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Recliner for vehicle seat

Abstract

A recliner for a vehicle seat includes a first gear having a center hole provided at a center thereof, a second gear being internally in contact with the first gear and configured to eccentrically engage with the first gear, a socket having a coupling portion configured to be coupled to the center hole, and a pair of wedge cams disposed between the socket and the second gear and configured to restrain or release the socket and the second gear.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS

(1) This application claims priority to and the benefit of Korean Patent Application No. 10-2022-0094177 filed in the Korean Intellectual Property Office on Jul. 28, 2022, the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD

(2) The present invention relates to a recliner for a vehicle seat.

BACKGROUND ART

(3) In general, a recliner may adjust an angle of a seatback in a forward/rearward direction with respect to a seat cushion and provide a high coupling force between components during a reclining operation, thereby ensuring safety of a vehicle occupant. The recliners may be classified into a manual recliner that adjusts an angle of a seatback in response to a lever manipulation, and a powered recliner that may be automatically operated by power of a motor generated in response to a switch manipulation.

(4) FIG. 1 is a view illustrating a state in which a recliner for a vehicle seat in the related art is mounted on a seatback frame, FIG. 2 is a cross-sectional side view of the recliner for a vehicle seat in the related art, FIG. 3 is a view illustrating a collar part of the recliner for a vehicle seat in the related art, and FIG. 4 is a top plan view illustrating a state in which wedge cams of the recliner for a vehicle seat in the related art are coupled to the collar part.

(5) As illustrated in FIG. 1, a recliner **100** may be mounted on a seatback frame SF in a seatback SB. As illustrated in FIGS. 2 and 3, the recliner **100** in the related art includes a first gear **101** having inner teeth **101a**, and a second gear **102** having outer teeth **102a** that engage with the inner teeth **101a** of the first gear **101**. An eccentric state of the second gear **102**, which is eccentrically coupled in the first gear **101**, is maintained by a pair of wedge cams **103** interposed between a bushing **108** and a collar part **101b** of the first gear **101** and elastically supported by a spring **109**. Further, a locking state or an unlocking state for an operation of the recliner may be maintained in the same way. The pair of wedge cams **103** is elastically supported by two opposite bent ends **109a** of the spring **109**, and a spread state thereof may be maintained. When a motor M is operated by an operation of a switch SW and a shaft **104** connected to the motor M rotates, the second gear **102** is rotated by a rotation of a socket **105** connected to the shaft **104** and rotations of the wedge cams **103**, and the first gear **101** rotates in conjunction with the rotation of the second gear **102**. Therefore, an angle of a seatback frame SF may be adjusted, and an angle of the seatback SB may be adjusted. A cover **106** may be coupled to an inner diameter portion of the second gear **102** so as to surround the spring **109**. A guide ring **107** may be coupled to surround an engagement portion where the inner teeth **101a** of the first gear **101** and the outer teeth **102a** of the second gear **102** engage with one another.

(6) Meanwhile, when an external force is applied to the seatback frame SF, a load L, which is transmitted through an engagement portion between the inner teeth **101a** of the first gear **101** and the outer teeth **102a** of the second gear **102**, is concentrated on the collar part **101b** of the first gear **101**, which causes deformation of the collar part **101b**. The deformation of the collar part **101b** may cause a deterioration in engagement properties between the second gear **102** and the first gear **101** and cause damage.

(7) In the related art, a thickness of the collar part **101b** of the first gear **101** is increased to solve the above-mentioned problem, but there is a limitation in increasing the thickness of the collar part. The collar part **101b**, which is produced by a burring or forming process, has a non-uniform surface

roughness SU, and scratches SC are inevitably formed in an axial direction of an outer diameter portion. For this reason, friction of the wedge cams **103**, which are in contact with the collar part **101b** and rotate, is increased, which adversely affects the operation of the recliner. In addition, as illustrated in FIG. **4**, a gap G may be formed between the wedge cam **103** and the socket **105** to compensate for a dimension tolerance condition for each component. The gap G may cause a time difference between an operation of the socket **105** and an operation of the wedge cam **103**.

DOCUMENT OF RELATED ART

Patent Document

(8) (Patent Document 1) Korean Patent No. 10-2236705 (published on Apr. 6, 2021)

SUMMARY OF THE INVENTION

(9) The present invention has been made in an effort to solve the above-mentioned problem, and an object of the present invention is to provide a recliner for a vehicle seat, in which a thickness of a body portion of a socket is increased, and a coupling portion extending from the body portion is coupled to a center hole of a first gear, such that a supporting force of the socket may be increased, and a load applied to the socket may be dispersed, thereby improving engagement properties between first and second gears.

(10) Another object of the present invention is to provide a recliner for a vehicle seat, in which a contact portion of a socket, which comes into contact with a wedge cam, may be polished to minimize friction of the wedge cam, and the wedge cam may come into contact with and be coupled to a body portion of the socket such that a motion of the wedge cam may be performed at the same time when a shaft is rotated by an operation of a motor.

(11) To achieve the above-mentioned objects, the present invention provides a recliner for a vehicle seat, the recliner including: a first gear having a center hole provided at a center thereof; a second gear being internally in contact with the first gear and configured to eccentrically engage with the first gear; a socket having a coupling portion configured to be coupled to the center hole; and a pair of wedge cams disposed between the socket and the second gear and configured to restrain or release the socket and the second gear.

(12) The coupling portion may extend in a direction from a body portion of the socket to the center hole, the body portion may have a first stepped portion provided at one end thereof and assembled to be directed toward the first gear, and the wedge cam may be in contact with and coupled to the body portion.

(13) The coupling portion may include: a first coupling portion extending from the body portion and having a smaller outer diameter than the body portion so that the first stepped portion is formed on a boundary between the first coupling portion and the body portion; and a second coupling portion extending from the first coupling portion and having a smaller outer diameter than the first coupling portion so that a second stepped portion is formed on a boundary between the second coupling portion and the first coupling portion.

(14) The center hole may include: a first center hole to which the first coupling portion is coupled; and a second center hole to which the second coupling portion is coupled, the second center hole being configured to communicate with the first center hole and configured as a hole smaller than the first center hole.

(15) The socket may be formed by sintering or forging.

(16) The entirety of the socket or a contact portion of the socket, which comes into contact with the wedge cam, may be at least polished.

(17) The socket may include: a wing portion formed on an outer diameter portion of the body portion and spaced apart from the first stepped portion at an interval; a push portion extending in a direction from one surface of the wing portion to the first stepped portion; and an assembling portion protruding from the other surface of the wing portion.

(18) The wing portion may have a coupling groove, an elastic member may be coupled to the assembling portion, and two opposite ends of the elastic member may be coupled to insertion

grooves provided at ends of the pair of wedge cams, which face each other, through the coupling groove.

(19) The push portion may have an arc shape, and the wedge cam may be rotated by being pushed by the push portion.

(20) The socket may have an inner diameter portion penetrating a center thereof, and the inner diameter portion may have an angular structure to which a shaft is capable of being coupled.

(21) According to the present invention, the thickness of the body portion of the socket may be increased, and the coupling portion extending from the body portion may be coupled to the center hole of the first gear, such that the supporting force of the socket may be increased, and the load applied to the socket may be dispersed, thereby improving engagement properties between the first and second gears.

(22) According to the present invention, the contact portion of the socket, which comes into contact with the wedge cam, may be polished, thereby minimizing friction of the wedge cam.

(23) The wedge cam may come into contact with and be coupled to the body portion of the socket such that the motion of the wedge cam may be performed at the same time when the shaft is rotated by the operation of the motor.

(24) The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features described above, further aspects, embodiments, and features will become apparent by reference to the drawings and the following detailed description.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. 1 is a view illustrating a state in which a recliner for a vehicle seat in the related art is mounted on a seatback frame.

(2) FIG. 2 is a cross-sectional side view of a recliner for a vehicle seat in the related art.

(3) FIG. 3 is a view illustrating a collar part of the recliner for a vehicle seat in the related art.

(4) FIG. 4 is a top plan view illustrating a state in which a wedge cam of the recliner for a vehicle seat in the related art is coupled to the collar part.

(5) FIG. 5 is an exploded perspective view of a recliner for a vehicle seat according to an exemplary embodiment of the present invention.

(6) FIG. 6 is a perspective view of the recliner for a vehicle seat according to the exemplary embodiment of the present invention.

(7) FIG. 7 is a cross-sectional side view of the recliner for a vehicle seat according to the exemplary embodiment of the present invention.

(8) FIG. 8 is an enlarged view of a socket according to the exemplary embodiment of the present invention.

(9) FIG. 9 is a top plan view illustrating a state in which a wedge cam of the recliner for a vehicle seat according to the exemplary embodiment of the present invention is coupled to the socket.

(10) FIG. 10 is a view illustrating a load applied to the socket of the recliner for a vehicle seat according to the exemplary embodiment of the present invention.

(11) It should be understood that the appended drawings are not necessarily to scale, presenting a somewhat simplified representation of various features illustrative of the basic principles of the invention. The specific design features of the present invention as disclosed herein, including, for example, specific dimensions, orientations, locations, and shapes will be determined in part by the particular intended application and use environment.

(12) In the figures, reference numbers refer to the same or equivalent parts of the present invention throughout the several figures of the drawing.

DETAILED DESCRIPTION

(13) Hereinafter, exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings. First, in assigning reference numerals to constituent elements of the respective drawings, it should be noted that the same constituent elements will be designated by the same reference numerals, if possible, even though the constituent elements are illustrated in different drawings. In addition, in the description of the present invention, the specific descriptions of publicly known related configurations or functions will be omitted when it is determined that the specific descriptions may obscure the subject matter of the present invention. Further, the exemplary embodiments of the present invention will be described below, but the technical spirit of the present invention is not limited thereto and may of course be modified and variously carried out by those skilled in the art.

(14) FIG. 5 is an exploded perspective view of a recliner for a vehicle seat according to an exemplary embodiment of the present invention, and FIG. 6 is a perspective view of the recliner for a vehicle seat according to the exemplary embodiment of the present invention.

(15) As illustrated in FIGS. 5 and 6, a recliner **200** for a vehicle seat of the present invention includes a first gear **210** having a center hole **212** provided at a center thereof, a second gear **220** being internally in contact with the first gear **210**, a socket **250** having a coupling portion **251** coupled to the center hole **212**, and a pair of wedge cams **240** coupled between the socket **250** and the second gear **220**.

(16) The present invention provides a structure in which the coupling portion **251** of the socket **250** is coupled to the center hole **212** of the first gear **210**. Therefore, it is not necessary to provide a collar part on the first gear **210**, unlike the related art.

(17) The center hole **212** of the first gear **210** includes a first center hole **212a**, and a second center hole **212b** configured to communicate with the first center hole **212a**. The second center hole **212b** is configured as a hole smaller than the first center hole **212a** so that a stepped portion is formed between the first center hole **212a** and the second center hole **212b**.

(18) A coupling member **290** may be coupled to an inner diameter portion of the second gear **220**. The coupling member **290** may be positioned between the inner diameter portion of the second gear **220** and the wedge cam **240**. For example, the coupling member **290** may be a bushing, a bearing, or the like.

(19) Two opposite ends **281** of an elastic member **280**, which are bent and extend, push ends of the pair of two opposite wedge cams **240**, which face each other, in a direction in which the ends of the pair of two opposite wedge cams **240** move away from each other. The elastic member **280** may be coupled to the socket **250**. The elastic member **280** may be positioned between a first cover **260** and the socket **250**.

(20) FIG. 7 is a cross-sectional side view of the recliner for a vehicle seat according to the exemplary embodiment of the present invention, FIG. 8 is an enlarged view of a socket according to the exemplary embodiment of the present invention, and FIG. 9 is a top plan view illustrating a state in which a wedge cam of the recliner for a vehicle seat according to the exemplary embodiment of the present invention is coupled to the socket.

(21) As illustrated in FIGS. 7 to 9, the first gear **210** may have inner teeth **211** provided on an inner diameter portion thereof.

(22) The second gear **220** may have a smaller outer diameter than the first gear **210**. The second gear **220** may eccentrically engage with the first gear **210**. The second gear **220** has outer teeth **221** provided on an outer diameter portion thereof. The outer teeth **221** of the second gear **220** may engage with the inner teeth **211** of the first gear **210**.

(23) The wedge cam **240** may have an arc shape. The wedge cam **240** may have a width that gradually increases toward one end thereof. The pair of wedge cams **240** may restrain or release the socket **250** and the second gear **220**.

(24) The wedge cam **240** may rotate when the socket **250** rotates. An inner diameter portion **253** of

the socket **250** may have an angular structure such as a quadrangular structure. A shaft (not illustrated) for transmitting power may be coupled to the inner diameter portion **253** of the socket **250**. The shaft may be connected to a motor (not illustrated).

(25) The socket **250** includes a body portion **252** and the coupling portion **251**. Because the body portion **252** rotates at the same time when the socket **250** operates, the wedge cams **240** begin to be released before contact occurs in a gap G. As a result, responsiveness may be improved.

(26) The coupling portion **251** extends in a direction from the body portion **252** to the center hole **212** of the first gear **210**.

(27) The coupling portion **251** includes a first coupling portion **251a** extending from the body portion **252**, and a second coupling portion **251b** extending from the first coupling portion **251a**.

(28) The first coupling portion **251a** has an outer diameter that conforms to the first center hole **212a**. During the assembling process, the first coupling portion **251a** is inserted into and coupled to the first center hole **212a**.

(29) The first coupling portion **251a** has a smaller outer diameter than the body portion **252**. Therefore, a first stepped portion **252a** may be provided on a boundary between the body portion **252** and the first coupling portion **251a**.

(30) During the assembling process, the first stepped portion **252a** may be assembled to be directed toward the first gear **210**. With the above-mentioned structure, a thickness of the body portion **252** is inevitably increased. The increase in thickness of the body portion **252** may minimize a load applied to the socket **250**.

(31) The second coupling portion **251b** has an outer diameter that conforms to the second center hole **212b**. During the assembling process, the second coupling portion **251b** is inserted into and coupled to the second center hole **212b**.

(32) The second coupling portion **251b** extends from the first coupling portion **251a**. The second coupling portion **251b** has a smaller outer diameter than the first coupling portion **251a**. Therefore, a second stepped portion **251c** may be provided on a boundary between the first coupling portion **251a** and the second coupling portion **251b**.

(33) The stepped coupling structures between the coupling portion **251** of the socket **250** and the center hole **212** of the first gear **210** may securely couple the socket **250** to the first gear **210**.

(34) The socket **250** includes the inner diameter portion **253**, a wing portion **254**, a push portion **255** extending from one surface of the wing portion **254**, and an assembling portion **256** protruding from the other surface of the wing portion **254**.

(35) The inner diameter portion **253** is formed to penetrate a center of the socket **250**. The shaft (not illustrated) may be coupled to the inner diameter portion **253**. The inner diameter portion **253** may have an angular structure such as a quadrangular structure to which the shaft may be coupled.

(36) The wing portion **254** is formed on an outer diameter portion of the body portion **252** and spaced apart from the first stepped portion **252a** at an interval. For example, the wing portion **254** may be formed circularly. The wing portion **254** has a coupling groove **254a**. The wing portion **254** is coupled to surround the wedge cams **240** during the assembling process. As the body portion **252** and the wing portion **254** are formed, an assembling space for the wedge cams **240** may be formed between the body portion **252** and the wing portion **254**.

(37) The push portion **255** extends in a direction from one surface of the wing portion **254** to the first stepped portion **252a**. The push portion **255** may have an arc shape. When the socket **250** rotates, the wedge cams **240** may be rotated by being pushed by the push portion **255** (see FIG. 9).

(38) The elastic member **280** may be coupled to the assembling portion **256**, such that the two opposite bent ends **281** may be coupled to insertion grooves **241** provided at the ends of the pair of wedge cams **240**, which face each other, through the coupling groove **254a**. For example, the elastic member **280** may be a spring.

(39) The first cover **260** may be coupled to the inner diameter portion of the second gear **220**. The first cover **260** may prevent the separation of the wedge cams **240**, the socket **250**, the elastic

member **280**, and the like that are coupled in the second gear **220**. For example, the first cover **260** may be coupled to the inner diameter portion of the second gear **220** by welding.

(40) A second cover **270** may be coupled to an outer diameter portion of the first gear **210**. The second cover **270** may be coupled to surround an engagement portion between the inner teeth **211** of the first gear **210** and the outer teeth **221** of the second gear **220**, thereby preventing the second gear **220** from separating from the first gear **210**.

(41) As illustrated in FIG. **8**, the socket **250** may be formed by sintering or forging.

(42) The entirety of the socket **250**, which is formed by sintering or forging, or the contact portion of the socket **250**, which comes into contact with the wedge cams **240**, may be polished. For example, at least the body portion **252** of the socket **250** may be polished.

(43) The polishing may remove scratches on the socket **250** and optimize surface roughness. Therefore, the friction of the wedge cam **240**, which is in contact with the socket **250**, may be minimized, thereby allowing the wedge cam **240** to operate smoothly.

(44) Next, a load applied to the socket of the present invention will be described.

(45) FIG. **10** is a view illustrating a load applied to the socket of the recliner for a vehicle seat according to the exemplary embodiment of the present invention.

(46) In the related art, when an external force is applied to a seatback frame, a load, which is transmitted through an engagement portion between inner teeth of a first gear and outer teeth of a second gear, is concentrated on a collar part of the first gear, which causes deformation of the collar part. The deformation of the collar part causes a deterioration in engagement properties between the second gear and the first gear and causes damage.

(47) However, because the present invention provides the structure in which the coupling portion **251** of the socket **250** is coupled to the center hole **212** of the first gear **210**, the collar part of the first gear in the related art is not required, the thickness of the body portion **252** of the socket **250** is inevitably increased, and thus the load applied to the socket **250** may be minimized.

(48) As illustrated in FIG. **10**, in the recliner **200** of the present invention, a load *L*, which is applied to the socket **250** through the engagement portion between the inner teeth **211** of the first gear **210** and the outer teeth **221** of the second gear **220**, may be dispersed by the body portion **252** with the increased thickness. Therefore, it is possible to ensure engagement performance of the first gear **210** and the second gear **220**.

(49) In the related art, because the collar part, with which the wedge cam is in contact, is manufactured by burring or forming, the outer diameter portion of the collar part is scratched, and non-uniform surface roughness is caused. Further, because the collar part is integrated with the first gear, it is not easy to process the outer diameter portion of the collar part.

(50) However, in the present invention, the socket **250** coupled to the center hole **212** of the first gear **210** is separately configured. Therefore, it is very easy to perform the polishing, such as barreling, on the entirety of the socket **250** or the contact portion of the socket **250**, which is in contact with the wedge cam **240**, during a subsequent process after the socket **250** is formed by sintering or forging.

(51) The surface roughness of the outer diameter portion of the socket **250** may be optimized, and scratches may be perfectly removed by polishing the outer diameter portion of the socket **212**. The contact portion of the socket **250**, which comes into contact with the wedge cam **240**, may be polished, such that the friction of the wedge cam **240**, which operates by being in contact with the socket **250**, may be minimized, thereby allowing the wedge cam **240** to operate smoothly.

(52) Next, a process of adjusting an angle of the seatback of the present invention will be described.

(53) As illustrated in FIGS. **9** and **10**, the motor (not illustrated) is operated by an operation of a switch (not illustrated), and the shaft (not illustrated) connected to the motor rotates.

(54) The socket **250** connected to the shaft is rotated by the rotation of the shaft. The push portion **255** rotates as the socket **250** rotates. The wedge cam **240** may be rotated by being pushed by the

push portion 255. The second gear 220 may be rotated by the rotations of the socket 250 and the wedge cam 240.

(55) The first gear 210 rotates in conjunction with the rotation of the second gear 220. As the first gear 210 rotates, an angle of the seatback frame (not illustrated) may be adjusted, such that an angle of the seatback (not illustrated) may be adjusted in conjunction with the adjustment of the angle of the seatback frame.

(56) The present invention may be applied to a powered recliner configured to be automatically operated by power of a motor in response to a switch manipulation.

(57) According to the present invention as described above, the thickness of the body portion of the socket may be increased, and the coupling portion extending from the body portion may be coupled to the center hole of the first gear, such that the supporting force of the socket may be increased, and the load applied to the socket may be dispersed, thereby improving engagement properties between the first and second gears. In addition, according to the present invention, the contact portion of the socket, which comes into contact with the wedge cam, may be polished, thereby minimizing friction of the wedge cam. In addition, the wedge cam may come into contact with and be coupled to the body portion of the socket such that the motion of the wedge cam may be performed at the same time when the shaft is rotated by the operation of the motor.

(58) The above description is simply given for illustratively describing the technical spirit of the present invention, and those skilled in the art to which the present invention pertains will appreciate that various modifications, changes, and substitutions are possible without departing from the essential characteristic of the present invention. Accordingly, the embodiments disclosed in the present invention and the accompanying drawings are intended not to limit but to describe the technical spirit of the present invention, and the scope of the technical spirit of the present invention is not limited by the embodiments and the accompanying drawings. The protective scope of the present invention should be construed based on the following claims, and all the technical spirit in the equivalent scope thereto should be construed as falling within the scope of the present invention.

(59) As described above, the exemplary embodiments have been described and illustrated in the drawings and the specification. The exemplary embodiments were chosen and described in order to explain certain principles of the invention and their practical application, to thereby enable others skilled in the art to make and utilize various exemplary embodiments of the present invention, as well as various alternatives and modifications thereof. As is evident from the foregoing description, certain aspects of the present invention are not limited by the particular details of the examples illustrated herein, and it is therefore contemplated that other modifications and applications, or equivalents thereof, will occur to those skilled in the art. Many changes, modifications, variations and other uses and applications of the present construction will, however, become apparent to those skilled in the art after considering the specification and the accompanying drawings. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention which is limited only by the claims which follow.

Claims

1. A recliner for a vehicle seat, the recliner comprising: a first gear having a center hole defined at a center thereof; a second gear being in contact with an inner portion of the first gear and configured to eccentrically engage with the first gear; a socket having a coupling portion configured to be coupled to the center hole; and a pair of wedge cams disposed between the socket and the second gear and configured to restrain or release the socket and the second gear, wherein the coupling portion extends in a direction from a body portion of the socket to the center hole, the body portion has a first stepped portion defined at one end thereof and directed toward the first gear, and the pair

- of wedge cams are in contact with and coupled to the body portion, wherein the first stepped portion extends on and along a surface of the first gear to a position where the surface of the first gear and a surface of the pair of wedge cams contact each other, such that the surface of the pair of wedge cams is coplanar with the first stepped portion.
2. The recliner of claim 1, wherein the coupling portion comprises: a first coupling portion extending from the body portion and having a smaller outer diameter than the body portion so that the first stepped portion is defined on a boundary between the first coupling portion and the body portion; and a second coupling portion extending from the first coupling portion and having a smaller outer diameter than the first coupling portion so that a second stepped portion is defined on a boundary between the second coupling portion and the first coupling portion.
 3. The recliner of claim 2, wherein the center hole comprises: a first center hole to which the first coupling portion is coupled; and a second center hole to which the second coupling portion is coupled, the second center hole being configured to communicate with the first center hole and having a hole diameter smaller than a hole diameter of the first center hole.
 4. The recliner of claim 1, wherein the socket is formed by sintering or forging.
 5. The recliner of claim 4, wherein an entire surface of the socket or at least a contact portion of the socket, which comes into contact with at least one of the pair of wedge cams, is polished.
 6. The recliner of claim 2, wherein the socket comprises: a wing portion disposed on an outer diameter portion of the body portion and spaced apart from the first stepped portion at an interval; a push portion extending in a direction from one surface of the wing portion toward the first stepped portion; and an assembling portion protruding from another surface of the wing portion.
 7. The recliner of claim 6, wherein the wing portion has a coupling groove, an elastic member is coupled to the assembling portion, and two opposite ends of the elastic member are coupled to insertion grooves defined at ends of the pair of wedge cams, which face each other, through the coupling groove.
 8. The recliner of claim 6, wherein the push portion has an arc shape, and the pair of wedge cams are configured to be rotated by being pushed by the push portion.
 9. The recliner of claim 6, wherein the socket has an inner diameter portion penetrating a center thereof, and the inner diameter portion has an angular structure capable of being coupled with a shaft.
 10. A recliner for a vehicle seat, the recliner comprising: a first gear having a center hole defined at a center thereof; a second gear being in contact with an inner portion of the first gear and configured to eccentrically engage with the first gear; a socket having a coupling portion configured to be coupled to the center hole; and a pair of wedge cams disposed between the socket and the second gear and configured to restrain or release the socket and the second gear, wherein the coupling portion extends in a direction from a body portion of the socket to the center hole, and the body portion has a first stepped portion defined at one end thereof and directed toward the first gear, and wherein the socket comprises: a wing portion disposed on an outer diameter portion of the body portion and spaced apart from the first stepped portion at an interval; a push portion extending in a direction from one surface of the wing portion toward the first stepped portion; and an assembling portion protruding from another surface of the wing portion.
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