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(54) Title: SEAT TRIM COVER

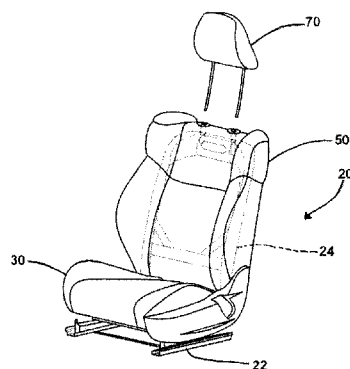


FIG. 2

(57) Abstract: An upholstery fabric for covering a core of a seat, especially a vehicle seat and other trim fabric applications of a vehicle. The trim cover is knitted to a three dimensional shape of the underlying seat. This knitting process allows the creating of seats having stretch areas, rigid areas and pockets integrally knit into the trim cover without the need for cutting and sewing.

SEAT TRIM COVER

Cross Reference to Related Application

[0001] This application claims priority to U.S. Provisional Application Serial No. 61/111,035 filed on November 4, 2008, entitled "Seat Trim Cover," the entire disclosure of the application being considered part of the disclosure of this application and hereby incorporated by reference.

Background

[0001] The invention relates to the use of an upholstery fabric for covering a core of a seat, especially a vehicle seat and other trim fabric applications of a vehicle. More specifically, the present invention relates to a seat trim cover formed as a three-dimensional fabric.

[0002] The usual method of making a vehicle seat cover include cutting pieces of woven fabric, sewing pieces of such fabric together and forming the cut and sewn pieces to conform to the intended seat core to be covered. The cutting of the pieces to be sewn creates waste and unusable portions of material which must be disposed of or recycled. The cutting and sewing process also required additional manufacturing time. In addition, many materials require lamination, which requires additional cost and time. Therefore, a fabric which eliminates the need to cut, sew and assemble by providing, for example, a seat cover in final form is desirable. The material can be knitted to include pockets or other features.

Summary

[0003] The invention relates to the use of an upholstery fabric for covering a core of a seat, especially a vehicle seat and other trim fabric applications of a vehicle. More specifically, the present invention relates to a seat trim cover formed as a three-dimensional fabric.

Brief Description of the Drawings

- [0004] FIG. 1 is a perspective view of an exemplary vehicle;
- [0005] FIG. 2 is a front perspective view of an exemplary seat;
- [0006] FIG. 3 is a front perspective view of a seat including elastic zones identified by dotted lines;
- [0007] FIG. 4 is a perspective view of a seat with a headrest having an expandable fabric portion;
- [0008] FIG. 5A is a side view of a headrest in the normal position with an area of expandable fabric;
- [0009] FIG. 5B is a side view of a headrest in FIG. 5A in the expanded position;
- [0010] FIG. 6A is a perspective view of an exemplary seat having wear resistant areas;
- [0011] FIG. 6B is a side view of an exemplary seat having wear resistant areas;
- [0012] FIG. 7A is an exemplary exploded perspective view of a seat bottom;
- [0013] FIG. 7B is a sectional view of the seat along lines B-B in FIG. 7A with the exploded items in FIG 7A assembled into the seat;
- [0014] FIG. 8A is a perspective view of an exemplary seat with integrated mud flaps;
- [0015] FIG. 8B is a sectional view of the seat along lines B-B in FIG. 8A;
- [0016] FIG. 9A is a perspective view of a seat having a headrest trimmed with the present invention;
- [0017] FIG. 9B is a side view of the seat in FIG. 9A;
- [0018] FIG. 10A is a perspective view of a seat including an airbag deployment join seam;
- [0019] FIG. 10B is an enlarged view of the join seam;
- [0020] FIG. 11 is a perspective view of an exemplary seat;

[0021] FIG. 12 is a rear perspective view of a rear seat and cargo area with a continuous sheet of material extending from the back of the rear seat across the surface of the cargo area;

[0022] FIG. 13 is a perspective view of a seat with flexible areas of material near pivot points;

[0023] FIG. 14 is a perspective view of a seat with an integrated umbrella pocket and pockets;

[0024] FIG. 15 is a rear perspective view of a seat with integrated pockets;

[0025] FIG. 16 is a perspective view of a seat with a trim cover;

[0026] FIG. 17 is a perspective view of an exemplary seat with a seatbelt trim cover, including an enlarged view of the seatbelt being held in position by the trim cover, superimposed over the seat;

[0027] FIG. 18A is a perspective view of a seat with a flexible trim slot; and

[0028] FIG. 18B is an enlarged, perspective view of the flexible trim material with a trim slot.

Description

[0029] Referring generally to the figures and in particular FIG. 1, a vehicle 10 is shown including one or more vehicle seats 20 provided for occupants of the vehicle 10. While a vehicle 10 is shown with reference to vehicle seat assemblies 20, it should be understood that the present invention may be used in other areas of the vehicle for various trim options as well as other styles and configurations of seats.

[0030] FIG. 2 is an isometric view of an exemplary seating assembly 20. The seating assembly 20 includes a seat track 22 and seating components including a seat base 30 connected to a seatback 50 and a head restraint 70. The head restraint component 70 is shown here as being disassembled from the seatback 50. The seatback 50 includes a seat

frame 24 shown in phantom having a seat core 26 and a trim cover 28 as further illustrated in the sectional views of FIGS. 7B and 8B, such as a woven fabric, attached to the seat core 26 for occupant comfort. It should be understood that the seat core 26 may also be known as a foam core which may be made of any number of known materials including, but not limited to, polypropylene, polyurethane, or expanded polypropylene.

[0031] The present invention uses a unique knitted and stretchable fabric that is directly knitted to the approximate size and shape desired, thereby eliminating the need for lamination, cutting and sewing steps typically required. The fabric is generally knitted to size and shape by computer controlled machines, such as Stoll machines, with each part being created from individual lengths of yarn or other materials. Due to the reduced waste and processing steps, this process is environmentally friendly, generally uses less chemicals, and has reduced freight costs. The fabric is configured to contour around a 3-dimensional or head restraint core (not illustrated). The flexible and stretchable nature of the fabric allows for easy assembly. Another benefit of the present invention is that patterns and logos may be knit into and form part of the material without expensive embroidery or stitching options and due to the made-to-shape covering, the log or design would be consistently located in the desired place without additional alignment or cutting steps. Other benefits of the fabric or material as a trim cover 28 are described in greater detail below.

[0032] The trim materials 28 may be formed from eco-friendly post-consumer polyester waste. The trim material 28 is stretchable, breathable and is configured to self adjust to the contours of the seat covers.

[0033] FIG. 3 shows the use of 3-dimensional knitted fabric to form a one-piece seat back cover 28 and a one-piece seat bottom cover 28. The one-piece seat back cover 28 includes an integral cover for the head restraint 70 thereby eliminating any gap between the seat back 50 and the head restraint 70 normally resulting from the known manner of

providing a seat back cover separate from the head restraint cover. The one-piece seat back cover 28 may be knitted to provide for less density in the area between the seat back and the head restraint in order to permit the head restraint to be easily raised or adjusted while the knit seat cover stretches. Also, different yarns may be used in this area. Assembling a one-piece seat cover for the seatback and a one-piece seat bottom cover saves assembly time. In addition, the dotted lines in FIG. 3 represent stretch areas 90 that allow movement of the seat and easier assembly. As clearly shown in FIG. 3, the trim cover 28 may be configured to allow both raising of the head restraint 70 and tilting of the head restraint 70 without any visible gaps between the head restraint 70 and the seatback 50 through the use of these stretch areas 90.

[0034] Also, any portion of the seat cover 28, seat back 50 or seat bottom 30, may be knit with a lower density (or more flexible property) portion to provide for various dimensional forms of the seat. For example, a one-piece knit seat bottom cover 28 may be provided with less density in the bolster area 92 in order to permit such area to expand or form with adjustable or formed bolster portions of the seat core. The stretchable trim cover 28 allows more adjustment in the bolster areas 92. Previously, designers needed to determine the limits of sewn trim covers, whereas the flexible trim cover 28 allows significantly more deformation and movement of the seat to give a customized fit.

[0035] FIGS. 4, 5A and 5B show an active head restraint having a trim cover 28 formed with three-dimensional knit materials. The head restraint trim cover 28 is knitted to expand in a region adjacent to a portion, such as the illustrated stretch area, of the head restraint 70 capable of adjusting or moving forward in the event of collision. Currently, such active head restraints leave an uncovered gap when activated. As clearly illustrated in FIGS. 5A and 5B, the portion expands without destroying the trim cover. FIG. 5A shows the head restraint 70 before activation, and FIG. 5B shows the head restraint 70 after activation. The

trim cover 28 stretches to allow activation of the head restraint 70. Of course, in addition to the illustrated stretch area 90, the whole head restraint 70 may be formed with a trim cover 28 that allows stretching. Also, the trim cover 28 may be formed from flexible material with the stretch area 90 having greater flexibility. Even though the head restraint 70 is illustrated as having a separate trim cover 28 from the trim cover 28 of the seatback 50, the stretchable areas illustrated in FIGS. 4 and 5A and 5B may easily be added to the one piece trim cover of FIG. 3.

[0036] FIGS. 5, 6A and 6B show a three-dimensional formed one-piece seat trim cover 28 having certain portions of the seat trim cover 28 knit with varying properties to reduce noise, vibration and harshness concerns present in current seat covers. In FIGS. 5, 6A and 6B, the three-dimensional formed one-piece seat trim cover 28 is formed with an increased material thickness and density in certain locations of the seat assembly including, for example, the illustrated increased thickness portions 94 illustrated in FIG. 6B as a portion 94 of the seat back 50 trim cover 28 in periodic contact with the head restraint 70 and as illustrated in FIG. 6A, the portion 94 of the seat bottom 30 trim cover 28 in contact with the seat back 50 trim cover 28. In addition, such varying material properties may also be used in other high wear areas of the seat such as the portion of the seat in contact with the seat belt. These increased thickness portions 94 may be added to the one-piece cover of FIG. 3 and the head restraint cover of FIG. 4.

[0037] FIGS. 7A and 7B illustrate a three-dimensional formed one-piece seat trim cover 28 knitted in a manner to provide an ease of assembly of a seat core 26 such as a foam cushion inserted for use in the seat bottom 30 to provide bolster support. The one-piece seat trim cover 28 is formed completely as a three-dimensional cover with only one end left uncovered for the ease during assembly of inserting, in this case, a foam cushion therein. It should be appreciated that this three-dimensional cover 28 may also be used for ease in

assembling other portions of the seat such as the seat back 50 and head restraint 70. In particular, the stretchable trim cover 28 allows for some temporary deformation during assembly. The trim cover 28 may then be stitched closed. Some stitch or adhesive, or other mechanisms of tie downs 96 may be used to conform the trim cover 28 to the shape of the seat core 26.

[0038] FIGS. 8A and 8B show a three-dimensional formed one-piece seat trim cover 28 for use in a seat bottom. The seat trim cover 28 is formed as one-piece covering both the seat core portion 26 as well as acting as a cover over an exposed portion of the seat bottom, also known as a seat trim cover "mud flap 98." Usually, this portion of the trim cover 28 is cut and sewn onto a portion of the seat trim cover. However, in this embodiment, the seat trim cover 28 can be formed with both the seat core trim cover portion and the "mud flap" portion 98 in one-piece thereby eliminating the need for this additional operation of cutting and sewing the "mud flap." Similarly, such an integral "mud flap 98" may be used in connection with the seat back for covering exposed portions of the rear of the seat assembly. The assembly time is also reduced as the mud flap is integral without break as part of the seat cover, as well as the under carriage portion 99 that extends under the seat behind the mud flap 98.

[0039] FIGS. 9A and 9B show a three-dimensional formed one-piece seat trim cover for use in a head restraint. The trim cover 28 is formed with a "see-through" portion 100 to provide improved visibility through the head restraint for vehicle occupants. The trim cover 28 may be formed with varying properties throughout the one-piece trim cover 28 including for example, a thicker and more dense portion 102 adjacent to the head restraint structure and a less dense see-through-like portion in the center portion of the trim cover 28. The variances in the material may all be formed within a single unitary piece with no additional sewing or stitching required.

[0040] FIGS. 10A and 10B show a three-dimensional formed one-piece seat trim cover 28 for use in a seat 20 wherein such seat includes built-in airbags (not illustrated). The trim cover 28 may be knitted with a deployment portion 104 where the cover 28 includes certain properties which make the deployment of the airbag more controlled. For example, the trim cover 28 may be knitted with a tighter weave or with yarns with less ability to stretch to ensure that the seam 106 ruptures consistently in the desired fashion.

[0041] FIG. 11 shows a three-dimensional formed one-piece seat trim cover 28 knit to provide for the management of heated or cooled seats. The seat trim cover 28 may be knitted to include fibers which conduct heat in a specific predetermined area of the trim cover, such as the illustrated conductive area 108. Alternatively, the trim cover 26 may be knit with varying densities across the surface of the trim cover 26 in order to direct the flow of heating or cooling to certain portions of the trim cover 26. For example, the trim cover 26 may be knitted in the seat bottom area with fibers which conduct heat while knit with fibers which do not conduct such heat in the bolster region.

[0042] FIG. 12 shows a three-dimensional formed one-piece seat trim cover 28 having the rear portion 52 of the seat trim cover 26 knit to include a flap-like portion 110 extending into a cargo area 112 of the vehicle in order to provide a closeout of the cargo area 112 without leaving gaps in between the seat back 52 and the cargo floor 112. This eliminates gaps where items may become caught and provides a clean visually free of obstruction cargo area.

[0043] FIG. 13 shows a three-dimensional formed one-piece seat trim cover covering both the seat back 50 and seat bottom 30 portions of a seat 20 wherein the seat trim cover 28 includes varying properties in certain areas of the trim cover 28 to permit more flexibility. The seat trim cover 28 is shown with the joint between the seat back 50 and seat bottom 30

covered with a flexible, less dense property material 114 than other portions of the seat trim cover.

[0044] FIGS. 14 and 15 show a three-dimensional formed one-piece seat trim cover 28 for a seat back 50 knitted to include certain pockets 116 for retaining occupant accessories. The seat trim cover 28 is formed in one-piece to include pockets 116 for use by the vehicle occupants, and without the stitching of additional pieces to form the pockets 116.

[0045] FIG. 16 shows a three-dimensional formed one-piece seat trim cover 28 including certain portions formed with a heat setting operation to cause that portion of the seat trim cover 28 to be more rigid than other portions of the seat trim cover 28. For example, a cover 118 for the side portion 32 of the seat bottom usually used to cover the seat track mechanism is shown formed with the three-dimensional knitting process plus using a heat setting method to cause that rigid cover portion 118 to be more rigid than other portions of the seat trim cover.

[0046] FIGS. 17, 18A and 18B show a three-dimensional formed one-piece seat trim cover 28 having certain portions 120 of the seat trim cover formed with varying properties to provide for assembly of a seat belt mechanism. FIG. 17 shows a seat trim cover 26 formed with a seat buckle housing 34 having stiffer or more dense properties at the varied property portion 120 than other portions of the same seat trim cover in order to position or hold the seat buckle in a predetermined position. FIGS. 18A and 18B show a seat trim cover formed with a portion 120 of the seat trim cover 26 having a hole 122 to provide for a seat belt to be looped therethrough. In this portion of the seat trim cover 28 the material properties may be varied to provide, for example, more flexibility to extend the seat belt 34 therethrough during assembly or use.

[0047] These illustrations, together with the accompanying annotations are highly informative and will be readily appreciated by those skilled in the art. Furthermore, the

various depictions throughout all of the figures in this application may be mixed and matched with one another, thus multiplying the use of three-dimensionally knit materials within a seat trim cover.

[0048] The foregoing invention has been described in accordance with the relevant legal standards, thus the description is exemplary rather than limiting in nature. Variations and modifications to the disclosed embodiment may become apparent to those skilled in the art and fall within the scope of the invention.

CLAIMS

What is claimed is:

1. A seat assembly comprising:
a seat bottom and a seat back each including a seat core having a 3D shape and a trim cover and wherein the trim cover is knitted to the 3D shape of the seat core and wherein said trim cover is capable of receiving portions of said seat core after said trim cover is formed in the shape of said seat core.
2. The seat assembly of Claim 1 wherein said seat bottom includes a wear portion have at least one of thicker fibers, different yarns, or a denser weave as compared to the rest of the trim cover and wherein said wear portion is integrally knitted into the trim cover.
3. The seat assembly of Claim 1 wherein said trim cover includes individual pockets that are knitted into the trim cover without stitches.
4. The seat assembly of Claim 3 further including at least one tie down and wherein said tie down is applied to said trim cover to conform said trim cover to the shape of said seat core.
5. The seat assembly of Claim 1 wherein the trim cover for each of the seat bottom is distinct and separately formed.
6. The seat assembly of Claim 1 wherein the trim cover is a single unitary unit applied over both the seat back and the seat bottom.

7. The seat assembly of Claim 1 wherein the trim cover is a single unitary unit applied over the seat cover of the seat back and a head restraint.

8. The seat assembly of Claim 7 wherein said head restraint is capable of expanding without substantially deforming the trim cover.

9. The seat assembly of Claim 7 wherein said head restraint is cable of moving relative to said seat back and wherein said trim cover is capable stretching to allow said movement, without substantial deformation of the trim cover and without visible gaps between the head restraint and the seat back.

10. The seat assembly of Claim 9 wherein said trim cover stretches as said head restraint moves relative to said seat back.

11. The seat assembly of Claim 1 wherein at least one of said seat back and said seat bottom include a deployment portion on the trim cover and wherein the deployment portion includes a weakened area to allow passage of an air bag.

12. The seat assembly of Claim 11 wherein said deployment area is formed from at least one of thicker fibers, tighter weave and different fibers to reduce stretchability of the trim cover in the deployment portion as compared to the rest of the trim cover.

13. The seat assembly of Claim 11 wherein said weakened area is a seam that is stitched closed.

14. The seat assembly of Claim 1 wherein at least one of said seat back and said seat bottom includes a temperature conductive area.

15. The seat assembly of Claim 14 wherein conductive fibers capable of transferring heat are knitted into said trim cover in said temperature conductive area.

16. The seat assembly of Claim 1 wherein said seat assembly includes a rear portion having a rear trim cover and wherein said rear trim cover extends outwardly away from the seat to create a surface.

17. The seat assembly of Claim 1 further including flexible areas on said trim cover between said seat back and said seat bottom and wherein said trim cover is configured to cover both said seat back and said seat bottom as a single unitary trim cover.

18. The seat assembly of Claim 1 further including integrally knitted pockets that are formed substantially without stitching.

19. The seat assembly of Claim 1 wherein said trim cover further includes integrally knitted rigid portions.

20. A seat assembly comprising:

a head restraint having a 3D shape and a trim cover and wherein the trim cover is knitted to the 3D shape of the head restraint and wherein said trim cover includes side portions having a dense knit and see-through portions having a open knit on the front and back of the headrest and wherein said see-through portions have an optical clarity that allows discernment of shapes and objects through the front layer of the trim cover having the see-through portion and the back layer of the trim cover having the see through portion.

21. A seat assembly comprising:

a head restraint having a 3D shape and a trim cover and wherein the trim cover is knitted to the 3D shape of the head restraint and wherein said trim cover includes a stretch area that is capable of allowing expansion of the head rest by and active head restraint system, without permanent deformation of the trim cover.

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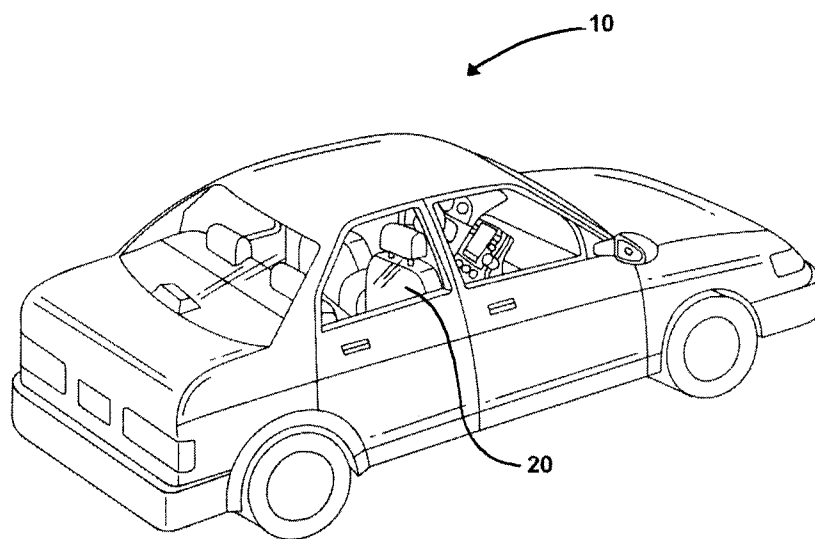


FIG.1

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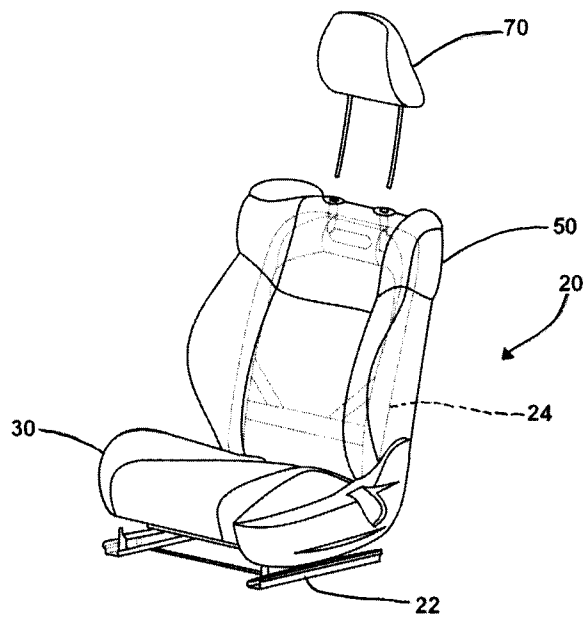


FIG. 2

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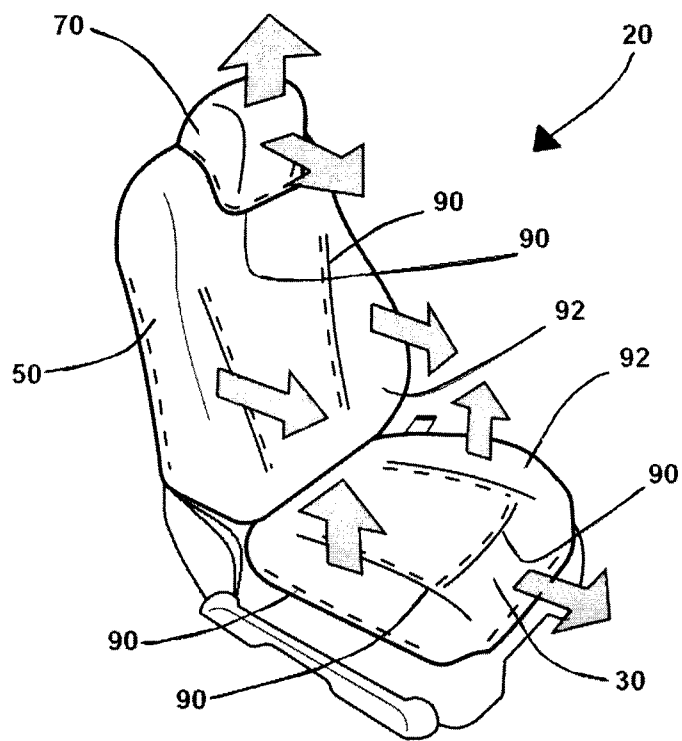


FIG.3

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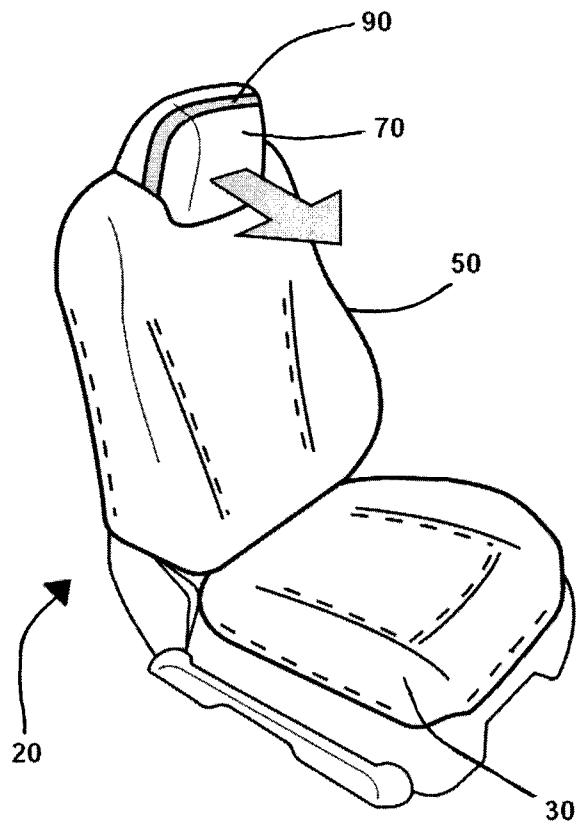


FIG.4

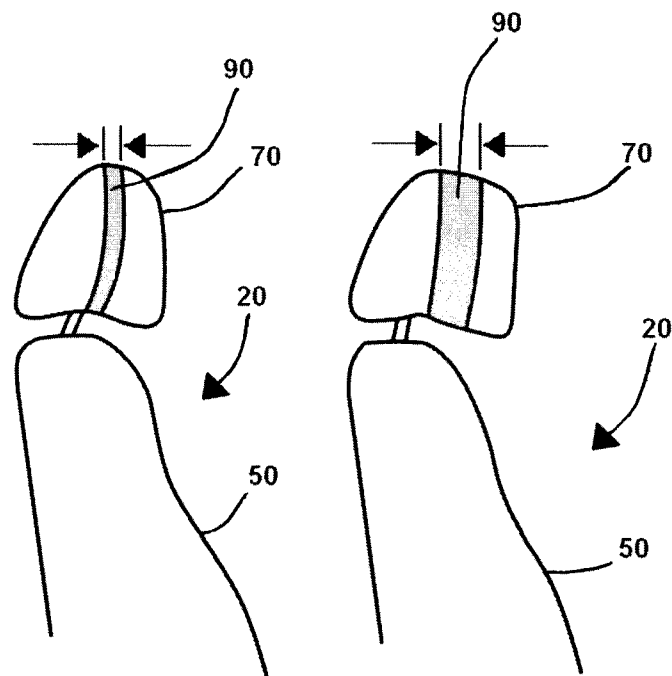


FIG.5A

FIG.5B

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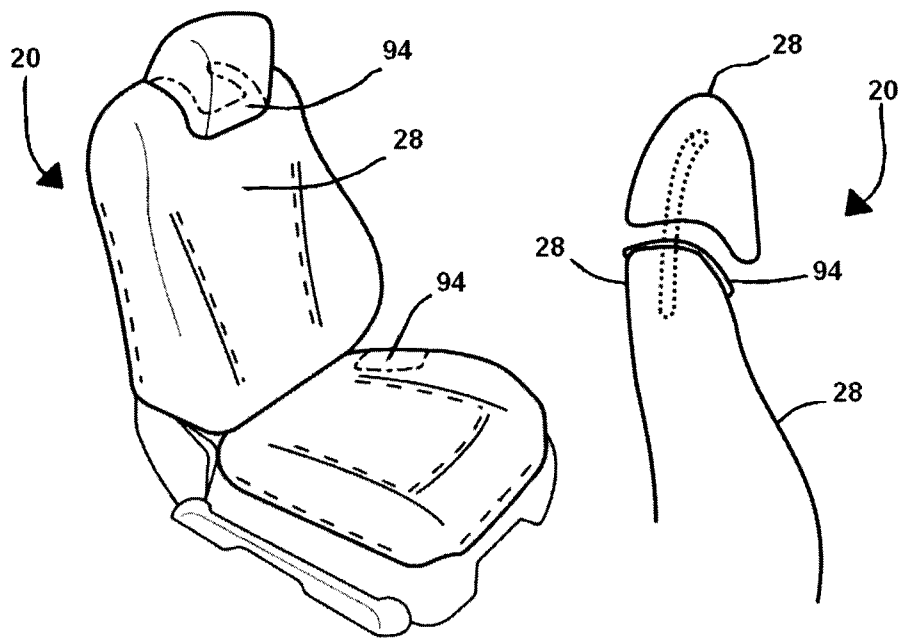


FIG. 6A

FIG. 6B

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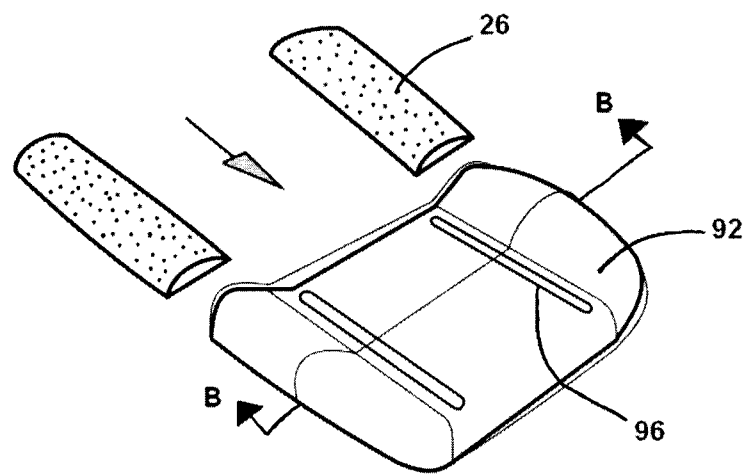


FIG. 7A

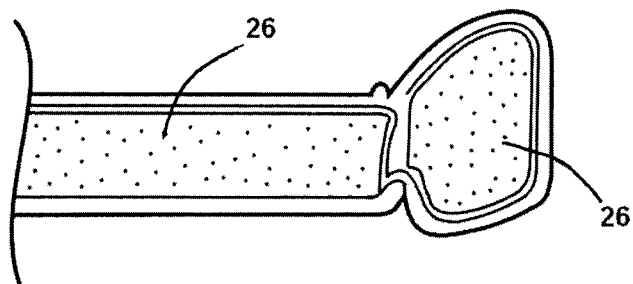
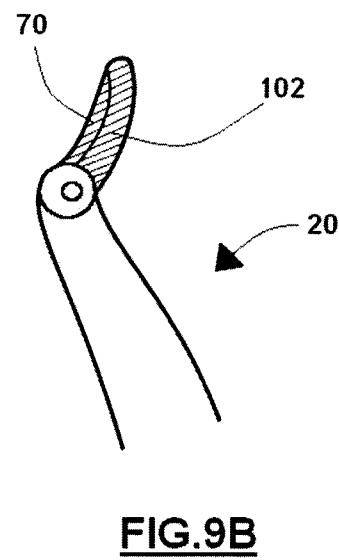
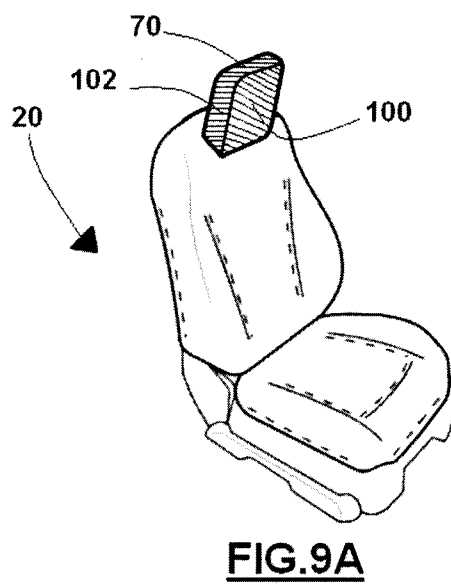
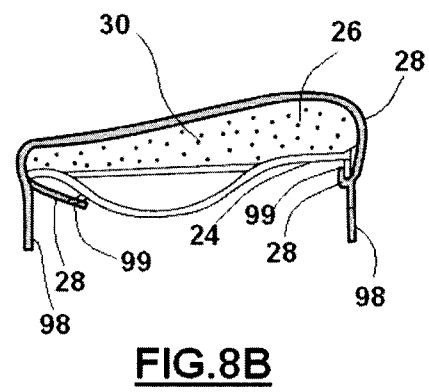
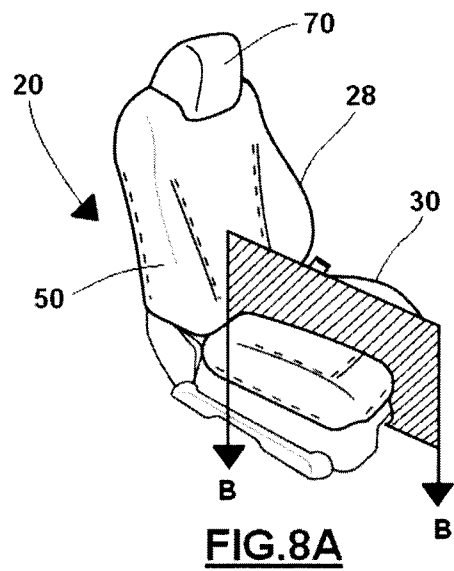
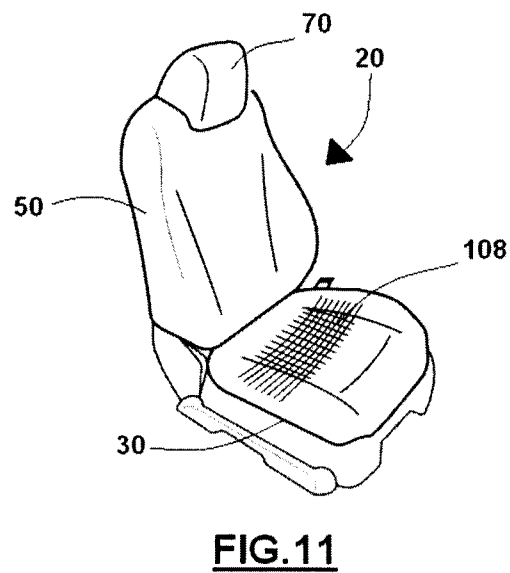
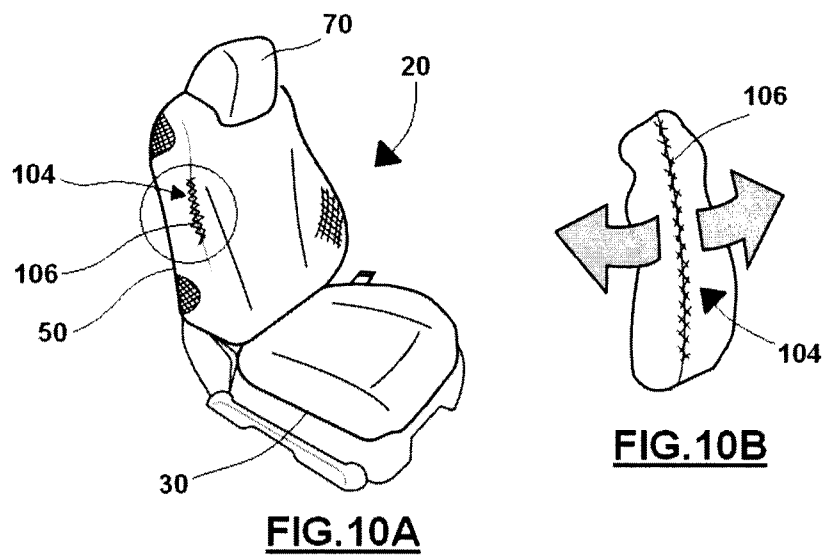


FIG. 7B



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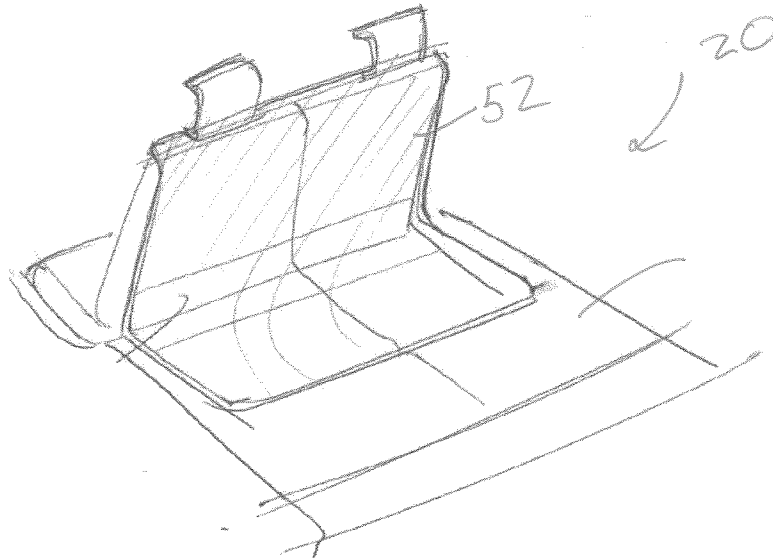


FIG. 12

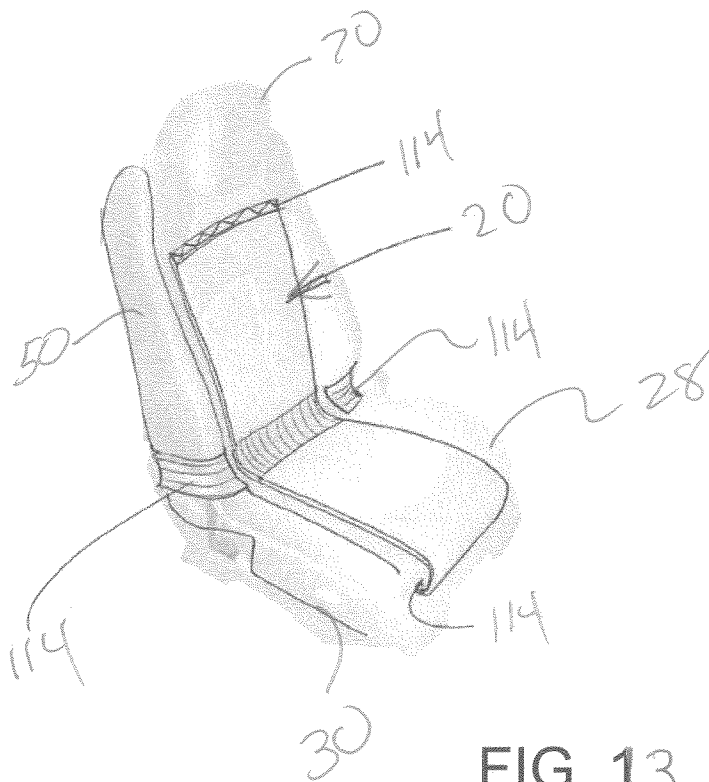


FIG. 13

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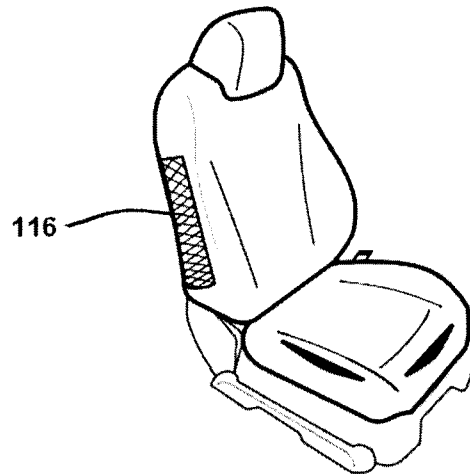


FIG. 14

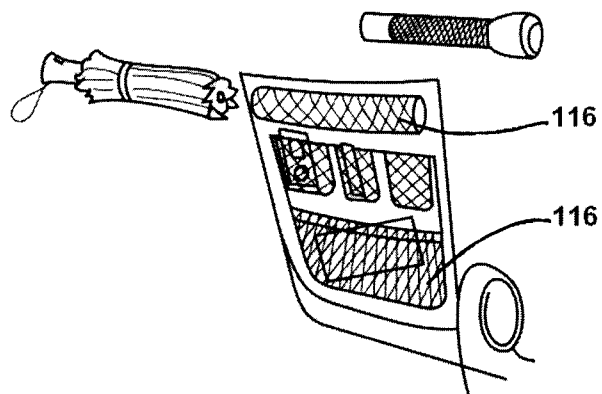
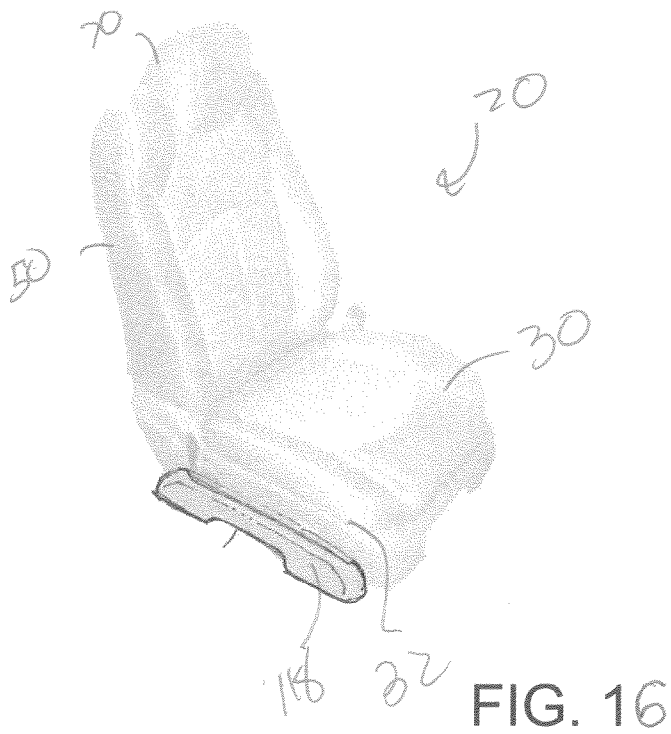


FIG. 15



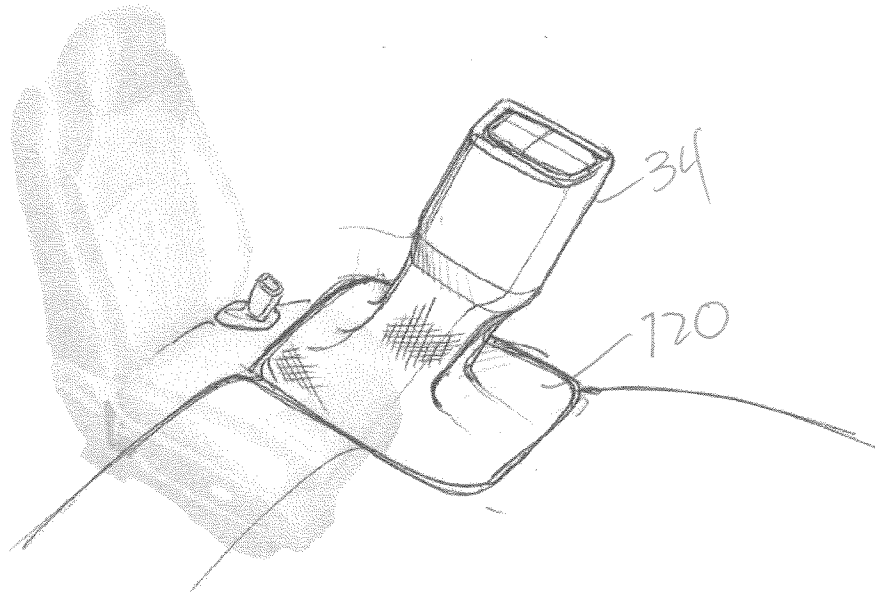
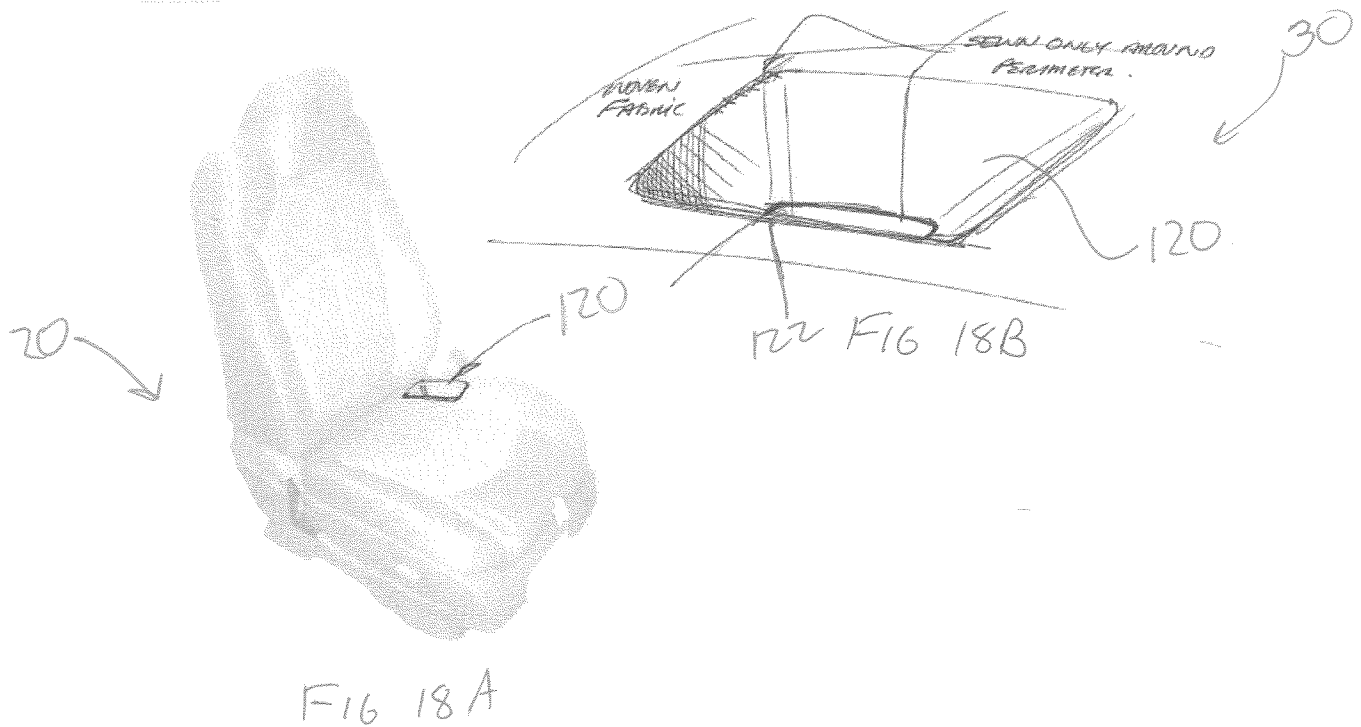


FIG. 17



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/063200

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B60N 2/58 (2009.01)

USPC - 297/218.1

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(8) - B60N 2/42, 2/48, 2/58 (2009.01)

USPC - 297/180.14, 216.1, 218.1, 218.2, 220, 229, 391

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

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

PatBase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---	US 5,023,125 A (GRAY) 11 June 1991 (11.06.1991) entire document	1, 2, 5
Y		3-4, 6-19
X ---	US 4,657,304 A (HEESCH et al) 14 April 1987 (14.04.1987) entire document	21
Y		8-10, 20
Y	US 2007/0040426 A1 (KENNY) 22 February 2007 (22.02.2007) entire document	3-4, 6-10, 17-19
Y	US 6,523,237 B1 (KOPEC et al) 25 February 2003 (25.02.2003) entire document	11-13
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☐ Further documents are listed in the continuation of Box C.


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Date of the actual completion of the international search

14 December 2009

Date of mailing of the international search report

23DEC 2009

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