, in particular a child safety seat, that will enable a simple and inexpensive solution of the drawbacks set forth above.

[0008] Provided according to the present invention is a tension regulator for a safety belt of a seat, in particular a child safety seat, the regulator comprising:

- a body made of a single piece of metal material and comprising:
 - a) an attachment portion, and
 - b) a contrast cross member;

- a retention cross member, coupled to said body in a position such as to remain wound, in use, by a second strap of said safety belt, and movable in a longitudinal direction between:

- a) an advanced position towards said contrast cross member, for exerting a nipping action on said second strap between said contrast and retention cross members, and
- b) a retracted position, for leaving said second strap free to slide in the space between said contrast and retention cross members; and

- an actuation portion, which can be pressed manually for displacing said retention cross member into its retracted position; said regulator being characterized in that said body comprises a guide cross member defining, with said contrast cross member, a passage that can be engaged by said second strap for maintaining a fold of said second strap around an edge of said contrast cross member.

[0009] For a better understanding of the present invention a preferred embodiment is now described, purely by way of nonlimiting example, with reference to the attached drawings, wherein:

- Figure 1 is a side view of a preferred embodiment of the tension regulator for a safety belt of a seat, in particular a child safety seat, according to the present invention;
- Figure 2 is an exploded perspective view at an enlarged scale of the tension regulator of Figure 1;
- Figure 3 is a cross-sectional view according to the line III-III of Figure 2;
- Figure 4 is similar to Figure 3 and shows the tension regulator with its own components assembled in a configuration of use; and
- Figure 5 is a perspective view of a different safety belt applied to which is the tension regulator of the present invention.

[0010] In Figure 1, the reference number 1 designates as a whole a child safety seat for carrying a child in a motor vehicle. The child safety seat 1 comprises a sitting surface 5 and a backrest 6, and is set on a seat 7 of the motor vehicle, for example, a rear seat. The child safety seat 1 is fixed to the seat 7 via a coupling assembly 8 (known and not described in detail), of the type commonly referred to as "isofix", and via a safety belt 9, which withholds the top end of the backrest 6 against the backrest of the seat 7, preventing the safety seat 1 from tilting forwards.

[0011] The belt 9 is of a static type, i.e., is without automatic roll-up devices (winders) and pretensioner safety devices, and comprises a strap 10 provided, at the bottom end, with a spring catch 11, which is fixed in a way illus-

trated schematically, for example is anchored by snap action, to a half-ring 12 fixed on a portion of the vehicle body or of the structure of the seat 7.

[0012] The strap 10 comprises an intermediate portion 14, which carries a tension indicator 31 and is connected to the end of a strap 17 via a tension regulator 19 defined by a buckle. The top end of the strap 10 is defined by a portion 18, slidably inserted and withheld in the regulator 19, as will be described more fully in what follows.

[0013] The ends of the strap 17, instead, are defined by two loops 22, 23: the loop 22 is wound in a fixed position around a cross member 21 (Figure 2) of the regulator 19, whilst the loop 23 is wound in a fixed position around an engagement element, defined for example by a pin 24, fixed to a top portion 26 of the backrest 6.

[0014] With reference to Figures 2 to 4, the regulator 19 comprises a body 32 and a slider 33, slidably coupled to one another in a rectilinear longitudinal direction 34, which is aligned with the strap 17 when the belt 9 is tensioned.

[0015] The body 32 is made of a single piece of steel and comprises a plane plate 35 having a rectangular through opening 36, which is defined by the cross member 21, by a cross member 37 for retention of the portion 18 and by two lateral portions 38 parallel to the direction 34.

[0016] The body 32 further comprises two lateral appendages 39, which extend from the edges of the portions 38 and are bent back inwards in a position facing a top surface 41 of the plate 35 so as to form, together with the portions 38, respective C-shaped portions and, hence, respective guide channels 42.

[0017] The channels 42 are closed, in a position adjacent to the cross member 21, by respective walls 43, which are orthogonal to the direction 34 and form part of the appendages 39. The channels 42 house, at their ends, respective elastic elements 45, defined in particular by helical springs, which are arranged so that they rest, on one side, against the walls 43 and, on the other side, against respective side projections 47 of the slider 33 so as to push the slider 33 in the direction 34 away from the walls 43 and the cross member 21.

[0018] The body 32 moreover has a through opening 48 separated from the opening 36 by the cross member 37 and defined not only by the cross member 37, but also by a cross member 49 for guiding the portion 18, and by two lateral radiusing portions 50, which define the prolongation of the portions 38 and are inclined with respect to the portions 38 in a direction opposite to the appendages 39 and to the slider 33.

[0019] The cross member 49 lies in a plane parallel to the cross members 21 and 37, is parallel to the cross members 21 and 37, and has a convex curved front edge.

[0020] Once again with reference to the attached figures, the slider 33 is defined by a steel plate, which is obtained starting from a sheet of metal plate, which is blanked to obtain the external perimetral rim and an intermediate through opening 52 and is then bent to obtain

the lateral profile shown in Figure 4.

[0021] The opening 52 is defined by: a rear cross member 53, having a bottom face which slides in contact with the surface 41; a transverse portion 54, facing the cross member 53 and having a front end appendage 55, which is external to the channels 42 and is bent in a direction opposite to the cross member 49 so as to form a push-button; and two lateral portions 56, which are substantially aligned with the projections 47. In particular, the distance between the bottom face of the cross member 53 and the top face of the projections 47 and of the portion 54 approximates by defect the height of the channels 42 to guarantee guide coupling (Figure 4).

[0022] According to what is shown in Figure 4, the portion 14 enters the regulator 19 passing on top of the cross member 49. The part that effectively engages the regulator 19, defined by the portion 18, passes in the opening 48, underneath the cross member 37, and then folds in order to pass through the opening 36. The portion 18 is then wound around the cross member 53 of the slider 33, and then comes back into the opening 52. When it leaves the opening 52, the portion 18 enters the opening 36 again and is folded around a bottom and rear edge 60 of the cross member 37.

[0023] Next, the portion 18 passes underneath the cross member 37, and then again in the opening 48 above the portion 14, where it can be pulled manually by a user for tensioning the belt 9.

[0024] The slider 34 can move under the guide of the channels 42 between an advanced position, in which it is pushed by the springs 45 for exerting a nipping action on the portion 18 between the cross members 37 and 53 and for withholding the portion 18 in a fixed position, and a retracted position, in which it leaves the portion 18 the space necessary for sliding between the cross members 37 and 53 and in the openings 36, 48, 52.

[0025] In particular, in order to release or distend the belt 9, for example in order to slide the loop 23 out of the pin 24, the slider 33 is translated into the retracted position by manually pressing the portion 54.

[0026] The opening 48 guides the portion 18 so as to keep it folded on the edge 60, which prevents the strap 18 from setting itself orthogonal to the plate 35 when the belt 9 is not tensioned and, hence, possibly sliding out of the regulator 19 even though it is gripped by the nipping action between the cross members 37 and 53.

[0027] Figure 5 shows the same regulator 19 applied to another safety belt of a static type, designated by the reference number 62. In Figure 5, wherever possible, the same reference numbers have been used as the ones already used for the corresponding components shown in Figure 1.

[0028] The belt 62 is carried by the structure of the child safety seat 1. The ends of the belt 62 extend on the outside of the child safety seat 1 and are fixed to respective engagement devices 64, which form part of the assembly 8 and are provided for being engaged to respective pins (not illustrated) fixed to the body or structure of

the seat 7, in order to withhold the child safety seat 1 in a fixed position on the seat 7. Also in this case, by pulling a portion 18 of the belt 62, a tensile force is applied on the belt 62 in order to render the position of the safety seat 1 stable and secure.

[0029] In both cases, shown in Figures 1 and 5, the regulator 19 is without structural elements, retention elements, and guide elements made of plastic material: in fact, the cross member 49 is made of a single piece with the plate 35, on the one hand, and the cross member 53 is made of a single piece with the portion 55, on the other hand. In this way, high levels of reliability and safety, as well as a high level of simplicity of installation, are achieved. Obviously, a covering made of plastic material could be provided, but only having an aesthetic function.

[0030] As has been mentioned above, the opening 48 enables the portion 14 to be guided in a direction substantially parallel to the direction 34 and the portion 18 to be kept folded on the edge 60 of the cross member 37 so that the portion 18 is withheld in a stable way by the nipping action exerted by the cross member 53 even when the belt 9 is not perfectly tensioned.

[0031] Finally, it is clear that modifications and variations may be made to the regulator 19 described herein with reference to the attached figures, without thereby departing from the sphere of protection of the present invention, as defined in the annexed claims.

[0032] In particular, the shape of the portion 54 could be different; and/or the relative position between the cross members 49 and 37 could be different from the one illustrated; and/or the direction of winding of the portion 18 around the cross member 53 could be reversed with respect to the one described above; and/or the function of thrust of the cross member 53 in its advanced position towards the cross member 37 could be performed by a system different from the springs 45; and/or the cross member 21 could be replaced by a tab, which can be connected to an engagement device of the safety belt.

Claims

1. A tension regulator (19) for a safety belt (9) of a seat (1), in particular a child safety seat, the regulator comprising:

- a body (32), made of a single piece of metal material and comprising:

- a) an attachment portion (21), and
- b) a contrast cross member (37);

- a retention cross member (53), coupled to said body (32) in a position such as to remain wound, in use, by a strap (10) of said safety belt (9), and movable in a longitudinal direction (34) between:

- a) an advanced position towards said con-

trast cross member (37), for exerting a nipping action on said strap (10) between said contrast cross member (37) and retention cross member (53); and

b) a retracted position, for leaving said strap (10) free to slide in the space between said contrast cross member (37) and retention cross member (53); and

- an actuation portion (55), which can be pressed manually for displacing said retention cross member (53) into its retracted position;

said regulator being **characterized in that** said body (32) comprises a guide cross member (49), defining, with said contrast cross member (37), a passage (48) that can be engaged by said strap (10) for keeping said strap (10) folded around an edge (60) of said contrast cross member (37).

2. The regulator according to Claim 1, **characterized in that** said retention cross member (53) and said actuation portion (55) form part of a slider (33) made of a single piece.

3. The regulator according to Claim 2, **characterized in that** said slider (33) is defined by a steel plate made starting from a blanked and bent sheet.

4. The regulator according to Claim 2 or Claim 3, **characterized in that** it further comprises elastic means (45) arranged between said slider (33) and said body (32) for pushing said retention cross member (53) towards its advanced position.

5. The regulator according to Claim 4, **characterized in that** said elastic means comprise two springs (45) coupled to respective lateral portions (47) of said slider (33).

6. The regulator according to any one of Claims 2 to 5, **characterized in that** said body (32) comprises two lateral guide portions (39) defining respective channels (42) parallel to said longitudinal direction (34) for guiding said slider (33).

7. The regulator according to Claims 5 and 6, **characterized in that** said springs (45) are housed in said channels (42).

8. The regulator according to any one of Claims 2 to 7, **characterized in that** said slider (33) has an opening (52), defined by said retention cross member (53), by two lateral portions (56), and by a front cross member (54), starting from which said actuation portion (55) extends in cantilever fashion.

9. The regulator according to any one of the preceding

claims, **characterized in that** said guide cross member (49) lies in a plane parallel to said contrast cross member (37) and set at a distance from said contrast cross member (37) in a direction opposite to said retention cross member (53).

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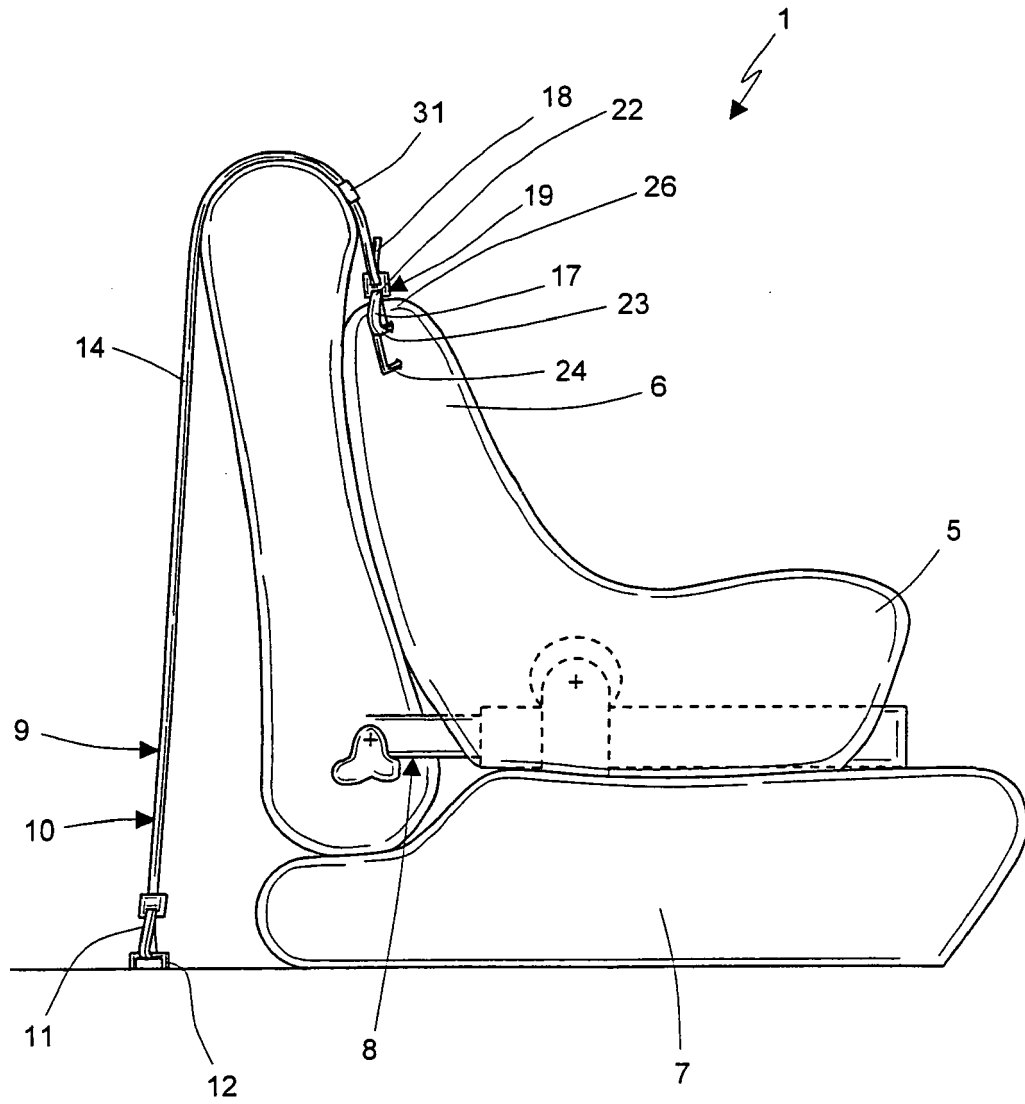
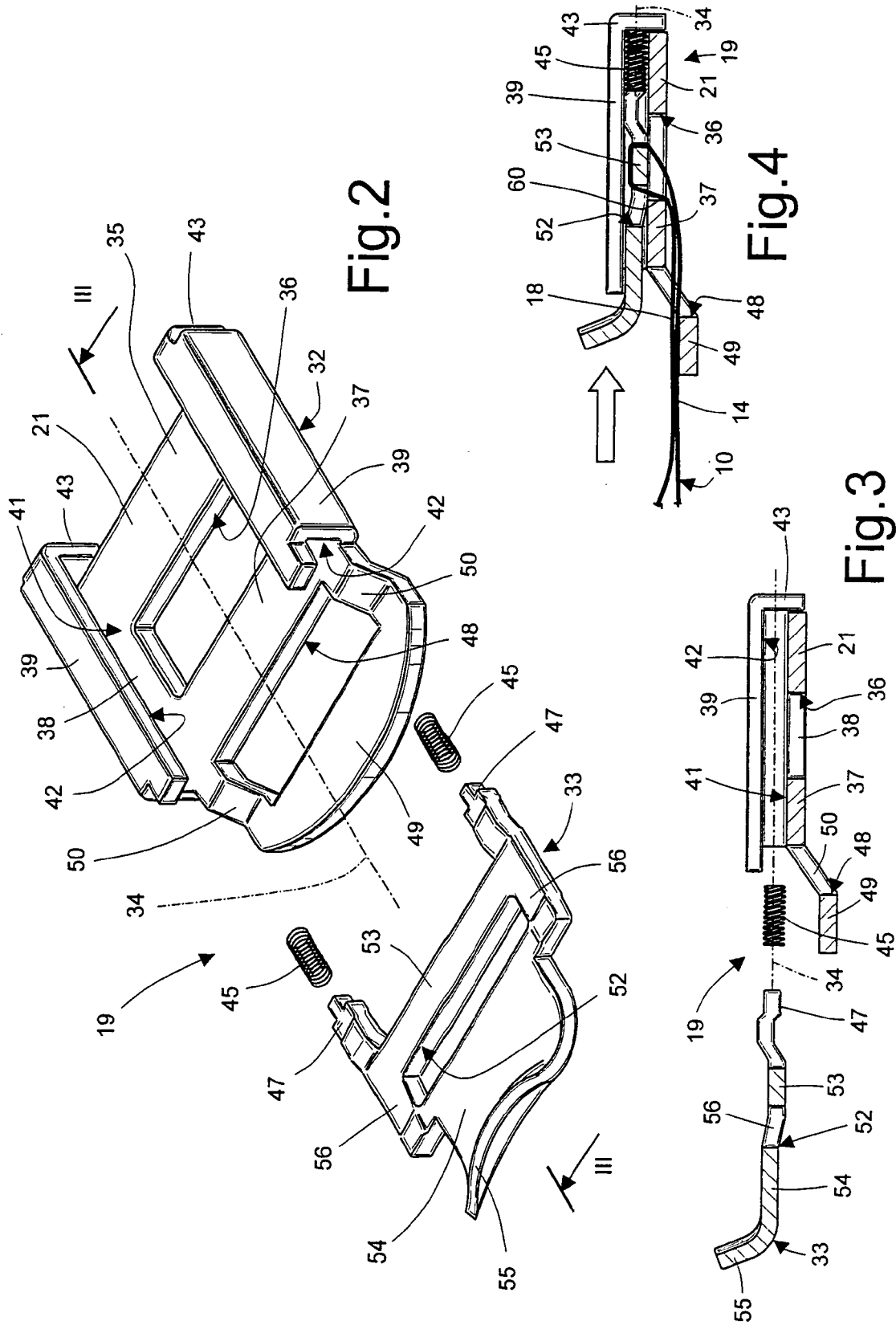


Fig.1



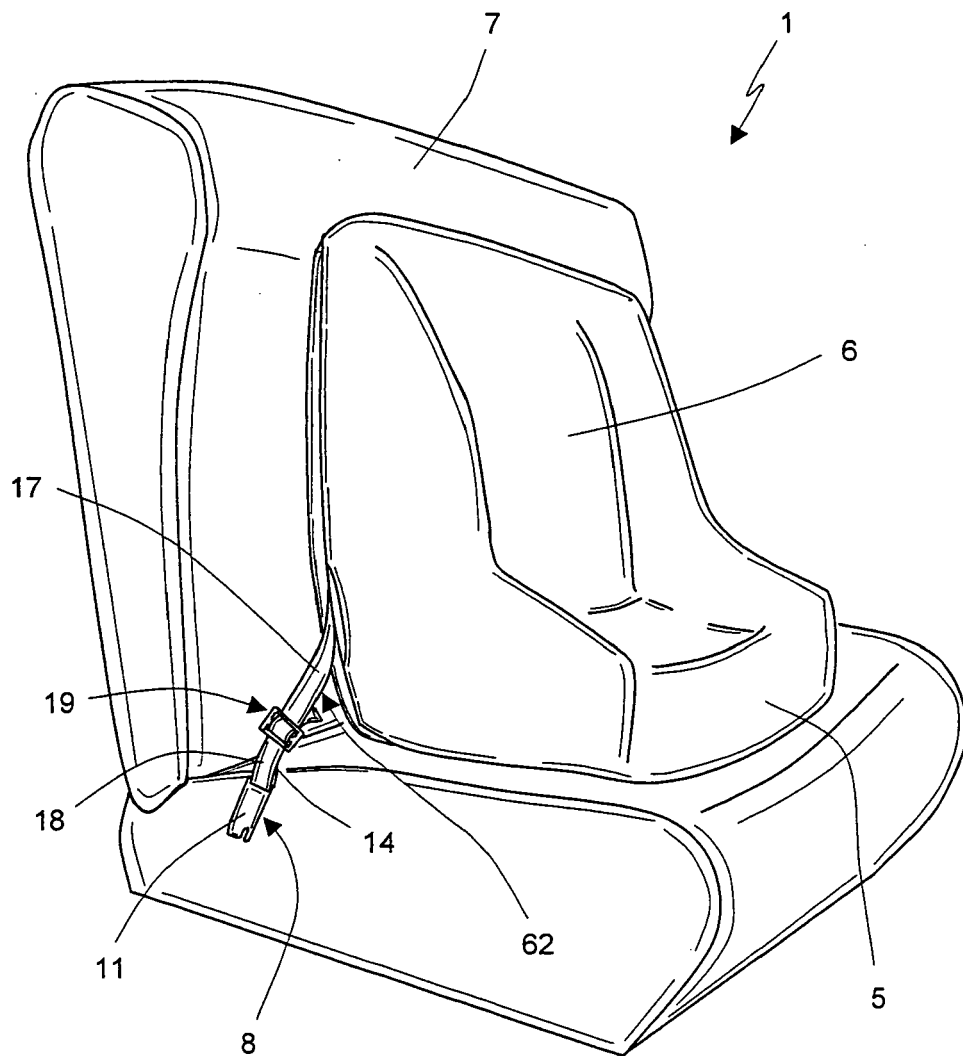


Fig.5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5510

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 1 066 740 A (KOCK & SONS INC H) 26 April 1967 (1967-04-26) * claim 1; figures 3-5 *	1-9	INV. A44B11/25
A	GB 653 832 A (MATTHEW HARVEY & COMPANY LTD; HENRY BRITTAIN) 30 May 1951 (1951-05-30) * page 3, line 62 - line 70; figure 3 *	1-9	
D,A	EP 0 040 062 A (ASE UK LTD [GB]) 18 November 1981 (1981-11-18) * abstract; figures 1,5 *	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			A44B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 10 December 2007	Examiner Westermayer, Wilhelm
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 42 5510

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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10-12-2007

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 1066740	A	26-04-1967	NONE	
GB 653832	A	30-05-1951	NONE	
EP 0040062	A	18-11-1981	DE 3165828 D1	11-10-1984

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 0040062 A [0003] [0005]