



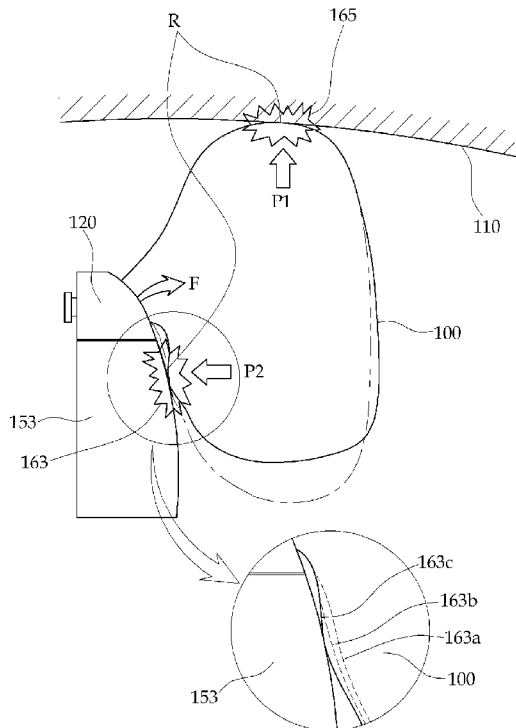
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[Continued on next page]

(54) Title: MIDDLE SIDE AIRBAG STUCK BY FRICTIONAL PRESSURE

[Fig. 2]



(57) Abstract: Disclosed is a middle side airbag stuck by frictional pressure. The middle side airbag prevents passengers seated on rear seats and a driver and a passenger seated on front seats from being injured upon the side collision of a vehicle, or restricts the movement of the driver toward the passenger seat due to the side collision of the vehicle even if only the driver gets in the vehicle alone. An airbag cushion is inflated with a height enough to make contact with the surfaces of both of a vehicle roof and a mid-tower console, so that the airbag cushion is supported by the frictional pressure at the vehicle roof and the mid-tower console to provide strong firmness at the side portion. The middle side airbag includes stitch lines which are torn when the internal pressure of the airbag cushion is affected by the collision between a driver and a passenger.

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## Description

### Title of Invention: MIDDLE SIDE AIRBAG STUCK BY FRICTIONAL PRESSURE

#### Technical Field

- [1] The present invention relates to a middle side airbag capable of absorbing the impact of passengers seated on rear seats in a vehicle when the passengers collide with each other upon the side collision of the vehicle, preventing a driver and a passenger seated on front seats from being injured, or restricting the movement of the driver toward the passenger seat due to the side collision of the vehicle even if only the driver gets in the vehicle alone. More particularly, the present invention relates to a middle side airbag stuck by frictional pressure in which an airbag cushion is inflated with a height enough to make contact with the surfaces of both of a vehicle roof and a mid-tower console, so that the airbag cushion is supported by the frictional pressure at the vehicle roof and the mid-tower console to provide strong firmness at the side portion.
- [2] The present invention includes a plurality of stitch lines which are torn when the internal pressure of the airbag cushion is affected by the collision between a driver and a passenger, so that the volume of the airbag cushion is changed. Accordingly, the internal pressure of the middle side airbag can be properly maintained and strong air pressure can be maintained at the side of the mid-tower console of the airbag cushion.
- [3] Therefore, according to the middle side airbag of the present invention, the airbag cushion is formed on the whole and securely fixed to provide strong firmness at the side portion, thereby restricting the movement of occupants. Accordingly, the collision between occupants can be prevented upon vehicle collision.

#### Background Art

- [4] In general, an airbag system is a representative safety device to protect passengers upon vehicle collision.
- [5] The airbag system is classified into a driver front airbag (DAB) and a passenger front airbag (PAB), which are installed in a steering wheel and an instrumental panel, respectively, to prevent front-side collision of a driver and a passenger, and a curtain airbag (CAB) mounted on the side portion of the vehicle such that the safety of occupants can be ensured upon side collision.
- [6] Recently, a middle side airbag is installed not only between passengers seated on rear seats in a vehicle, but also in a console between a driver seat and a passenger seat, thereby preventing occupants seated in the front portion of the vehicle from colliding with each other, or thereby preventing a driver from being sprung out of the driver seat to the side portion of the vehicle even if an occupant is absent in the passenger seat.

- [7] As described above, the middle side airbag is typically inflated between the driver seat and the passenger seat. Especially, as shown in FIG. 1, the middle side airbag is deployed from a lateral surface of an arm rest 5 of a console box as shown in FIG. 1.
- [8] As described above, a deployment hole 7 of the middle side airbag is higher than a seat 3. In this case, the middle side airbag is inflated in a lateral direction without forming a partition. In other words, although the middle side airbag can sufficiently protect a driver 1 or a passenger when the middle side airbag is deployed while forming a wall (partition) in the vertical direction, the middle side airbag according to the present invention is deployed like an air chamber having the shape of a substantially-circular balloon.
- [9] In addition, the middle side airbag according to the related art may be fitted into the space between the arm rest and the seat such that the middle side airbag can be supported based on friction. However, actually, if the airbag is deployed, the airbag may not be fitted into the space between the arm rest and the seat so that the airbag may not have the function of a partition.
- [10] Therefore, when the middle side airbag is inflated upon the side collision of the vehicle, the middle side airbag is not stuck, so that the driver 1 and the passenger may collide with each other beyond of the airbag.
- [11] Accordingly, the driver 1 and the passenger collide with each other upon the side collision of the vehicle, so that the driver 1 and the passenger may be seriously injured, or the driver may be sprung out of the driver seat to the passenger seat even if only the driver gets in the vehicle alone, so that a large safety accident may be caused. Therefore, a predetermined device is required to securely confine the driver 1 and the passenger while acting as a partition between the driver 1 and the passenger.
- [12] Although the middle side airbag according to the related art may have only the size enough to protect the head of an occupant from impact, the whole size of the middle side airbag is increased because the middle side airbag must have the operating relation of forming a partition on the whole. Accordingly, the injection volume of air is increased, so that the inflation speed of the airbag may be decreased. In addition, since the middle side airbag must form a thin and wide partition, the middle side airbag may be not inflated (deployed) completely. Accordingly, the operating failure of the middle side airbag may occur.
- [13] In addition, a greater amount of fabric is required to fabricate a large and wide middle side airbag, so that the cost is increased. Accordingly, the economic feasibility may be degraded. Although the middle side airbag is not required under the head of the occupant, so that the large-size middle side airbag is not required, the middle side airbag is fabricated in large size, so that the cost may be wasted.

## Disclosure of Invention

### Technical Problem

- [14] The present invention has been made to solve the problems occurring in the prior art, and an object of the present invention is to provide a middle side airbag stuck by frictional pressure, in which the middle side airbag is deployed upon the side collision of the vehicle to form a partition only at a region corresponding to the heads of occupants, which are the collision portions of the occupants, so that a driver and a passenger having a passenger seat are confined at left and right sides, thereby preventing the impact in the heads of the driver and the passenger when the driver and the passenger collide with each other to prevent the driver and the passenger from being injured, or the movement of the driver to the passenger seat caused by the side collision of the vehicle is restricted even if only the driver gets in the vehicle alone.
- [15] Another object of the present invention is to provide a middle side airbag stuck by frictional pressure, in which an airbag cushion is inflated with a height enough to make contact with the surfaces of both of a vehicle roof and a mid-tower console, so that the airbag cushion is supported by the frictional pressure at the vehicle roof and the mid-tower console to form a partition, thereby providing strong firmness at the side portion.
- [16] Still another object of the present invention is to provide a middle side airbag, in which passengers moving in the horizontal direction due to the side collision of the vehicle can be safely protected, the size of the airbag cushion is more increased at the sides of the vehicle roof and the mid-tower console box to specially enhance friction and support force, and the size of the airbag cushion is reduced, so that the cost for the middle side airbag can be reduced, and the whole volume and weight of the middle side airbag can be enhanced while increasing the frictional support force, thereby representing stability.
- [17] Still yet another object of the present invention is to provide a middle side airbag capable of controlling the motion of occupants due to increased frictional support force not only when passengers sit on vehicle seats side by side in a vehicle, but also when a passenger has a seat alone in the vehicle. Especially, greater support force is required when the passenger has a seat alone in the vehicle. In this case, a stitch line of the airbag cushion is more downed at the contact part between the mid-tower console and the airbag cushion, so that the frictional support force according to the internal air pressure of the airbag cushion can be improved.
- [18] Still yet another object of the present invention is to provide a middle side airbag, in which the deployment time of the airbag cushion and the package of the airbag module can be optimized when the airbag module is installed at the central portion of the mid-tower console, so that the airbag module is mounted (inflated) in a region in which

friction is caused by the mid-tower console, thereby optimizing the performance of the middle side airbag module and the size of the airbag module.

- [19] Still yet another object of the present invention is to provide a middle side airbag including a plurality of stitch lines which are torn when the internal pressure of the airbag cushion is affected by the collision between a driver and a passenger, so that the volume of the airbag cushion is changed, thereby properly maintaining the internal pressure of the middle side airbag and maintaining strong air pressure at the side of the mid-tower console of the airbag cushion. Accordingly, not only when only a driver gets in the vehicle alone, but also when passengers collide with each other, safety can be effectively ensured.

### **Solution to Problem**

- [20] In order to accomplish the above objects, there is provided a middle side airbag inflated between a passenger and a driver to prevent the passenger and the driver from being injured due to side collision therebetween. An inflator is placed in a mid-tower console to inject air into the middle side airbag. The middle side airbag includes a vehicle-roof-side cushion contact part provided at an upper portion of the middle side airbag to make contact with a vehicle roof, and a mid-tower-console-side cushion contact part provided at a lower rear surface of the middle side airbag to make contact with a mid-tower console.

- [21] Preferably, the middle side airbag is inflated in a vertical direction to form a partition, at a region in which heads of the driver and the passenger collide with each other upon vehicle collision, without making contact with a lower portion of an arm rest that does not support the middle side airbag, thereby reducing a size of an airbag cushion. The mid-tower-console-side cushion contact part and the vehicle-roof-side cushion contact part are pressurized and supported by internal air of the middle side airbag, which is inflated, to form the firm partition.

- [22] Preferably, the mid-tower-console-side cushion contact part is divided into a plurality of levels so that the internal pressure of the airbag is variously applied to the contact part with the mid-tower console, and pressure-supported by frictional resistance, thereby forming a firm middle-side-airbag- partition.

### **Advantageous Effects of Invention**

- [23] As described above, the present invention may have the following effects through the combination and the operating relation between components.
- [24] According to the present invention, the middle side airbag is deployed upon the side collision of the vehicle to form a partition, so that a driver and a passenger having a passenger seat are confined at left and right sides, thereby preventing the driver and the passenger from being injured when the driver and the passenger collide with each

other, or the movement of the driver to the passenger seat caused by the side collision of the vehicle can be restricted even if only the driver gets in the vehicle alone or one passenger has a rear seat in the vehicle.

[25] According to the present invention, an airbag cushion is inflated with a height enough to make contact with the surfaces of both of a vehicle roof and a mid-tower console, so that the airbag cushion is supported by the frictional pressure at the vehicle roof and the mid-tower console to form a partition, thereby providing strong firmness at the side portion.

[26] Accordingly, the motion of occupants can be controlled due to increased frictional support force not only when passengers sit on vehicle seats side by side in a vehicle, but also when a passenger has a seat alone in the vehicle. Especially, greater support force is required when the passenger has a seat alone in the vehicle. In this case, a stitch line of the airbag cushion is more downed at the contact part between the mid-tower console and the airbag cushion, so that the frictional support force according to the internal air pressure of the airbag cushion can be improved.

[27] According to the present invention, passengers moving in the horizontal direction due to the side collision of the vehicle can be safely protected, the size of the airbag cushion is more increased at the sides of the vehicle roof and the mid-tower console box to specially enhance friction and support force, and the size of the airbag cushion is reduced, so that the cost for the middle side airbag can be reduced, and the whole volume and weight of the middle side airbag can be enhanced while increasing the frictional support force.

[28] According to the present invention, the deployment time of the airbag cushion and the package of the airbag module can be optimized when the airbag module is installed at the central portion of the mid-tower console, so that the airbag module is mounted (inflated) in a region in which friction is caused by the mid-tower console, thereby optimizing the performance of the middle side airbag and the size of the airbag module. Accordingly, stable airbag functions can be performed.

[29] According to the present invention, in order to properly maintain the internal pressure of the middle side airbag and maintain strong air pressure at the side of the mid-tower console of the airbag cushion, the middle side airbag includes a plurality of stitch lines such that the stitch lines are torn when the internal pressure of the airbag cushion is affected by the collision between a driver and a passenger, so that the volume of the airbag cushion is changed. Accordingly, not only when only a driver gets in the vehicle alone, but also when passengers collide with each other, safety can be effectively ensured.

### **Brief Description of Drawings**

- [30] FIG. 1 is a perspective view showing the deployment position of a middle side airbag according to the related art;
- [31] FIG. 2 is a side view showing the deployment of a middle side airbag according to the present invention;
- [32] FIG. 3 is a perspective view showing the deployment of the middle side airbag according to the present invention;
- [33] FIG. 4 is a front view showing the deployment of the middle side airbag according to the present invention; and
- [34] FIGS. 5 and 6 are a mid-tower-console-side cushion contact part having a plurality of stitch lines according to another embodiment of the present invention.

### **Best Mode for Carrying out the Invention**

- [35] Hereinafter, a middle side airbag stuck by frictional pressure according to an exemplary embodiment of the present invention will be described in detail with reference to accompanying drawings.
- [36] Prior to explaining the detailed description, it should be understood that the terms or words used in the present specification and claims may not be limited to common meanings or dictionary meanings, but interpreted as a meaning or a concept appropriate to the technical scope of the present invention under the principle that the inventor can coin new words to explain the present invention in the best manner.
- [37] Accordingly, the embodiments described in the present specification and the structure shown in accompanying drawings are only for illustrating the exemplary embodiments of the present invention within the technical scope of the present invention. Accordingly, the person skilled in the art should comprehend that various equivalents and modifications can be made in place of the embodiments.
- [38] Hereinafter, a middle side airbag 100 stuck by frictional pressure according to the present invention will be described in detail with reference to FIGS. 2 to 4.
- [39] Referring to FIGS. 2 to 4, the present invention relates to the middle side airbag 100 which is inflated between a driver 1 and a passenger to act as a partition between the driver 1 and the passenger, so that the driver 1 and the passenger can be prevented from being injured due to the side collision therebetween. An inflator 120 to inject air into the middle side airbag 100 is placed in a mid-tower console 153 of a center console 150 of a driver seat 3 provided in a vehicle.
- [40] According to one embodiment of the present invention, as shown in FIG. 2, the middle side airbag 100 is inflated between the passengers seated on rear seats of the vehicle and between the driver 1 and the passenger seated on front seats of the vehicle to prevent the passengers and the driver from being injured due to the side collision therebetween. An upper portion of the middle side airbag 100 makes contact with a

vehicle roof 110 and a lower lateral surface thereof is pressurized and supported by the mid-tower console 153. The middle side airbag 100 can be inflated in the vertical direction with a height enough to act as a partition.

[41] Therefore, the present invention provides the middle side airbag 100 inflated between the driver 1 and the passenger to prevent passengers seated on rear seats of the vehicle or the driver 1 and the passenger seated on front seats of the vehicle from being injured due to the side collision therebetween. The inflator 120 to inject air into the middle side airbag 100 is placed in the mid-tower console 153, and the middle side airbag 100 is provided at the upper portion thereof with a vehicle-roof-side cushion contact part 165 making contact with the vehicle roof 110 and at a lower rear surface thereof with a mid-tower-console-side cushion contact part 163 making contact with the mid-tower console 153.

[42] The middle side airbag 100 is inflated in the vertical direction to form a partition, at a region in which the heads of the driver 1 and the passenger collide with each other upon the vehicle collision, without making contact with the lower portion of the arm rest 150 that does not support the middle side airbag 100. Accordingly, the whole size of an airbag module can be reduced by reducing the size of an airbag cushion, so that the material cost for the middle side airbag 100 can be reduced. Accordingly, the middle side airbag 100 has an advantage in terms of economic feasibility.

[43] Accordingly, as described above, the upper portion of the middle side airbag 100 makes contact with the vehicle roof 110 and the lower portion of the middle side airbag 100 makes contact with a front surface of the mid-tower console 153, so that the upper and lower portions of the middle side airbag 100 have contact surfaces strongly pressurized by the internal air pressure of the air cushion. Accordingly, the middle side airbag 100 may be securely stuck by frictional support force in the vertical and inclination directions.

[44] In other words, as shown in the side view of FIG. 2 illustrating the deployment of the middle side airbag 100, the middle side airbag 100 is inflated with a sufficiently long length in the vertical direction to the extent that the upper portion of the middle side airbag 100 makes contact with the vehicle roof 110 upon vehicle collision.

[45] In this case, since the middle side airbag 100 is strongly pressurized at the vehicle-roof-side cushion contact part 165 between the upper portion of the middle side airbag 100 and the vehicle roof 100 due to the strong internal air pressure of the airbag cushion, so that great frictional support force occurs between the surfaces of the upper portion of the middle side airbag 100 and the vehicle roof 100. Similarly, great frictional support force occurs in the lower portion of the middle side airbag 100, that is, the mid-tower-console-side cushion contact part 163 between the lower inner lateral surface of the airbag cushion and the lateral surface of the mid-tower console 153.

- [46] The frictional support force through the pressurization is derived from frictional resistance R between the surface of the middle side airbag 100 and the surface of the mid-tower console 253 or frictional resistance R between the surface of the middle side airbag 100 and the surface of the vehicle roof 110. As the frictional coefficient of each surface is increased, the frictional support force is increased.
- [47] In general, the frictional resistance R may have various values according to the frictional coefficient of the material of each surface. Accordingly, in order to increase the frictional resistance R, each surface is preferably made of a material representing great frictional coefficient. For example, the middle side airbag 100 is preferably made of a material allowing the middle side airbag 100 to have a rough surface. In addition, the vehicle roof 110 may be made of soft fabric representing great frictional coefficient.
- [48] The middle side airbag 100 pressurized and supported by frictional resistance R is fixedly pressurized at the upper and lower portions thereof so that the middle side airbag 100 is securely fixed on the whole. Accordingly, the middle side airbag 100 sufficiently acts as a partition at the side of the head of the driver 1. Therefore, according to the present invention, the airbag cushion is inflated with a height enough to simultaneously make contact with the surfaces of the vehicle roof 110 and the mid-tower console 153. Accordingly, the inflated airbag cushion can be supported by frictional pressure at the sides of the vehicle roof 110 and the mid-tower console 153 to act as a partition, and have strong lateral surface firmness.
- [49] As described above, the middle side airbag 100 is deployed upon the side collision of the vehicle to form a partition, so that the collision impact between passengers seated on the rear seats of the vehicle may be absorbed. In addition, the driver and the passenger seated on the front seats of the vehicle are confined at left and right sides, thereby preventing the driver and the passenger having a passenger seat from being injured when the driver collides with the passenger having the passenger seat. In addition, even if the driver has the front seat alone in the vehicle or only one passenger has the rear seat in the vehicle, the middle side airbag 100 can securely prevent the driver from being inclined toward the passenger seat due to the impact caused by the side collision of the vehicle.
- [50] According to the embodiment of the present invention, as shown in FIG.2, a lower end portion of the middle side airbag 100 may not make contact with a horizontal arm rest 152.
- [51] A middle side airbag using frictional pressure according to the related art must make contact with a horizontal arm rest 152 at the lower end portion so that the middle side airbag may be supported by the frictional pressure. In contrast, in the middle side airbag 100 according to the present invention, the lower end portion of the airbag

cushion may not make additionally contact with the horizontal arm rest 152, but the lower inner lateral surface of the airbag cushion makes contact with the sidewall of the mid-tower console 153. Therefore, as shown in FIG. 2, the lower end portion of the airbag cushion does not have to be lengthened, but may have a length enough to absorb the impact of the heads of the driver 1 and the passenger. Therefore, according to the present invention, the whole size of the airbag module can be reduced, and an amount of fabric constituting the airbag cushion can be reduced, so that the middle side airbag 100 can have an advantage in terms of economic feasibility.

[52] The upper portion of the middle side airbag 100 having the above structure according to the present invention can be supported by pressure support force occurring together with the vehicle roof 110, and the lower portion of the middle side airbag 100 may form a vertical partition with pressure support force greater than pressure support force occurring by the horizontal arm rest 152.

[53] In addition, when the middle side airbag 100 is not inflated from the mid-tower console 152, but inflated from the lateral surface of the horizontal arm rest 152, the middle side airbag 100 is inflated in the horizontal direction instead of the vertical direction as shown in FIG. 1, so that the middle side airbag 100 cannot sufficiently act as a side airbag. According to the present invention, the middle side airbag 100 is inflated from the front surface of the mid-tower console 153 and supported through pressure on the lower front surface of the mid-tower console 153, so that the middle side airbag 100 can be inflated in the vertical direction.

[54] The middle side airbag 100 includes the mid-tower-console-side cushion contact part 163 and the vehicle-roof-side cushion contact part 165 which are provided at the sides of the vehicle roof 110 and the mid-tower console 153, respectively, pressurized by internal air of the middle side airbag 100 when the airbag 100 is inflated, and pressure-supported by frictional resistance R, so that the middle side airbag 100 can form a firm partition.

[55] In particular, referring to FIGS. 3 and 4, the arm rest 150 according to the present invention includes the mid tower console 153 extending upward at the rear portion of the arm rest 150 and the horizontal arm rest 152 having a low height and extending toward the front portion of the center console 150. The cushion contact parts of the middle side airbag 100, which is inflated, are pressure-supported on both the front surface of the mid-tower console 153 and the vehicle roof 110 so that the middle side airbag 100 can be fixed as a partition.

[56] As described above, the contact parts of the middle side airbag 100 at the sides of the vehicle roof 110 and the mid-tower console 153 serve as the mid-tower-console-side cushion contact part 163 and the vehicle-roof-side cushion contact part 165 which are pressurized by the internal air of the middle side airbag 100, which is inflated, and

supported by the frictional resistance R, thereby forming a firm partition of the middle side airbag 100. The mid-tower-console-side cushion contact part 163 is securely fixed to the mid-tower console 152 by frictional support force caused by strong internal pressure of the middle side airbag 100.

[57] As shown in FIGS. 2 and 3, the support through the pressure can be firmly achieved by the pressure F of air discharged from the inflator 120 of the airbag module, air pressure P1 applied to the vehicle roof 110, and air pressure P2 applied to the front surface of the mid-tower console 153, so that the middle side airbag 100 can sufficiently act as a partition.

[58] According to another embodiment of the present invention, as shown in FIGS. 5 and 6, the mid-tower-console-side cushion contact part 163 includes a plurality of stitch lines 163a, 163b, and 163c of variously changing the volume of the airbag cushion according to pressures applied to the airbag cushion from the outside at the contact side with the mid-tower console 110 to uniformly maintain the internal pressure of the airbag cushion while maintaining strong air pressure to properly support the airbag cushion through pressure at the side of the mid-tower console 110.

[59] In detail, the stitch lines 163a, 163b, and 163c of the mid-tower-console-side cushion contact part 163 are torn when the internal pressure of the airbag cushion is affected by the collision between the passengers seated on the rear seats or the driver and the passenger seated on the front seats, so that the volume of the airbag cushion is changed. Accordingly, the stitch lines 163a, 163b, and 163c can properly maintain the internal pressure of the airbag cushion.

[60] Accordingly, not only when a passenger gets in the vehicle alone, or only a driver has a front seat of the vehicle, but also when passengers get in the vehicle together and collide with each other upon the side collision of the vehicle, the middle side airbag 100 can effectively ensure the safety of the occupants.

[61] In general, as shown in FIG. 4, when the side collision of the vehicle occurs in the state that the driver and the passenger sit on front seats side by side in the vehicle, the airbag cushion collides with the occupants to receive strong pressure from the outside, and the internal pressure of the airbag cushion having a restricted volume is suddenly increased. Accordingly, the excessive air pressure in the airbag cushion cannot absorb the impact of the occupants colliding with the airbag cushion 100.

[62] Therefore, properly-maintaining the internal air pressure of the cushion according to the impact caused by the collision with the outside is important. The stitch lines 163a, 163b, and 163c formed on the mid-tower-console-side cushion contact part 163 properly maintain the internal air pressure of the cushion according to the impact caused by the collision with the outside.

[63] As shown in FIG. 5, when the driver has a seat in the vehicle alone or less external

impact is applied to the airbag cushion, the internal pressure of the airbag cushion is not suddenly increased. In this case, the stitch lines 163a, 163b, and 163c are not torn, but constitute a cushion line. Accordingly, the internal pressure P2A of the airbag cushion supports the front surface of the mid-tower console 153 with sufficient force so that the airbag cushion can sufficiently act as a partition.

[64] However, as shown in FIG. 6, in the state that two passengers or the driver and the passenger sit on seats in the vehicle, when two occupants collide with each other, greater impact may be applied to the outer portion of the airbag cushion 110. Accordingly, the internal pressure of the airbag cushion 110 is increased, so that the stitch lines are torn. In this state, the stitch line 163c forms a cushion line. Therefore, the internal pressure P2c of the airbag cushion 110 can support the front surface of the mid-tower console 153 with sufficient force, so that the airbag cushion 110 can sufficiently act as a partition.

[65] According to the present invention, the internal pressure of the middle side airbag can be properly maintained, and the strong air pressure to support the mid-tower-console-side cushion contact part can be maintained. To this end, when passengers collide with each other, so that the internal pressure of the airbag cushion is affected by the collision, a plurality of stitch lines are torn so that the internal volume of the airbag cushion can be changed. Therefore, not only when only a driver gets in the vehicle, but also when the passengers collide with each other, the safety of the occupants can be effectively ensured.

[66] In addition, according to the present invention, passengers moving in the horizontal direction due to the side collision of the vehicle can be safely protected, and the size of the airbag cushion is more increased at the sides of the vehicle roof and the mid-tower console box to specially enhance friction and support force. In contrast, the whole size of the airbag cushion is reduced, so that the cost for the middle side airbag can be reduced. In addition, the whole volume and weight of the middle side airbag can be enhanced while increasing the frictional support force.

[67] According to the present invention, the deployment time of the airbag cushion and the package of the airbag module can be optimized when the airbag module is installed at the central portion of the front surface of the mid-tower console. Accordingly, the airbag module is mounted (inflated) upward from the mid-tower-console-side cushion contact part 163, so that the performance of the middle side airbag module and the size of the airbag module can be optimized. Accordingly, the middle side airbag can perform a stable airbag function.

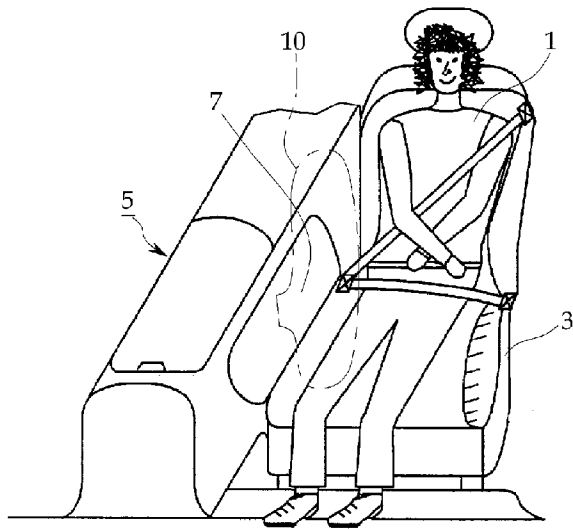
[68] Although the exemplary embodiments of the present invention have been described, it is understood that the exemplary embodiments help one ordinary skilled in the art to easily realize an airbag including a sub-string and a vent part according to the present

invention, but the present invention should not be limited to these exemplary embodiments and accompanying drawings. Therefore, various changes and modifications can be apparently made by the skilled in the art without departing from the technical spirit of the present invention. In addition, it is understood that parts that can be easily changed by the skilled in the art are within the spirit and scope of the present invention as hereinafter claimed.

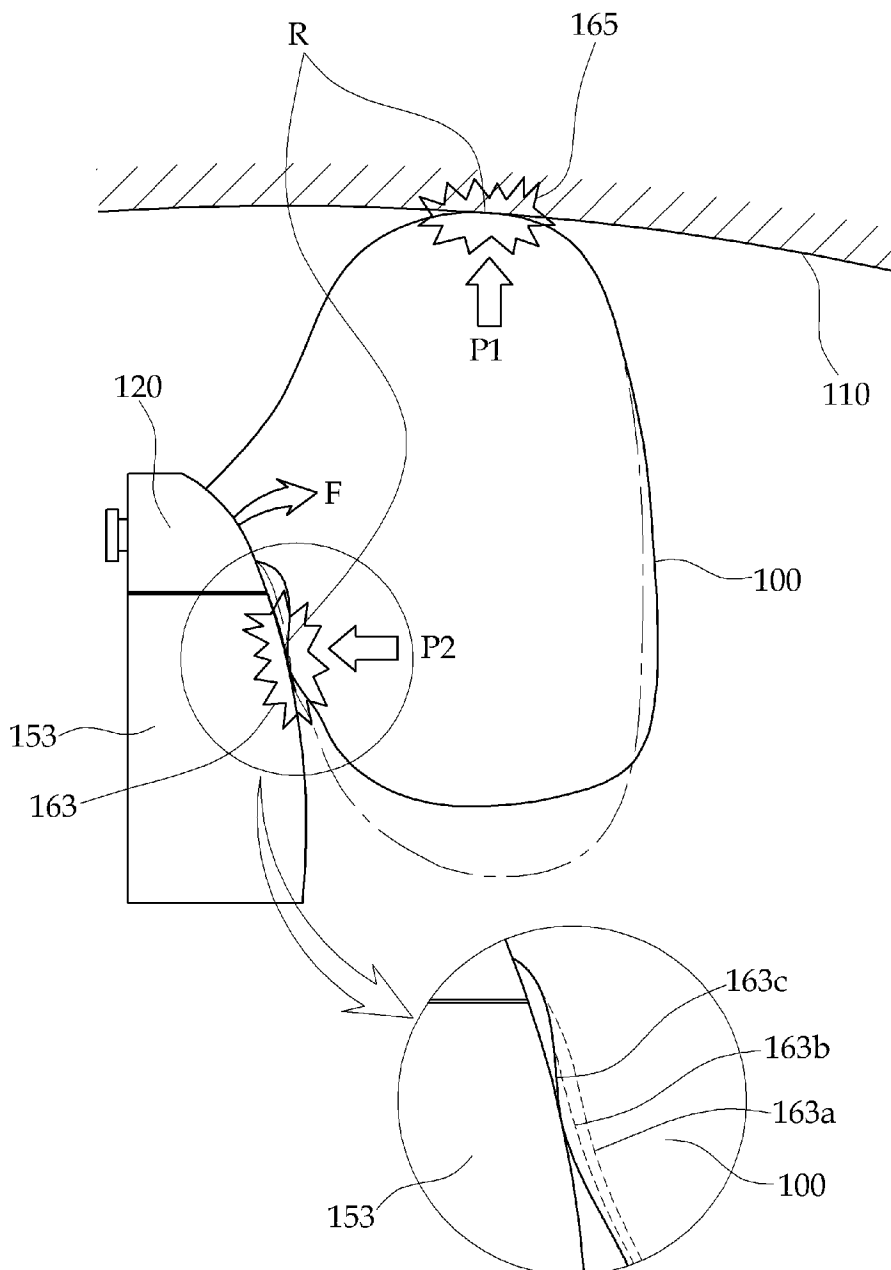
## Claims

- [Claim 1] A middle side airbag inflated between passengers seated on rear seats and between a driver and a passenger seated on front seats to prevent the passengers and the driver from being injured due to side collision therebetween,  
the middle side airbag is characterized in that an inflator is placed in a mid-tower console to inject air into the middle side airbag, and the middle side airbag comprises:  
a vehicle-roof-side cushion contact part provided at an upper portion of the middle side airbag to make contact with a vehicle roof; and  
a mid-tower-console-side cushion contact part provided at a lower rear surface of the middle side airbag to make contact with a mid-tower console.
- [Claim 2] The middle side airbag of claim 1, wherein the middle side airbag is inflated in a vertical direction to form a partition, at a region in which heads of the driver and the passenger collide with each other upon vehicle collision, without making contact with a lower portion of an arm rest that does not support the middle side airbag, thereby reducing a size of an airbag cushion.
- [Claim 3] The middle side airbag of claim 2, wherein the mid-tower-console-side cushion contact part and the vehicle-roof-side cushion contact part have a predetermined value of frictional resistance to be pressurized and frictionally supported by internal air of the middle side airbag.
- [Claim 4] The middle side airbag of claim 3, wherein the mid-tower-console-side cushion contact part includes a plurality of stitch lines which is torn when an internal pressure of the airbag cushion is affected by the collision between the driver and the passenger to variously change volume of the airbag cushion, thereby properly maintaining the internal pressure of the airbag cushion while strongly maintaining air pressure applied to the mid-tower console.

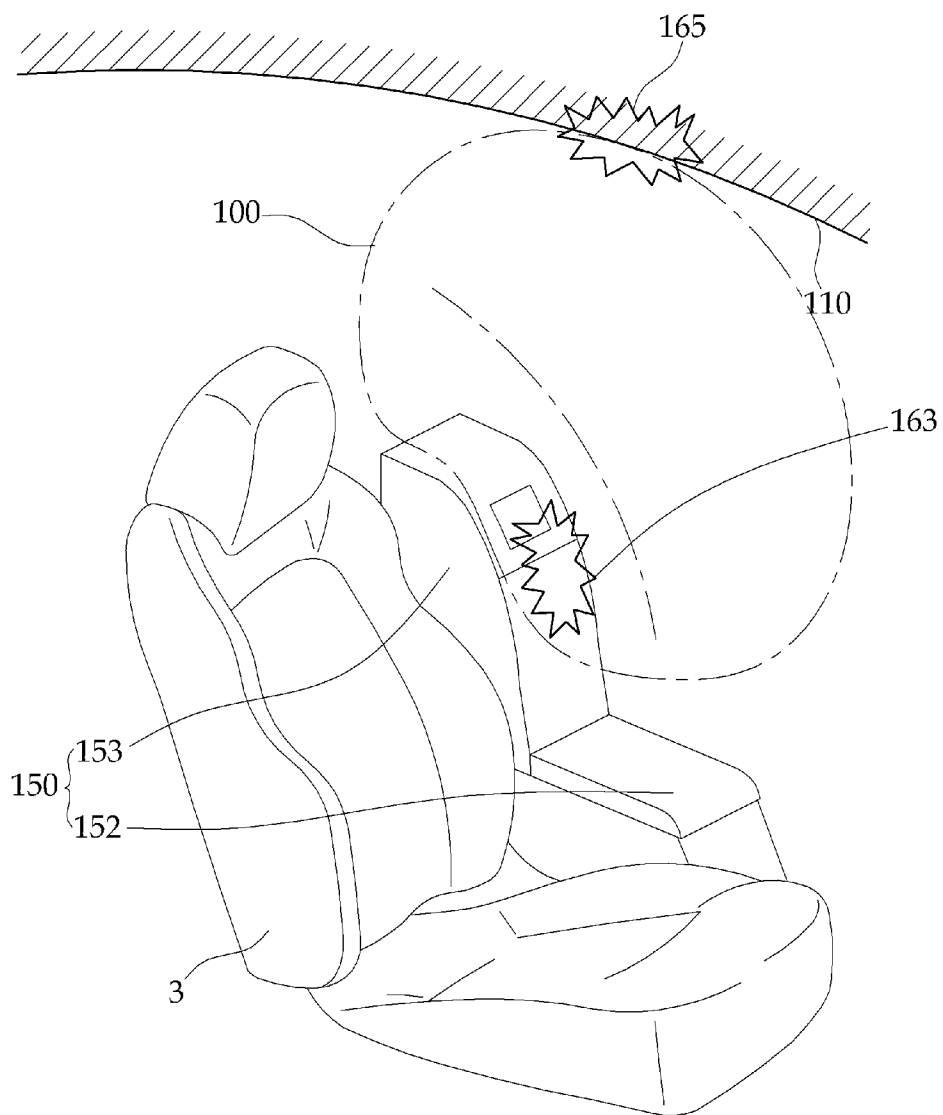
[Fig. 1]



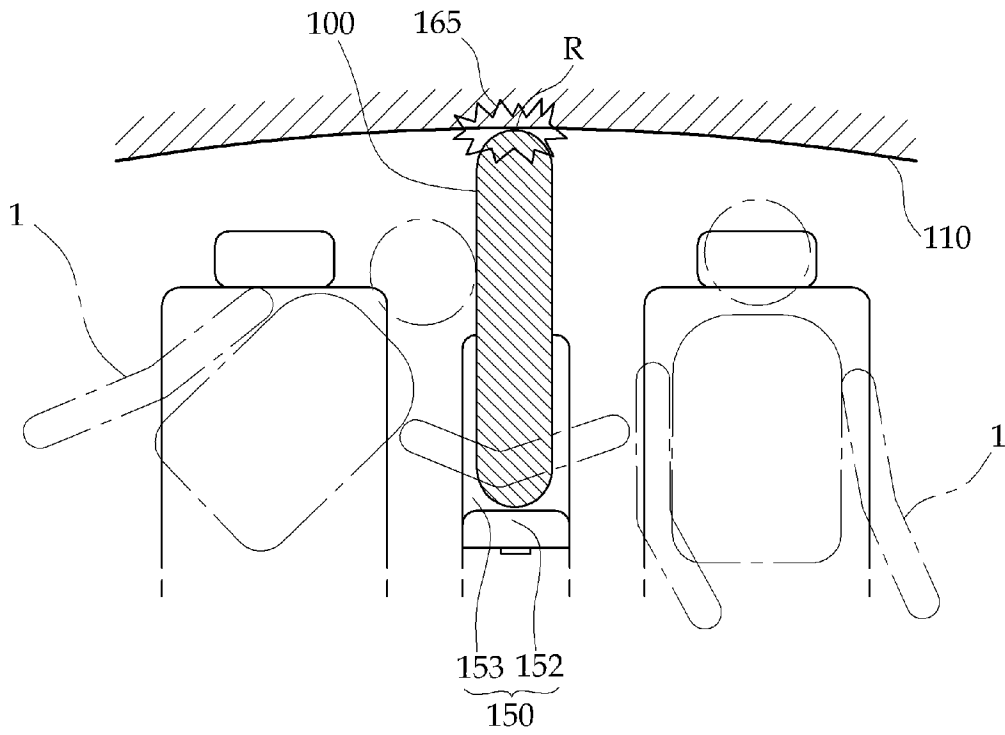
[Fig. 2]



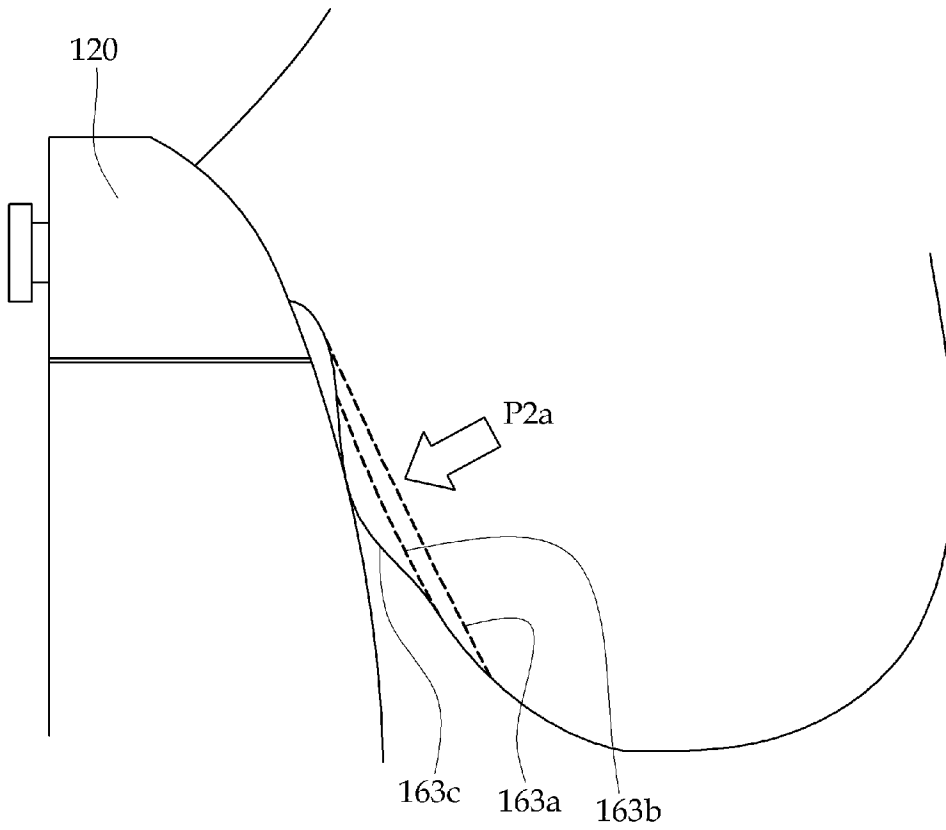
[Fig. 3]



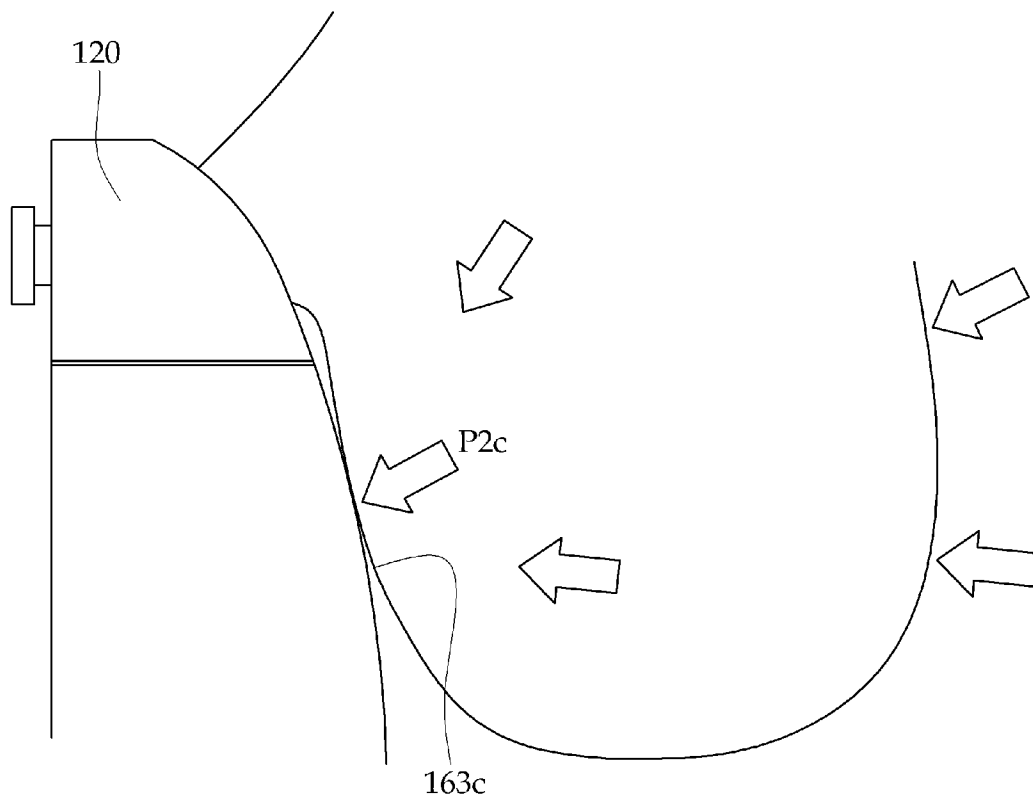
[Fig. 4]



[Fig. 5]



[Fig. 6]



**A. CLASSIFICATION OF SUBJECT MATTER*****B60R 21/207(2006.01)i, B60R 21/20(2011.01)i***

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)

B60R 21/207; B60R 21/20; B60R 21/22; B60R 21/16

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) &amp; Keywords: airbag, inflator, console, roof, cushion

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2009-067330 A (KANTO AUTO WORKS LTD et al.) 02 April 2009 See paragraphs [0022], [0025] and figures 1,2.	1-4
Y	JP 2004-217109 A (ARACO CORP) 05 August 2004 See paragraphs [0011], [0012] and figures 1,3.	1-4
Y A	KR 10-2003-0016896 A (DELPHI AUTOMOTIVE SYSTEMS SUNG WOO CO) 03 March 2003 See claim 1 and figures 1b,4a.	4 1-3

 Further documents are listed in the continuation of Box C. 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

"E" earlier application or patent but published on or after the international filing date

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"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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

29 JUNE 2012 (29.06.2012)

Date of mailing of the international search report

**29 JUNE 2012 (29.06.2012)**

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/KR2012/000649**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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KR 10-2003-0016896 A	03.03.2003	None	