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(54) Title: FOLD AND KNEEL SEAT WTIH REARWARD FOLDING MOTION

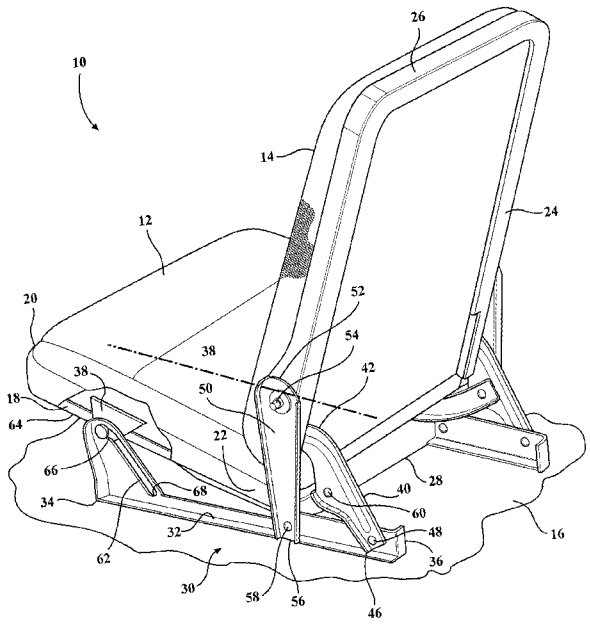


FIG. 1

(57) Abstract: A seat comprises a seat cushion and a seat back pivotally coupled to the seat cushion. A linkage assembly moves the seat between a seating position and a kneeling position lowered rearwardly and downwardly against a floor. The linkage assembly includes a support bracket, a front leg coupled between the seat cushion and the support bracket, a rear leg extending between an upper end pivotally coupled to the seat back and a lower end pivotally coupled to the support bracket, the rear leg pivotally coupled to the rear portion of the seat cushion, and a control link extending between a first end pivotally coupled to the seat back and a second end pivotally coupled to the support bracket for guiding the seat cushion between the seating and kneeling positions in response to pivotal movement of the seat back between the upright and folded positions.

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FOLD AND KNEEL SEAT WITH REARWARD FOLDING MOTION

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to and all the benefits of United States Provisional Application No. 61/654,204, filed on June 1, 2012 and entitled "Fold and Kneel Seat with Rearward Folding Motion."

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a seat assembly pivotal between an upright seating position and a folded position wherein a seat cushion is lowered and translated rearward to lie against the floor of an automotive vehicle and a seat back is pivoted forwardly lying flat along the seat cushion such that the seat back is clear from contact with a seat positioned forward of the seat assembly.

2. Description of Related Art

[0002] Seat assemblies for automotive vehicles include a generally horizontal seat cushion fixedly secured to the floor of the vehicle and a seat back pivotally coupled to the seat cushion. Rear seat assemblies, or 2nd row seats, are positioned behind the front passenger and driver seat assemblies for providing additional vehicle seating capacity. It is commonly known and desirable for the seat back of the rear seat assembly to be pivotal between a generally upright seating position to a folded position overlying the seat cushion to provide additional storage capacity in the vehicle. The seat cushion may also kneel downwardly from the seating position spaced above the floor of the vehicle to a kneel position resting against the floor.

[0003] However, the space between the front seat assemblies and rear seat assemblies often prevents the seat back of the rear seat assembly from freely pivoting to the folded position without contacting the front seat assembly.

[0004] Therefore, it is desirable to provide a fold and kneel seating assembly wherein the seat back may be pivoted from the seating position to the folded position while the seat

cushion moves downwardly and rearwardly from the seating position to a kneeling position and provide clearance of the seat back from contacting the front seat assembly.

SUMMARY OF THE INVENTION

[0005] According to one embodiment of the present invention, a seat assembly is provided for use in an automotive vehicle. The seat assembly comprises a seat cushion extending between a front portion and a rear portion and a seat back pivotally coupled to the seat cushion for pivotal movement between an upright seating position and a folded position overlying the seat cushion. A linkage assembly moves the seat assembly between a seating position spaced above a floor of the vehicle and a kneeling position lowered rearwardly and downwardly adjacent the floor. The linkage assembly includes a support bracket extending longitudinally between a first end and opposite second end, a front leg operatively coupled between the front portion of the seat cushion and the first end of the support bracket, a rear leg extending between an upper end pivotally coupled to the seat back and a lower end pivotally coupled to the second end of the support bracket, the rear leg pivotally coupled to the rear portion of the seat cushion between the upper and lower end, and a control link extending between a first end pivotally coupled to the seat back and a second end pivotally coupled to the support bracket for guiding the seat cushion between the seating and kneeling positions in response to pivotal movement of the seat back between the upright and folded positions.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

[0007] Figure 1 is a fragmentary perspective view of a fold and kneel seat assembly according to a first embodiment of the invention in a seating position;

[0008] Figure 2 is a perspective view of the seat assembly of Figure 1 actuated between the seating position and a folded position;

[0009] Figure 3 is perspective view of the seat assembly of Figure 1 in the folded position;

[0010] Figure 4 is perspective view of a fold and kneel seat assembly according to a second embodiment of the invention in a seating position;

[0011] Figure 5 is a perspective view of the seat assembly of Figure 4 actuated between the seating position and a folded position; and

[0012] Figure 6 is a perspective view of the seat assembly of Figure 5 in the folded position.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0013] Referring to Figures 1-3, a fold and kneel seat assembly according to a first embodiment of the invention is shown at 10. The seat assembly 10 includes a generally horizontal seat cushion 12 and a generally upright seat back 14. The seat assembly 10 is selectively operable between a seating position, wherein the seat cushion 12 is spaced generally horizontally above a floor 16 of the vehicle and the seat back 14 is in a generally upright position as shown in Figure 1, and a folded position, wherein the seat cushion 12 is lowered rearwardly against the floor 16 and the seat back 14 is pivoted forwardly overlying the seat cushion 12.

[0014] The seat cushion 12 includes a seat cushion frame 18 extending between a front portion 20 and a rear portion 22 for supporting a cellular foam pad encased in a trim cover as is commonly known in the art. Similarly, the seat back 14 includes a seat back frame 24 extending between a top portion 26 and a bottom portion 28 for supporting a cellular foam pad encased in a trim cover.

[0015] The seat assembly 10 is operable between the seating position and the folded position via a linkage assembly 30. A linkage assembly 30 is operatively coupled to each opposing lateral side of the seat assembly 10 in a mirror image. Therefore, only one linkage assembly 30 will be described in detail herein. The linkage assembly 30 includes a support bracket 32 extending longitudinally between a first end 34 and opposite second end 36 for supporting the seat assembly 10 on the vehicle floor 16. The support bracket 32 is adapted to be fixedly secured by fasteners, such as bolts, to the vehicle floor 16. The linkage assembly 30 further includes a front leg 38 extending downwardly from the bottom of the seat cushion 12 adjacent the front portion 20 of the seat cushion frame 18 for supporting the front portion 20 of the seat cushion 12 and a rear leg 40 for supporting the rear portion 22 of the seat

cushion 12 and bottom portion 28 of the seat back 14. The rear leg 40 extends between a first upper end 42 pivotally coupled to the bottom portion 28 of the seat back frame 24 by pivot post 44 and an opposite second lower end 46 pivotally coupled to the support bracket 32 by pivot pin 48. The linkage assembly 30 also includes a control link 50 pivotally coupled between the bottom portion 28 of the seat back 14 and the support bracket 32. More specifically, the control link 50 extends between a first upper end 52 pivotally coupled to the bottom portion 28 of the seat back frame 24 by a recliner pivot 54 spaced above the pivot post 44 and an opposite second lower end 56 pivotally coupled to the second end 36 of the support bracket 32 by a pivot pin 58. The rear portion 22 of the seat cushion frame 18 is pivotally coupled to the rear leg 40 by pivot pin 60 spaced approximately midway between the first upper end 42 and second lower end 46 of the rear leg 40.

[0016] In the first embodiment of the invention, the first end 34 of the support bracket 32 includes an inclined slot 62 therein extending downwardly and rearwardly for slidably receiving a guide pin 64 projecting outwardly from the front leg 38. The inclined slot 62 extends rearwardly from a flat or horizontal detent portion 66 for supporting the guide pin 64 and front leg 38 with the seat assembly 10 in the seating position and then extends downwardly and rearwardly to a lower end 68 for supporting the guide pin 64 and lowering the seat cushion 12 rearward and downwardly against the floor 16 in the folded position.

[0017] In operation, referring to Figure 1, the seat assembly 10 is shown in the seating position wherein the seat cushion 12 is spaced generally horizontally above the vehicle floor 16 and the seat back 14 is in a generally upright position. In the seating position, the guide pin 64 on the front leg 38 is seated in the flat detent portion 66 of the inclined slot. Also, the pivot post 44 of the rear leg 40 is in an over center condition wherein the pivot post 44 is forward of a straight line defined between the recliner pivot 54 and the pivot pin 48 in order to support the seat cushion 12 and seat back 14 in the seating position. Referring to Figure 2, as the seat back 14 is pivoted forwardly from the upright seating position towards a fold flat position overlying the seat cushion 12, the bottom portion 28 of the seat back frame 24 forces the rear leg 40 to pivot clockwise about the pivot pin 48. Pivotal movement of the rear leg 40 about the pivot pin 48 pulls rearwardly on rear portion 22 of the seat cushion frame 18. The seat cushion 12 is guided rearwardly and downwardly by the guide pin 64 sliding along the inclined slot 62 from the flat detent portion 66 to the lower end 68. Therefore, as the seat back 14 is pivoted about the recliner pivot 54 between the upright seating position and the

folded position, the rear leg 40 pivots clockwise and the pivot post 44 orbits about the recliner pivot 54 pulling the seat cushion 12 rearwardly. The guide pin 64 simultaneously travels along the inclined slot 62 to lower the seat cushion 12 from the seating position spaced above the floor to a kneeling position lying against the floor 16 as shown in Figure 3.

[0018] Referring to Figures 4-6, a seat assembly 10' of a second embodiment of the invention is shown. The seat assembly 10' of the second embodiment similarly includes a seat cushion 12', a seat back 14', and a linkage assembly 30'. The linkage assembly 30' includes a support bracket 32' extending longitudinally between a first end 34' and opposite second end 36' for supporting the seat assembly 10' on the vehicle floor 16'. The linkage assembly 30 further includes a rear leg 40' for supporting the rear portion 22' of the seat cushion 12' and bottom portion 28' of the seat back 14'. The rear leg 40' extends between a first upper end 42' pivotally coupled to the bottom portion 28' of the seat back frame 24' by pivot post 44' and an opposite second lower end 46' pivotally coupled to the support bracket 32' by pivot pin 48'. The linkage assembly 30' also includes a control link 50' pivotally coupled between the bottom portion 28' of the seat back 14' and the support bracket 32'. More specifically, the control link 50' extends between a first upper end 52' pivotally coupled to the bottom portion 28' of the seat back frame 24' by a recliner pivot 54' spaced above the pivot post 44' and an opposite second lower end 56' pivotally coupled to the second end 36' of the support bracket 32' by a pivot pin 58'. The rear portion 22' of the seat cushion frame 18' is pivotally coupled to the rear leg 40' by pivot pin 60' spaced approximately midway between the first upper end 42' and second lower end 46' of the rear leg 40'.

[0019] In the second embodiment of the invention, the inclined slot 62 formed in the support bracket 32 is replaced with a front leg 70 having an upper end 72 pivotally coupled to the front portion 20' of the seat cushion frame 18' by pivot 74 and a lower end 76 pivotally coupled to the first end 34' of the support bracket 32' by pivot 78.

[0020] In operation, referring to Figure 4, the seat assembly 10' is shown in the seating position wherein the seat cushion 12' is spaced generally horizontally above the vehicle floor 16' and the seat back 14' is in a generally upright position. In the seating position, the pivot post 44' of the rear leg 40' is in the over center condition in order to support the seat cushion 12' and seat back 14' in the seating position. Referring to Figure 5,

as the seat back 14' is pivoted forwardly from the upright seating position towards a fold flat position overlying the seat cushion 12', the bottom portion 28' of the seat back frame 24' forces the rear leg 40' to pivot clockwise about the pivot pin 48'. Pivotal movement of the rear leg 40' about the pivot pin 48' pulls rearwardly on rear portion 22' of the seat cushion frame 18'. The seat cushion 12' is guided rearwardly and downwardly by the front leg 70. Therefore, as the seat back 14' is pivoted about the recliner pivot 54' between the upright seating position and the folded position, the rear leg 40' pivots clockwise and the pivot post 44' orbits about the recliner pivot 54' pulling the seat cushion 12' rearwardly. The front leg 70 simultaneously pivots rearwardly and downwardly to lower the seat cushion 12' from the seating position spaced above the floor to a kneeling position lying against the floor 16' as shown in Figure 6.

[0021] The invention has been described herein in an illustrative manner, and it is to be understood that the terminology used is intended to be in the nature of words of description rather than limitation. Many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced other than as specifically enumerated within the description.

What is claimed:

1. A seat assembly for use in an automotive vehicle comprising:

a seat cushion extending between a front portion and a rear portion;

a seat back pivotally coupled to said seat cushion for pivotal movement between an upright seating position and a folded position overlying said seat cushion; and

a linkage assembly for moving said seat assembly between a seating position spaced above a floor of the vehicle and a kneeling position lowered rearwardly and downwardly adjacent the floor; said linkage assembly including a support bracket extending longitudinally between a first end and opposite second end, a front leg operatively coupled between said front portion of said seat cushion and said first end of said support bracket, a rear leg extending between an upper end pivotally coupled to said seat back and a lower end pivotally coupled to said second end of said support bracket, said rear leg pivotally coupled to said rear portion of said seat cushion between said upper and lower end, and a control link extending between a first end pivotally coupled to said seat back and a second end pivotally coupled to said support bracket for guiding said seat cushion between said seating and kneeling positions in response to pivotal movement of said seat back between said upright and folded positions.

2. A seat assembly as set forth in claim 1 wherein said control link is pivotally coupled to the seat back by a recliner pivot and said upper end of said rear leg is pivotally coupled to said seat back by a pivot post spaced below said recliner pivot.

3. A seat assembly as set forth in claim 2 wherein said front leg includes a guide pin projecting therefrom and said first end of said support bracket includes an inclined slot formed therein for slidably receiving said guide pin.

4. A seat assembly as set forth in claim 3 wherein said inclined slot extends between a flat detent portion for receiving said guide pin and supporting said front leg and seat cushion in said seating position and a lowered end angled downwardly and rearwardly for guiding said front leg and seat cushion to said kneeling position.

5. A seat assembly as set forth in claim 2 wherein said front leg includes an upper end pivotally coupled to said seat cushion and an opposite lower end pivotally coupled to said

first end of said support bracket for guiding said seat cushion rearwardly and downwardly from said seating to kneeling position.

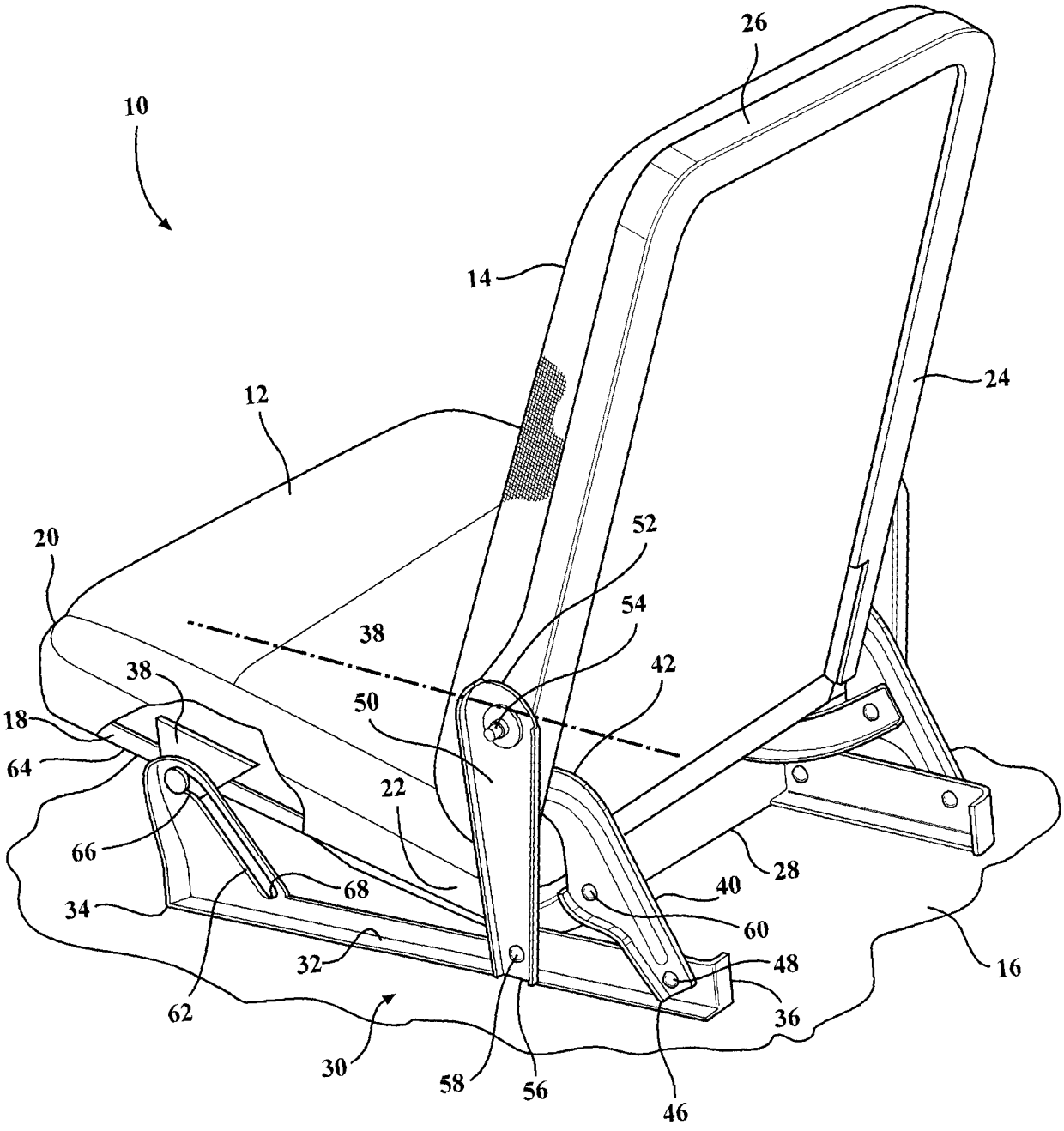

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FIG. 1

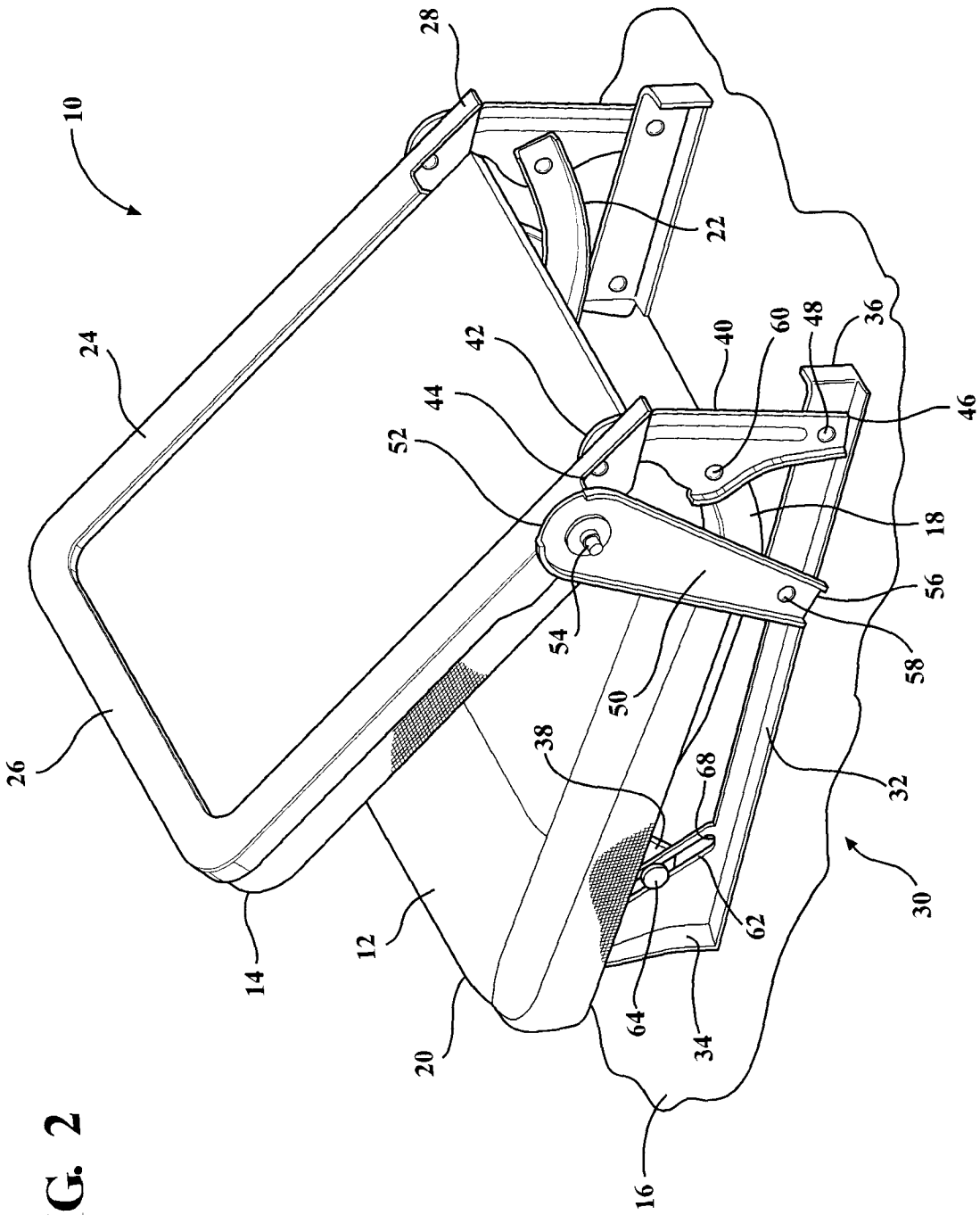

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FIG. 2

FIG. 3

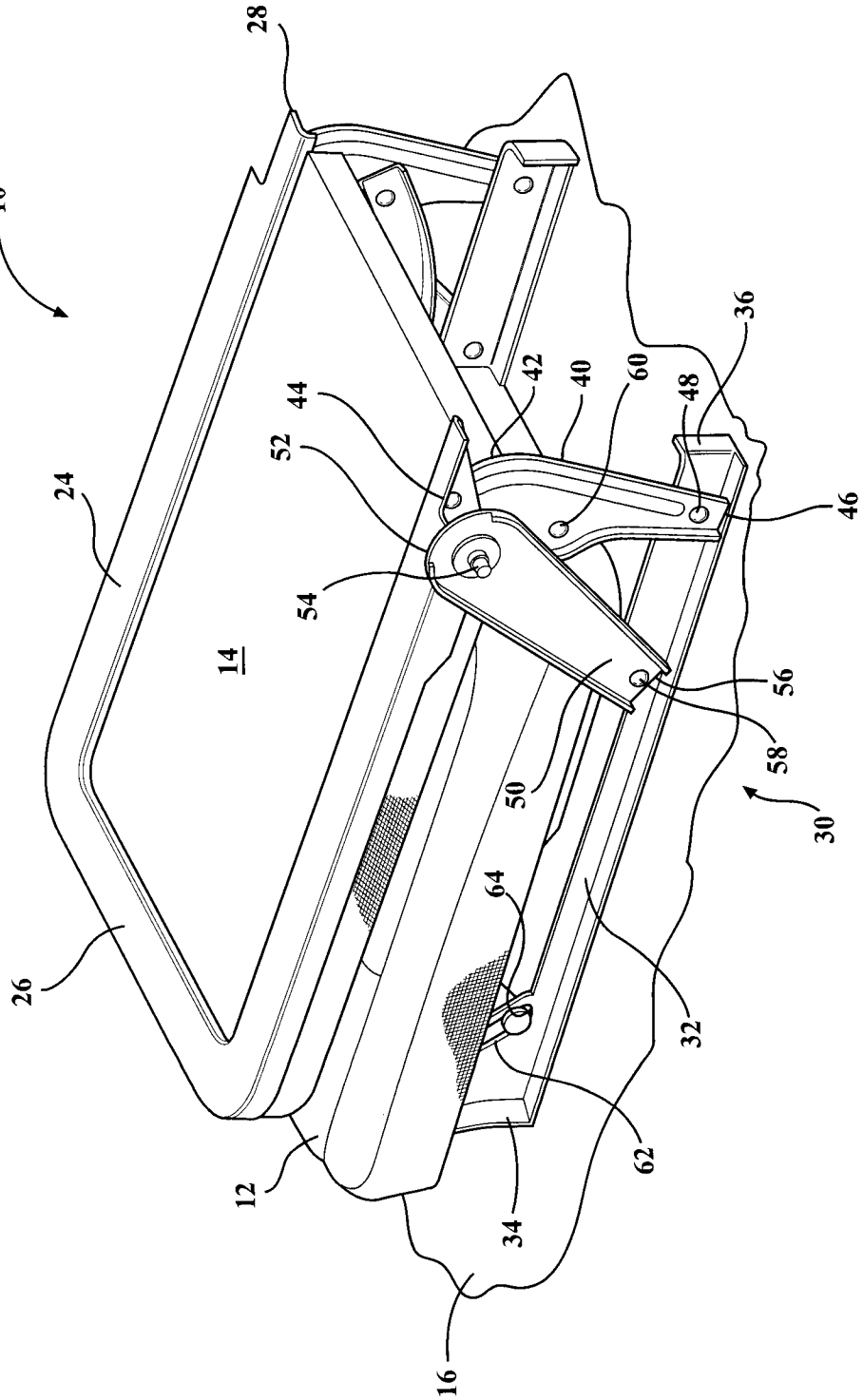
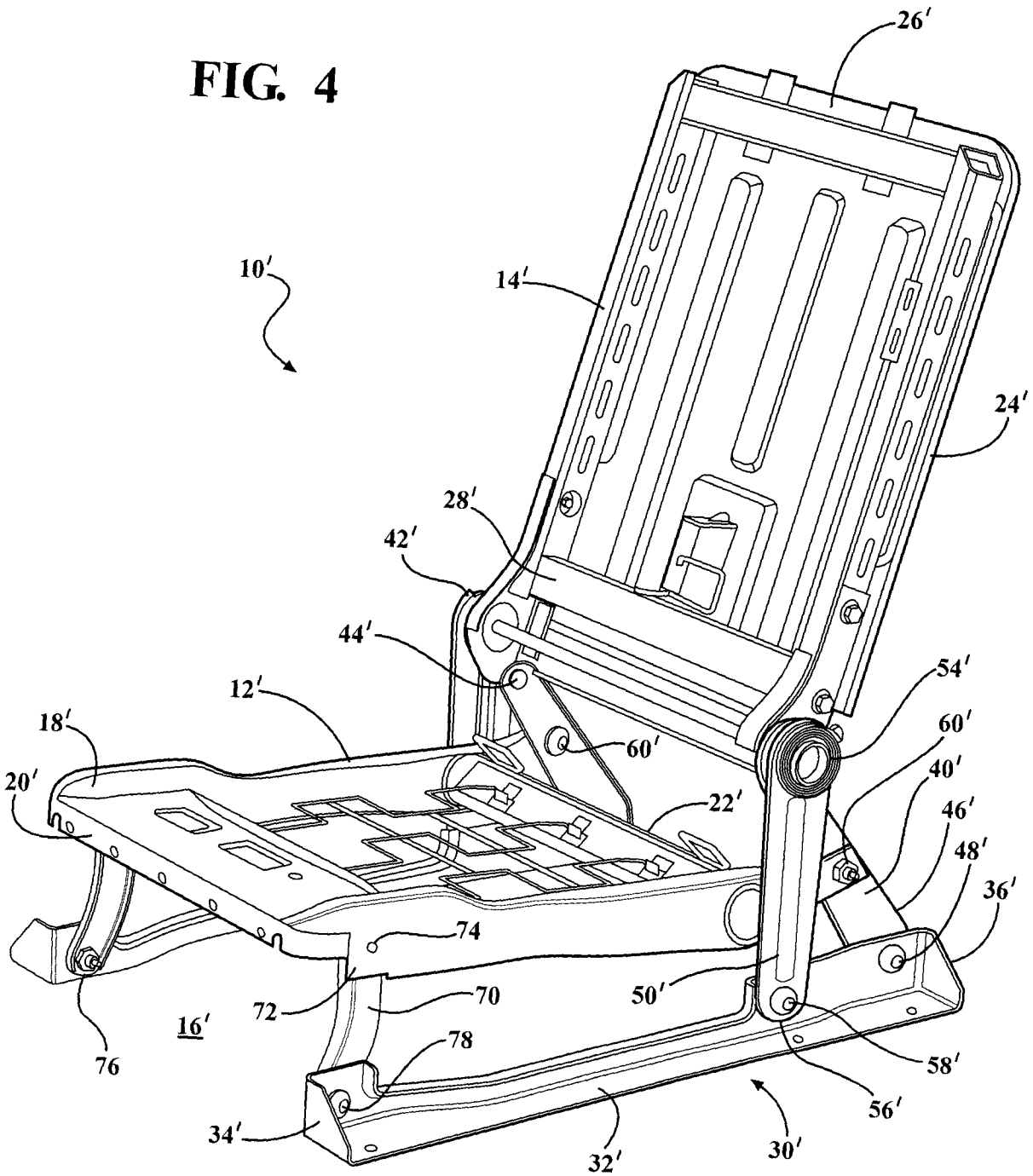


FIG. 4


26′
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14′
24′
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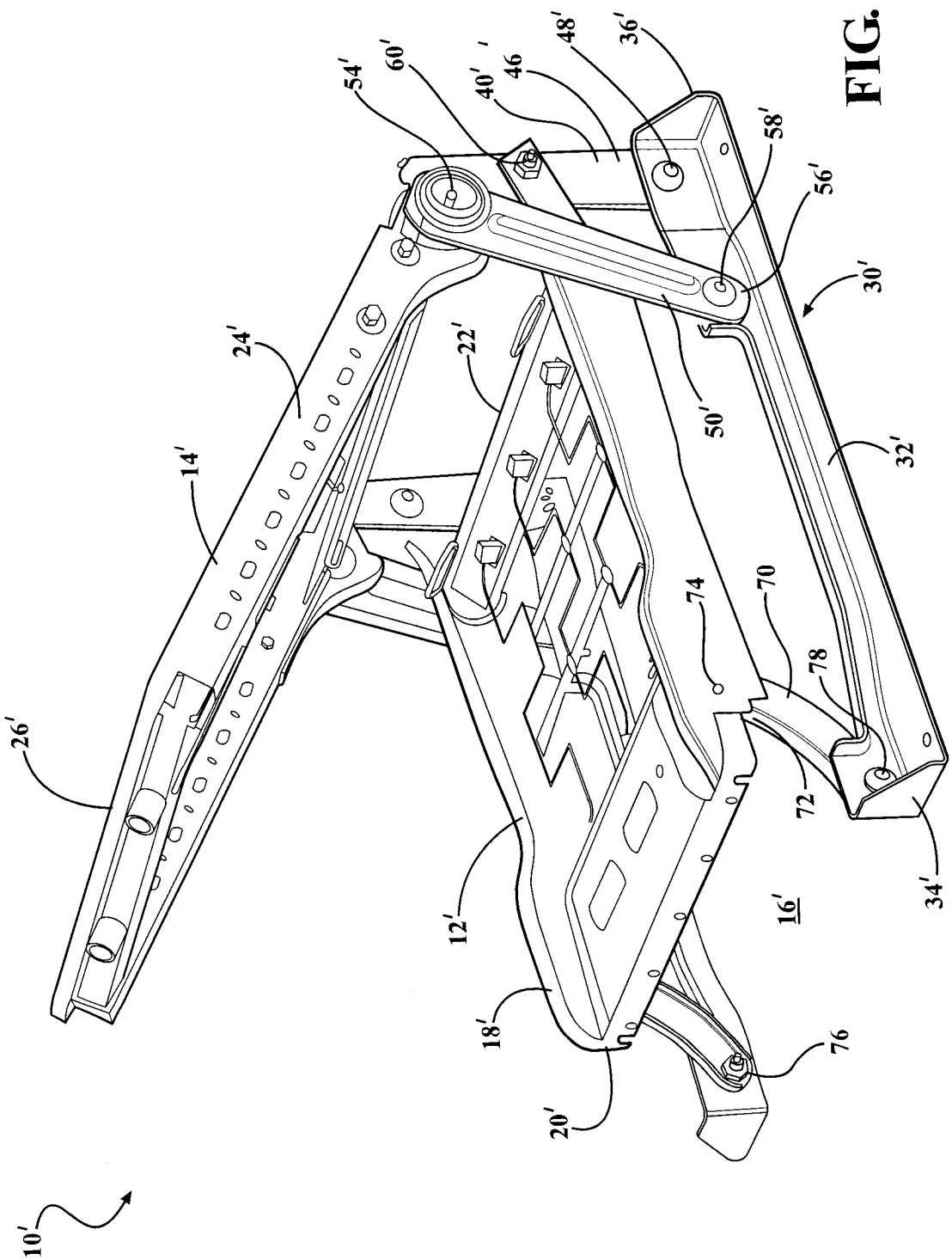

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FIG. 5

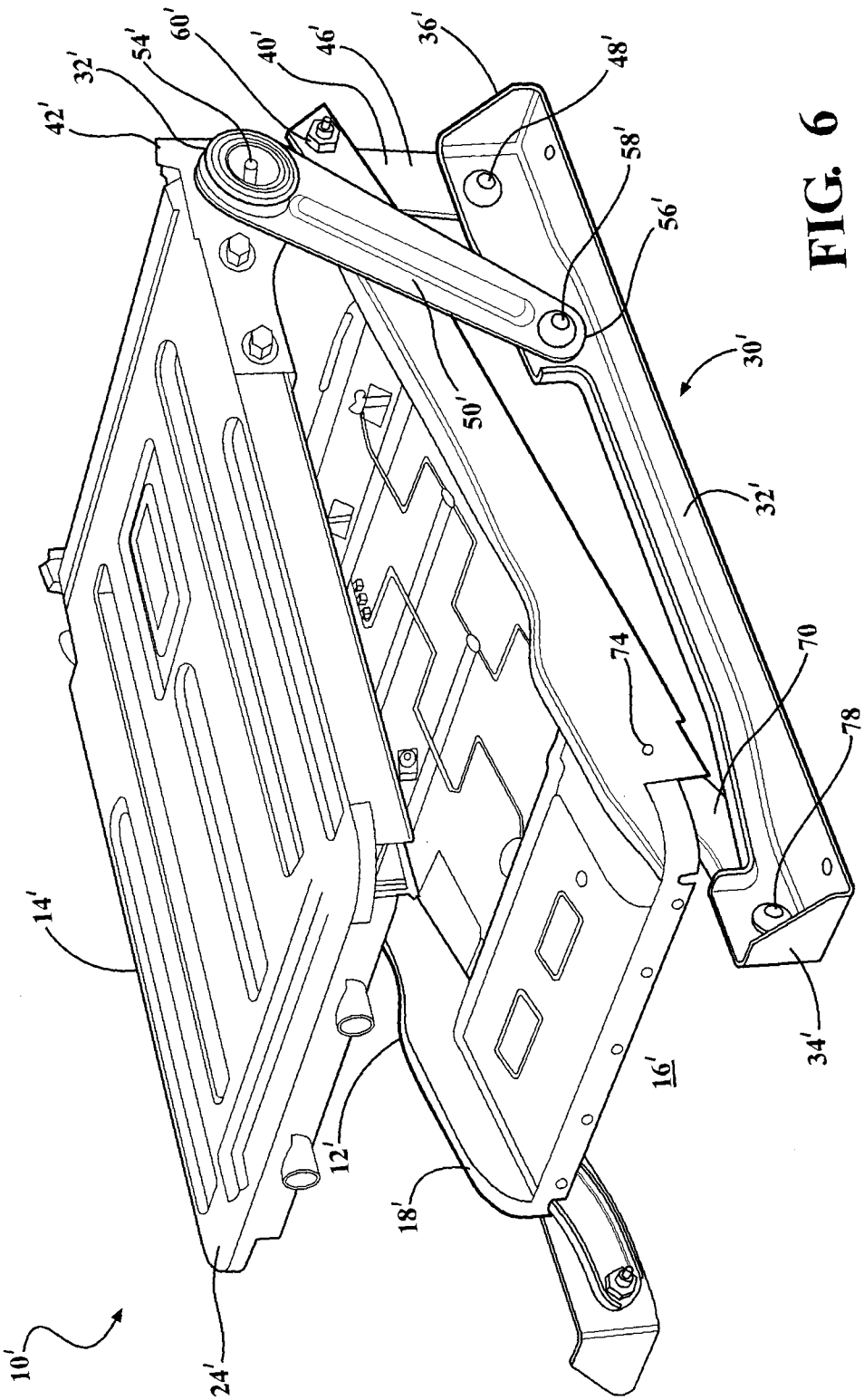


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC: ***B60N 2/30*** (2006.01) , ***B60N 2/04*** (2006.01) , ***B60N 2/20*** (2006.01) , ***B60N 2/68*** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B60N 2/30 (2006.01) , B60N 2/04 (2006.01) , B60N 2/20 (2006.01) , B60N 2/68 (2006.01)

USPC: 297/340, 297/341, 297/342, 297/316, 297/317, 297/378.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)

Espacenet, TotalPatent

Key words: vehicle, seat, chair, rear, tilt, collapse, fold, down, forward, kneel, backward, slot

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US2011/0115273 A1 (EPAUD, D., et al.) 19 May 2011 (19-05-2011) * the whole document *	1-5
A	US6817669 B2 (ROTH, M., et al.) 16 November 2004 (16-11-2004) * the whole document *	1-5
A	US2012/0038193 A1 (HURST III, N., et al.) 16 February 2012 (16-02-2012) * the whole document *	1-5

[ ] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 August 2013 (20-08-2013)	04 September 2013 (04-09-2013)

Name and mailing address of the ISA/CA	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Jeremy Garnet (819) 956-8721

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2013/000540

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US20110115273 (A1)	19-05-2011	CN102099222 (A)	15-06-2011
		CN102099222 (B)	29-05-2013
		FR2933916 (A1)	22-01-2010
		FR2933916 (B1)	14-01-2011
		KR20110052643 (A)	18-05-2011
		WO2010010274 (A1)	28-01-2010
US6817669 (B2)	16-11-2004	BR0202382 (A)	20-05-2003
		DE10130813 (A1)	06-02-2003
		DE10130813 (C2)	05-06-2003
		EP1270315 (A2)	02 -01-2003
		EP1270315 (A3)	14-01-2004
		US2003001419 (A1)	02-01-2003
US20120038193 (A1)	16-02-2012	CA2664954 (A1)	05-06-2008
		CN101553382 (A)	07-10-2009
		CN101553382 (B)	27-06-2012
		EP2064089 (A1)	03-06-2009
		EP2064089 (A4)	30-09-2009
		EP2064089 (B1)	30-06-2010
		KR20090086085 (A)	10-08-2009
		US2010052391 (A1)	04-03-2010
		US8066326 (B2)	29-11-2011
		US8308242 (B2)	13-11-2012
		WO2008064484 (A1)	05-06-2008