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Koreishi; Norimasa et al.

Vehicle seat structure

Abstract

A space for installing a seat mechanism can be reduced as compared with a prior art when a seatback is supported by support members. A rear panel is provided upright to partition an inside and an outside of a vehicle cabin. A seat support body includes support columns that are fixtures and seat crosses that are support members. The support columns are fixed to a rear panel. The seat crosses are supported by the rear panel with a gap therebetween via the support columns. Each seatback is supported on a back face thereof by the seat crosses. A belt path through which a webbing extends from a retractor to a shoulder anchor is formed in the gap between the seat crosses and the rear panel.

Inventors: Koreishi; Norimasa (Miyoshi, JP), Takeda; Hideo (Hekinan, JP), Takezoe;

Hitoshi (Seto, JP)

Applicant: TOYOTA JIDOSHA KABUSHIKI KAISHA (Toyota, JP)

Family ID: 1000008766917

Assignee: TOYOTA JIDOSHA KABUSHIKI KAISHA (Toyota Aichi-ken, JP)

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Primary Examiner: Colilla; Daniel J

Attorney, Agent or Firm: Dinsmore & Shohl LLP

Background/Summary

CROSS REFERENCE TO RELATED APPLICATION

(1) This application claims priority to Japanese Patent Application No. 2022-046441, filed on Mar. 23, 2022, which is incorporated herein by reference in its entirety including the specification, claims, drawings, and abstract.

TECHNICAL FIELD

(2) The present specification discloses a vehicle seat structure including a seat and a seat belt mechanism of a vehicle.

BACKGROUND

- (3) A vehicle seat includes a seat cushion that serves as a seat, a seatback that serves as a backrest, and a headrest disposed above the seatback. For example, JP 2003-25891 A discloses a seatback including a seatback frame and a headrest frame that are integrally formed. An upper end of the seatback is supported by an upright wall of a vehicle body (for example, a partition wall of a vehicle cabin) disposed behind the seatback. A lower end of the seatback is supported on a floor face of the vehicle cabin.
- (4) A seat belt mechanism further includes, in addition to a webbing that serves as a belt, a retractor, a shoulder anchor, a belt anchor, a belt buckle, and a tongue plate. The retractor is disposed behind the seatback and takes up and accommodates the webbing. The webbing pulled

out upward from the retractor is folded back by the shoulder anchor and is pulled forward of the seatback. Furthermore, a lower end of the webbing pulled out is fixed to the belt anchor. The webbing is inserted through the tongue plate, and a tip plate part of the tongue plate is inserted into the belt buckle when the seat belt mechanism is worn.

- (5) Incidentally, for securing rigidity of the seatback, in some cases support members (for example, a grid-like framework) having a higher rigidity than that of the partition wall of the vehicle body might be provided to support the seatback. Furthermore, in addition to the seatback, the seat belt mechanism might be fixed to the support members. In such a case, in order to provide a webbing path extending from the retractor to the shoulder anchor (a so-called belt path) behind the seatback, it is necessary to form a gap between a back face of the seatback and the support members. Securing this gap might cause an increase in space (make the space voluminous) for installing the seat mechanism.
- (6) To cope with this, the present specification discloses a vehicle seat mechanism capable of reducing a space for installing a seat mechanism as compared with the prior art when a seatback is supported by support members.

SUMMARY

- (7) The present specification discloses a vehicle seat structure. This seat structure includes: a partition wall; a seat support body; a seatback; a retractor; and a shoulder anchor. The partition wall is provided upright to partition an inside and an outside of a vehicle. The seat support body includes a fixture and a support member. The fixture is fixed to the partition wall. The support member is supported by the partition wall with a gap via the fixture. The seatback is supported on a back face thereof by the support member. The retractor is supported by the partition wall, and takes up and accommodates a webbing of a seatbelt mechanism. The shoulder anchor, through which the webbing is inserted, is supported by the partition wall at a position higher than a support position of the retractor. A belt path through which the webbing extends from the retractor to the shoulder anchor is formed in the gap between the support member and the partition wall.
- (8) According to the above configuration, the retractor and the shoulder anchor are fixed to the partition wall, and the gap provided for fixing the support member to the partition wall is used as a belt path; therefore, it is unnecessary to provide a gap for the belt path between the support member and the seatback.
- (9) In the above configuration, the support member includes a seat cross extending in the vehicle width direction. This seat cross is disposed at a position between the shoulder anchor and the retractor in the vehicle height direction and closer to the retractor than to the shoulder anchor. The seat cross is formed in a hat-shape in a cross section including: a main body that is Π -shaped in a cross section and has an opening facing the partition wall; an upper flange provided to extend upward from an upper end of the main body; and a lower flange provided to extend downward from a lower end of the main body. The lower flange is formed with a bent portion at a position of the lower flange facing the webbing extending through the belt path in such a manner that the bent portion is cut off on both sides in the vehicle width direction at the position and is bent so as to be separate from the webbing.
- (10) According to the above configuration, contact between the webbing and the edge of the lower flange is suppressed, to thereby suppress damage of the webbing.
- (11) According to the vehicle seat structure disclosed in the present specification, it is possible to reduce a space for installing the seat mechanism as compared with the prior art when the seatback is supported by the support member.

Description

BRIEF DESCRIPTION OF DRAWINGS

- (1) Embodiments of the present disclosure will be described based on the following figures, wherein:
- (2) FIG. **1** is a view illustrating a vehicle including a seat structure according to the present embodiment;
- (3) FIG. **2** is a perspective view illustrating the seat structure according to the present embodiment;
- (4) FIG. 3 is a perspective view illustrating an example when seats are removed from FIG. 2;
- (5) FIG. **4** is a view illustrating a back structure of a seatback;
- (6) FIG. **5** is an enlarged perspective view of FIG. **3** and illustrating a seat support structure and a seat belt mechanism;
- (7) FIG. **6** is a sectional view taken along line A-A of FIG. **5**; and
- (8) FIG. 7 is a perspective view illustrating a structure around a retractor.

DESCRIPTION OF EMBODIMENTS

- (9) Hereinafter, a vehicle seat structure according to embodiments will be described with reference to the drawings. Shapes, materials, numbers, and numerical values described below are examples for explanation, and can be changed as appropriate in accordance with the specifications of the seat structure. In the following, equivalent components are denoted by the same reference numerals in all drawings.
- (10) In FIG. **1** to FIG. **7**, for the purpose of indicating positions and directions of each component, an orthogonal coordinate system including FR, RW, and UP axes is used. The FR axis is a vehicle front-rear direction axis with a vehicle forward direction as a positive direction. The RW axis is a vehicle width direction axis with a vehicle rightward direction as a positive direction. The UP axis is a vehicle height direction with an upward direction as a positive direction.
- (11) FIG. 1 illustrates an appearance of a vehicle 10 provided with the seat structure according to the present embodiment. The vehicle 10 is a shared vehicle, such as a bus, for example. For example, the vehicle seat structure according to the present embodiment is applied to rearmost seats 20 in a vehicle cabin. However, the vehicle seat structure according to the present embodiment is not limited to the rearmost seats 20 in the vehicle cabin. As will be described later, the vehicle seat structure according to the present embodiment is applicable to a seat structure so long as the seat structure is configured such that a support body is disposed before a partition wall provided upright to partition an interior and an exterior of the vehicle cabin and each seatback is supported by this support body.
- (12) FIG. 2 illustrates the seats **20** and seat belt mechanisms **50** installed in the vehicle cabin. In addition to the seats **20** and the seat belt mechanisms **50**, the vehicle seat structure according to the present embodiment further includes, for example, a seat support body **60** (see FIG. **5**) and a partition wall (illustrated as a rear panel **70** in FIG. **5**).
- (13) With reference to FIG. **2**, the seats **20** for three passengers are disposed at a rearmost position of the vehicle cabin. However, depending on the width of the vehicle cabin, the width of the seats **20**, or the like, the seats **20** for any number of passengers may be disposed at the rearmost position of the vehicle cabin.
- (14) <Partition Wall>
- (15) The vehicle cabin is partitioned by a partition wall that partitions the inside and the outside of the vehicle cabin. FIG. **2** illustrates the rear panel **70** and a floor panel **80** as the partition wall. The floor panel **80** is a floor plate of the vehicle cabin, and has a low floor structure that allows a wheelchair to enter the vehicle **10**, for example.
- (16) The rear panel **70** is provided upright at a rearmost position of the vehicle cabin. A lower end of the rear panel **70** is connected to a rear end of the floor panel **80**. For example, the rear panel **70** has a stepped structure, and the seats **20** are installed in accordance with this stepped structure.
- (17) The rear panel **70** includes a leg plate **71** and a back plate **73** that are upright plates. The rear

- panel **70** also includes a seat plate **72** and a top plate **74** that are horizontal plates. The leg plate **71** is provided upright such that a lower end of the leg plate **71** is connected to the rear end of the floor panel **80**. The leg plate **71** faces legs of passengers sitting on the seats **20**.
- (18) In addition, although "being provided upright" typically refers to an aspect of being provided to extend in the vertical direction, the present disclosure is not limited to this aspect. For example, an aspect of having an installation angle within a predetermined assembly tolerance is also included, hereinafter, in the above aspect of being provided upright. Further, a plate surface may be partially subjected to curved surface processing or may be provided with surface beads processed to be uneven for improving surface rigidity. These fabricated structures are omitted in FIG. 1 to FIG. 7, for simplicity of illustration.
- (19) With reference to FIG. 2 and FIG. 3, the seat plate 72 is provided below seat cushions 24. For example, in a space below the seat plate 72 (space outside the vehicle cabin), driving devices, such as a transmission and a rotary electric machine of the vehicle 10, are accommodated.
- (20) Support frames **44** are disposed on the seat plate **72**. The support frames **44** are support members provided to extend in the vehicle front-rear direction. For example, the support frames **44** are each formed in a Π -shape in a cross section, and are provided in pairs for each seat **20**. As illustrated in the drawing, the support frames **44** support the seat cushions **24** via seat cushion brackets **25**.
- (21) The back plate **73** is an upright plate provided behind back faces of the seatbacks **30**. A lower end of the back plate **73** is connected to a rear end of the seat plate **72**. For example, a rear cross **82** that is a framework member is provided to extend in the vehicle width direction at an upper end of a back face (an externally exposed surface of the vehicle) of the back plate **73**. The rear cross **82** is connected to pillars (not illustrated) provided at both ends in the vehicle width direction of the vehicle **10**.
- (22) The seat support body **60** that supports the seatbacks **30** is fixed to the back plate **73**, and the seatbacks **30** are supported by the seat support body **60**. Detailed structures of the seat support body **60** and the seatbacks **30** will be described later.
- (23) With reference to FIG. **5**, headrest brackets **40** are supported on an upper part of a front face **73**A (internally exposed surface of the vehicle cabin) of the back plate **73**, the front face **73**A is opposite a rear face **73**B (FIG. **6**). Furthermore, stays **42** are provided to extend upward from the respective headrest brackets **40**, and lower ends of headrests **22** are connected to upper ends of the respective stays **42**.
- (24) For example, a front face of each headrest **22** that is a contact surface to a passenger, and a front face of each seatback **30** (see FIG. **2**) are aligned with each other. For example, the stays **42** are connected to lower ends of rear faces of the respective headrests **22**. In addition, for example, the thickness in the vehicle front-rear direction of each headrest **22** is determined such that a distance from the stay **42** to the front face of the headrest **22** is equal to or slightly shorter than a distance from the stay **42** to the front face of each seatback **30**.
- (25) Each headrest **22** is supported on the rear panel **70** that is the partition wall, instead of being supported on the seatback **30**, to thereby reduce support rigidity of the seatback **30**. Accordingly, the seatback **30** can be configured in a simple structure including two components of a back plate part **31** and an engagement plate **34**, as illustrated in FIG. **4**, which will be described later.
- (26) Returning to FIG. **5**, the seat belt mechanisms **50** included in the seat structure according to the present embodiment are supported on the back plate **73** of the rear panel **70**. Each seat belt mechanism **50** includes a retractor **52**, a shoulder anchor **53**, a belt anchor **54**, a belt buckle **55**, and a tongue plate **56** in addition to a webbing **51** that is a belt. The detailed structures of these components will be described later.
- (27) <Seat Support Body>
- (28) As shown in FIG. **3** and FIG. **5**, the seat support body **60** includes the support frames **44**, support columns **62** (fixtures) and seat crosses **64**A, **64**B (support members). All of these members

- are made of rigid members such as aluminum rectangular members. In front of the back plate **73** of the rear panel **70**, a grid-like support framework, which includes the support columns **62** that are vertical columns and the seat crosses **64**A, **64**B that are horizontal columns, is provided upright. (29) As described above, the support frames **44** are disposed on the seat plate **72** of the rear panel **70** and provided to extend in the vehicle front-rear direction. Each support frame **44** is Π -shaped in a cross section and has an opening that faces downward. The support frames **44** are provided in a pair, for example, at positions corresponding to both side ends in the vehicle width direction of each seat cushion **24** (see FIG. **2**).
- (30) Side walls of each support frame **44** are formed with fastening holes **44**A (see FIG. **5**) along the thickness direction of the side walls. After the fastening holes **44**A and fastening holes (not illustrated) of the seat cushion brackets **25** (see FIG. **2**) are aligned with each other, the seat cushion brackets **25** are fastened to the support frames **44** with bolts and nuts. Accordingly, the seat cushions **24** are supported on the support frames **44**.
- (31) The support columns **62** are fixtures fixed to the back plate **73** of the rear panel **70** that serves as the partition wall. Upper ends of the support columns **62** are supported by the rear cross **82**, for example. The support columns **62** and the rear cross **82** are joined to each other by welding, for example. The support columns **62** are provided upright along the back plate **73**. For example, the support columns **62** are provided to extend across the entire height of the back plate **73** (full length of the UP-axis dimension).
- (32) Each support column **62** is, for example, a vertical column member that is hat-shaped in a cross section, and has an opening facing the back plate **73**. A plurality of support columns **62** are provided along the vehicle width direction. For example, each support column **62** is fixed to the back plate **73** of the rear panel **70** in such a manner as to avoid the headrest bracket **40**, the shoulder anchor **53**, and the belt buckle **55**.
- (33) The seat crosses **64**A, **64**B are horizontal column members provided to extend in the vehicle width direction, and also serve as support members that support the seatbacks **30**. The seat crosses **64**A, **64**B are provided to extend across the entire width in the vehicle width direction of the back plate **73**, for example. The seat crosses **64**A, **64**B are provided between the shoulder anchors **53** and the retractors **52** in the vehicle height direction. In addition, the seat crosses **64**A, **64**B are provided with a distance therebetween in the vehicle height (up-down) direction. For example, the seat crosses **64**A, **64**B are joined to each support column **62** by welding at weld spots **67**B**2** as illustrated in FIG. **7**, for example.
- (34) As shown in FIG. **5**, the seat crosses **64**A, **64**B are each formed in a hat-shape in a cross section. More specifically, the seat crosses **64**A, **64**B have respective main bodies **65**A, **65**B that are Π-shaped in a cross section. The main bodies **65**A, **65**B have openings that face the back plate **73** of the rear panel **70** that serves as the partition wall. Further, the seat crosses **64**A, **64**B include respective upper flanges **66**A, **66**B provided to extend upward from upper ends of the main bodies **65**A, **65**B and lower flanges **67**A, **67**B provided to extend downward from lower ends of the main bodies **65**A, **65**B.
- (35) As will be described later, engagement claws **32** provided on a back face **30**B of each seatback **30** (see FIG. **4**) are hooked on the upper flange **66**A of the seat cross **64**A disposed at a relatively upper position. Such a hooked support structure allows the seat cross **64**A (and the seat cross **64**B) to be separate (floating) from the back plate **73** of the rear panel **70**. In other words, the seat crosses **64**A, **64**B are supported by the back plate **73** with a gap L1 (see FIG. **7**) therebetween via the support columns **62** serving as the fixtures.
- (36) That is, the support columns **62** function as spacers for separating the seat crosses **64**A, **64**B and the back plate **73** from each other. From this point of view, the seat crosses **64**A, **64**B may be supported by the back plate **73** of the rear panel **70** via brackets that are small piece members, instead of the support columns **62**.
- (37) Further, as will be described later, the gap L1 formed due to the hooking structure of the

seatbacks **30** serves as a belt path through which each webbing **51** extends from the retractor **52** to the shoulder anchor **53**. The lower flange **67**B of the seat cross **64**B, which is located between each retractor **52** and each shoulder anchor **53** and closer to the retractor **52** than to the shoulder anchor **53**, is formed with a bent portion **67**B**1** at a position facing the webbing **51** extending through the belt path. The bent portion **67**B**1** thus formed suppresses a contact between the lower flange **67**B and the webbing **51**, to thereby prevent the webbing **51** from being damaged by an edge of the lower flange **67**B. This detailed structure will be described later.

- (39) As shown in FIG. **4**, each seatback **30** includes the back plate part **31** and the engagement plate **34**, for example. As described above, since each headrest **22** is supported by the rear panel **70** (see FIG. **5**) instead of by the seatback **30**, the support rigidity of the seatback **30** is reduced accordingly, to thereby simplify the structure.
- (40) For example, the seatback **30** is configured to include two members, the back plate part **31** and the engagement plate **34**. The back plate part **31** is made of resin, for example, and has a structure in which a surface **30**A has a predetermined elasticity. For example, the back plate part **31** may include a rectangular frame body and a mesh disposed within the frame body.
- (41) The engagement plate **34** is disposed on the back face **30**B of the seatback **30**. The engagement plate **34** is disposed, for example, in an upper part of the back face **30**B of the seatback **30**. The engagement plate **34** is a plate member provided to extend substantially vertically from the back face **30**B of the seatback **30**. Furthermore, the engagement claws **32** are disposed at a rear end of the engagement plate **34**. The engagement claws **32** are provided in a pair, for example, along the vehicle width direction. The engagement plate **34** and the engagement claws **32** are integrally molded, for example.
- (42) For example, a vehicle front-rear dimension L3 of the engagement plate 34 is set to be equal to or larger than a vehicle front-rear dimension L4 of each of the main bodies 65A, 65B of the seat crosses 64A, 64B (see FIG. 5, FIG. 7). By setting these dimensions in this manner, the engagement claws 32 can be hooked on the upper flange 66A of the seat cross 64A.
- (43) As shown in FIG. **4**, a fastening hole **36** penetrating from the surface **30**A to the back face **30**B is formed at the center of a lower part of the back plate part **31**. After the engagement claws **32** are hooked on the upper flange **66**A of the seat cross **64**A, the fastening hole **36** of each back plate part **31** is aligned with a fastening hole of each seatback bracket **68** (see FIG. **5**), and the back plate part **31** is fastened to the seatback bracket **68** with a bolt and a nut. As a result, the back face **30**B of the seatback **30** is supported by the seat crosses **64**A, **64**B that are the supporting members.
- (44) <Seat Belt Mechanism>

(38) <Seatback>

- (45) As shown in FIG. **5**, each seat belt mechanism **50** includes the webbing **51**, the retractor **52**, the shoulder anchor **53**, the belt anchor **54**, the belt buckle **55**, and the tongue plate **56**. The webbing **51** is a belt, and is pulled up from the retractor **52** behind the seatback **30**, then folded back at the shoulder anchor **53**, and pulled out forward and downward of the seatback **30**, and furthermore, an end of the webbing is fixed to the belt anchor **54**.
- (46) The retractor **52** takes up and accommodates the webbing **51**. For example, the retractor **52** may be a well-known take-up device with a locking mechanism. The retractor **52** is supported by the rear panel **70** that serves as the partition wall. For example, as shown in FIG. **2** and FIG. **5**, each retractor **52** is disposed between the adjacent seats **20**, **20**. The retractors **52** are disposed below the seat cross **64**B.
- (47) Each shoulder anchor **53** has a through hole **53**A through which the webbing **51** is inserted. The shoulder anchor **53** is supported to the rear panel **70** at a position higher than a support position of the retractor **52**. For example, the shoulder anchor **53** is supported and fixed to the top plate **74** of the rear panel **70**.
- (48) Each belt anchor **54** is supported to a lower end of the back plate **73** of the rear panel **70**, for example. The webbing **51** is inserted through the tongue plate **56** in such a manner that the tongue

- plate **56** is located between the shoulder anchor **53** and the belt anchor **54**. In addition, the belt buckle **55** is supported by the back plate **73** of the rear panel **70** at a position on the opposite side of the seat **20** from the belt anchor **54**.
- (49) The belt path through which the webbing **51** extends from the retractor **52** to the shoulder anchor **53** is provided in the gap L**1** between the seat crosses **64**A, **64**B that are the support members and the back plate **73** of the rear panel **70** that is the partition wall.
- (50) With reference to FIG. **6**, for example, among the gap L**1** between the seat crosses **64**A, **64**B and the back plate **73** of the rear panel **70**, a separation distance L**2** between the through hole **53**A of each shoulder anchor **53** and the back plate **73**, and a separation distance L**3** between an outer peripheral surface **52**A**1** of the winding roll **52**A of each retractor and the back plate **73**, there is a relationship: L**1**>L**3**>L**2**.
- (51) By setting the gap L1 to be larger than the separation distance L2 and the separation distance L3, the belt path of the webbing 51 from the retractor 52 to the shoulder anchor 53 is secured within the gap L1. Further, by setting the separation distances to satisfy L2<L3, the lower end of the webbing 51; that is, a portion of the webbing 51 near the retractor 52, is taken up toward the seat cross 64B, as illustrated in FIG. 6 and FIG. 7.
- (52) In the seat structure according to the present embodiment, the lower flange **67**B of the seat cross **64**B is formed with the bent portion **67**B**1** (see FIG. **7**). The bent portion **67**B**1** is formed in the lower flange at a position where the lower flange **67**B faces the webbing **51**. The bent portion **67**B**1** is cut off on both sides in the vehicle width direction at this position from the lower flange **67**B, and is bent so as to be separate from the webbing **51**. Assuming that the webbing **51** moves out of control at the time of being taken up by the retractor **52**, the vehicle width dimension of the bent portion **67**B**1** is set to be twice or more the width dimension of the webbing **51**, for example. (53) The present disclosure is not limited to the present embodiments described above, and includes all changes and modifications without departing from the technical scope or the essence of the present disclosure defined by the claims.

Claims

- 1. A vehicle seat structure comprising: a partition wall provided upright to partition an inside and an outside of a vehicle; a seat support body that includes a fixture fixed to the partition wall, and a support member supported by the partition wall with a gap via the fixture; a seatback that is supported on a back face thereof by the support member; a retractor that is supported by the partition wall, and takes up and accommodates a webbing of a seatbelt mechanism; and a shoulder anchor that is supported by the partition wall at a position higher than a support position of the retractor, the webbing being inserted through the shoulder anchor, a belt path through which the webbing extends from the retractor to the shoulder anchor being formed in the gap between the support member and the partition wall.
- 2. The vehicle seat structure according to claim 1, wherein the support member includes a seat cross extending in a vehicle width direction, the seat cross being disposed between the shoulder anchor and the retractor in a vehicle height direction and closer to the retractor than to the shoulder anchor, the seat cross is formed in a hat-shape in a cross section including: a main body that is Π -shaped in a cross section and has an opening facing the partition wall; an upper flange provided to extend upward from an upper end of the main body; and a lower flange provided to extend downward from a lower end of the main body, and the lower flange is formed with a bent portion at a position of the lower flange facing the webbing extending through the belt path in such a manner that the bent portion is cut off on both sides in a vehicle width direction at the position and is bent so as to be separate from the webbing.