



US 20110198907A1

(19) **United States**(12) **Patent Application Publication**
Masunaga et al.(10) **Pub. No.: US 2011/0198907 A1**(43) **Pub. Date: Aug. 18, 2011**(54) **CHAIR**(52) **U.S. Cl. 297/353; 297/451.4**(76) Inventors: **Hiroshi Masunaga**, Yokohama-shi
(JP); **Hisato Fujita**,
Higashiyamato-shi (JP)(21) Appl. No.: **13/124,423**(22) PCT Filed: **Sep. 18, 2009**(86) PCT No.: **PCT/JP2009/066329**§ 371 (c)(1),
(2), (4) Date: **Apr. 15, 2011**(30) **Foreign Application Priority Data**

Oct. 16, 2008 (JP) 2008-267410

Feb. 25, 2009 (JP) 2009-042050

Publication Classification(51) **Int. Cl.**
A47C 3/00 (2006.01)(57) **ABSTRACT**

A chair configured such that a backrest support rod does not make contact with an object when the chair is swiveled and is thus reliably prevented from damaging the object or from being damaged by the object and that the chair uses a reduced number of parts, has a simple structure, and can be easily assembled. A chair, wherein front portions of front facing sections (9b) of a backrest support rod (9) are mounted to a support base (5) supported by a leg body (3) and supporting a seat (7). The backrest support rod (9) is formed in an L-shape in a side view and comprises upwardly facing raised sections (9a) and the forwardly facing front facing sections (9b). The upwardly facing raised sections (9a) and the forwardly facing front facing sections (9b) are connected together through a curved section (9c), and the raised sections (9a) support a backrest (6). A protective cover (11) covers at least that portion of the backrest support rod (9) which extends from the rear surface of the curved section (9c) to the lower surface thereof.

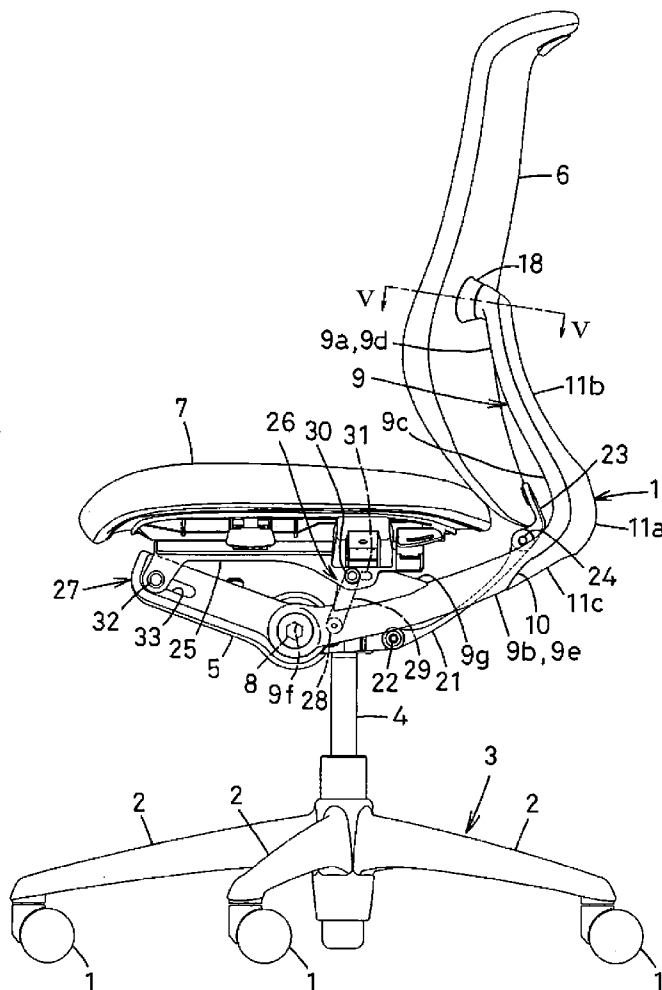


FIG. 1

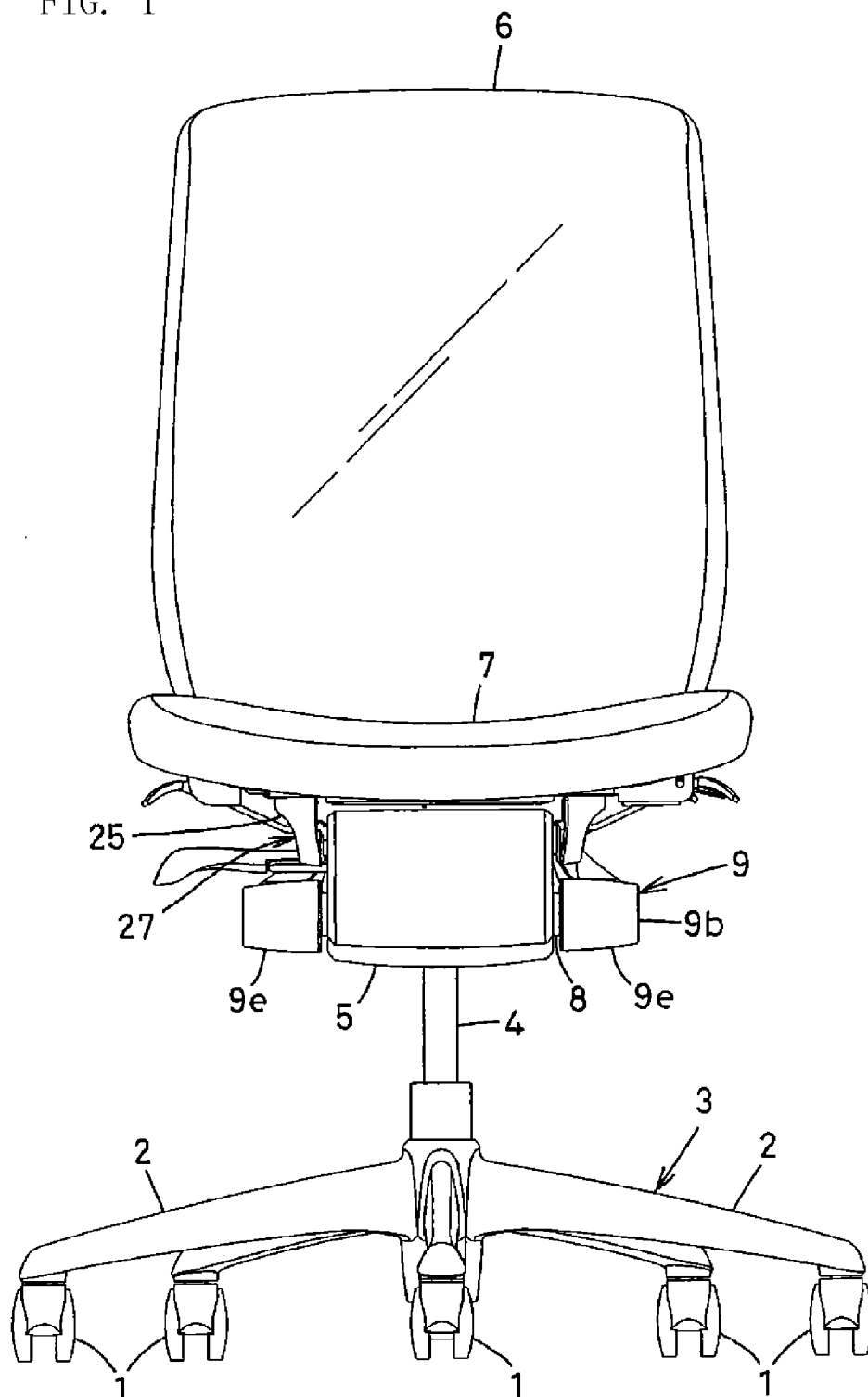
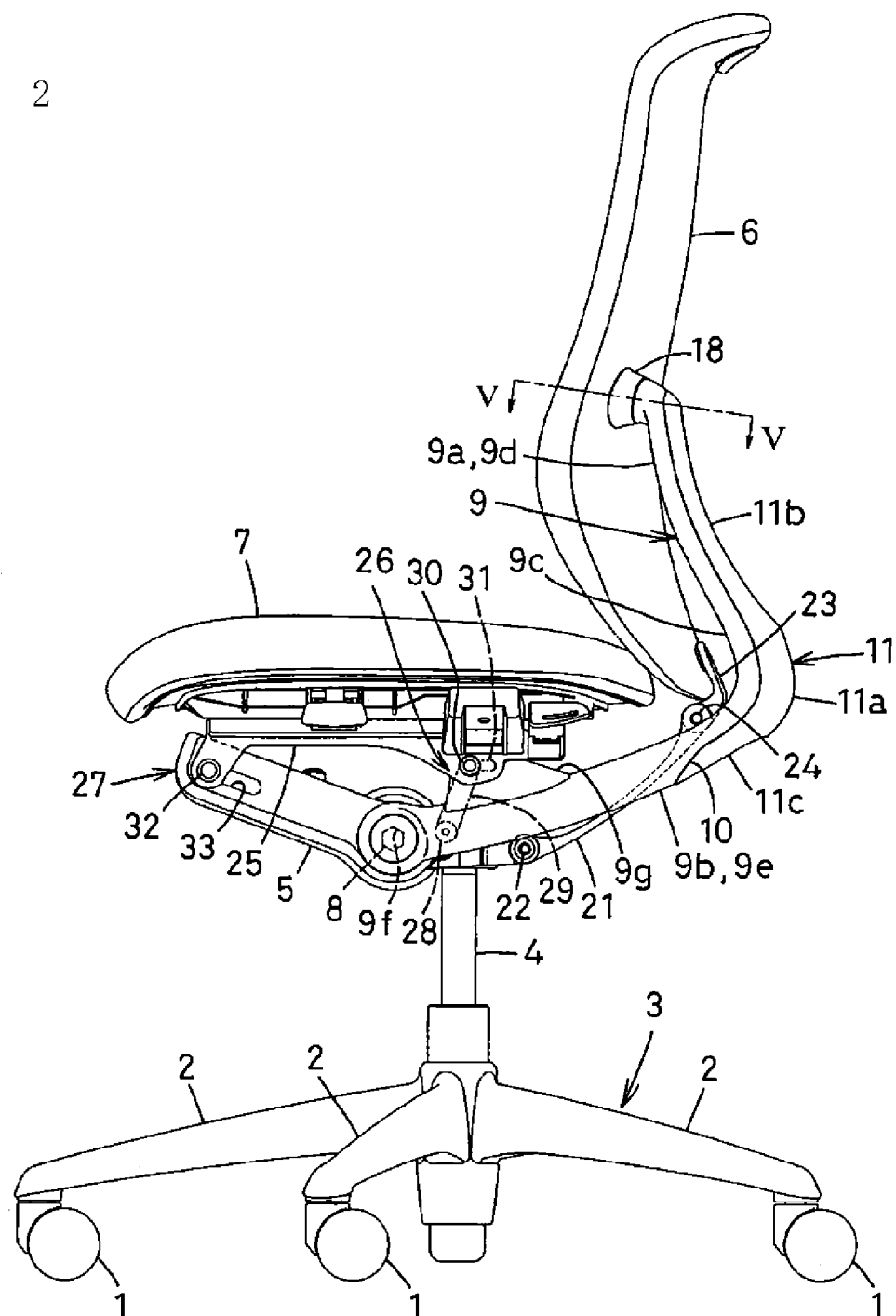


FIG. 2



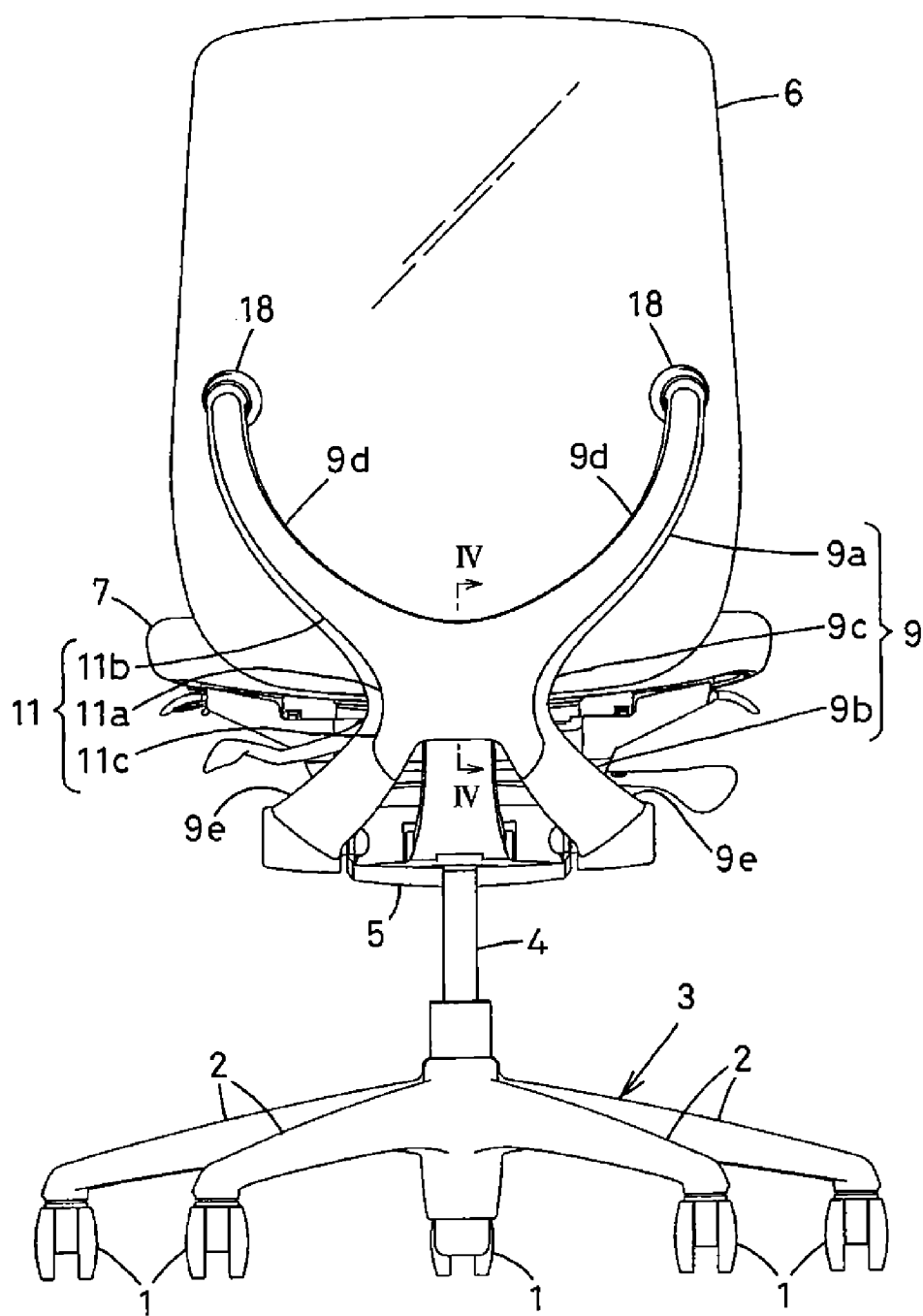


FIG. 4

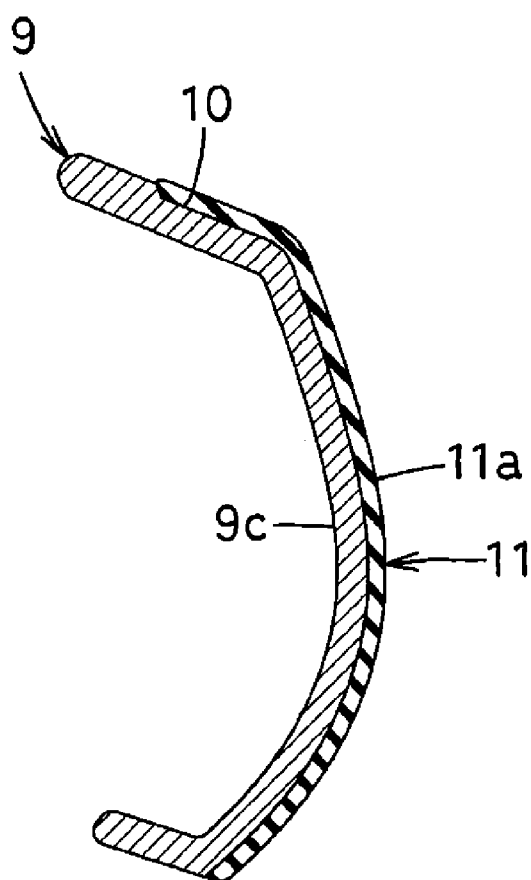


FIG. 5

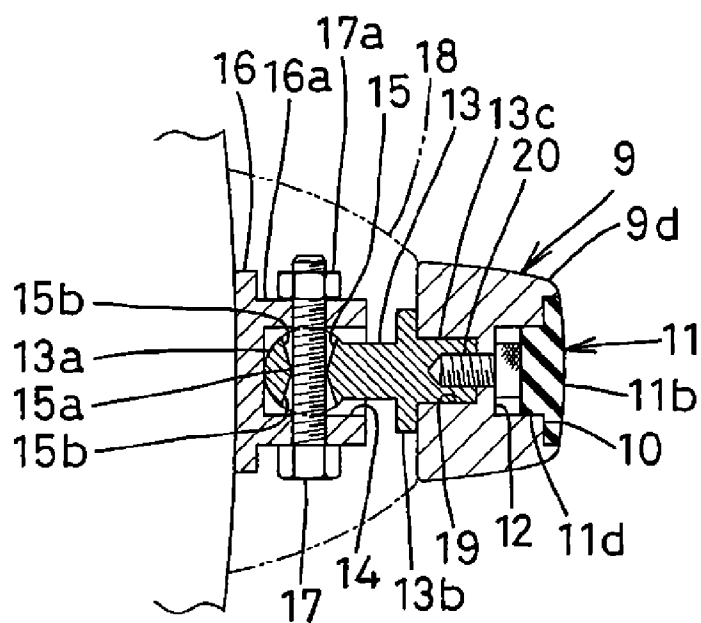


FIG. 6

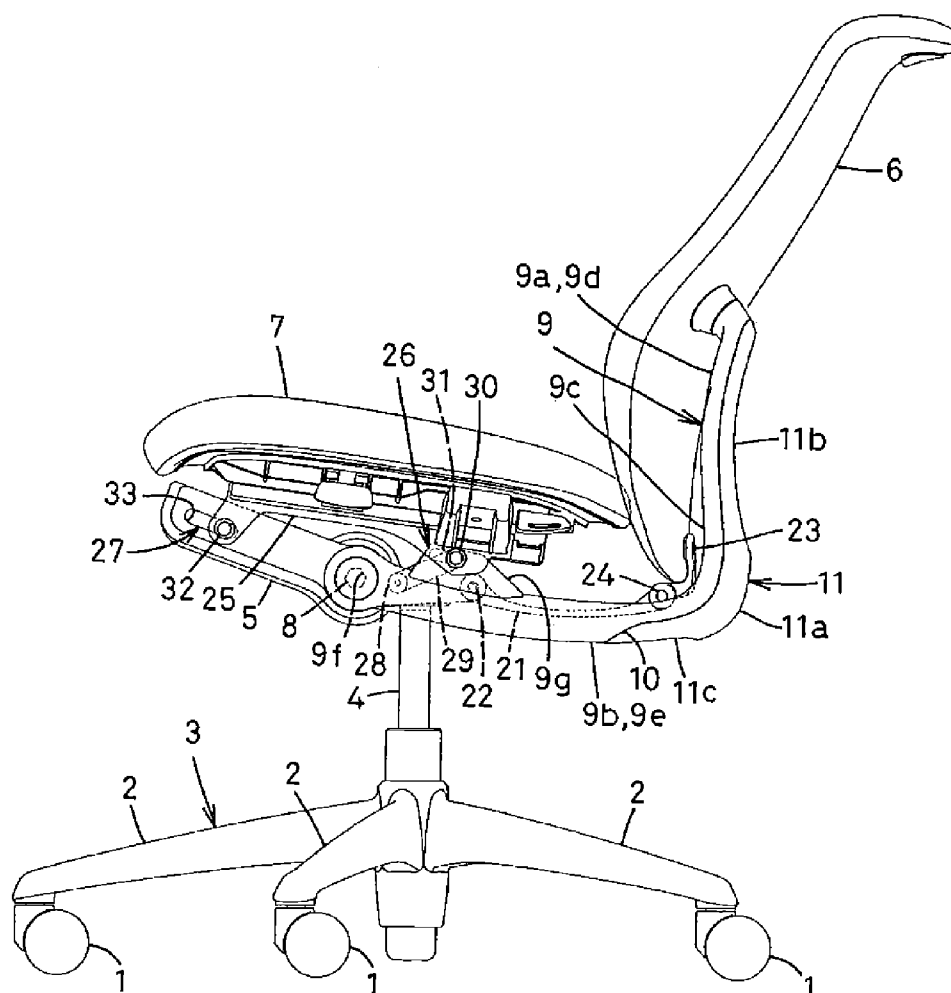


FIG. 7

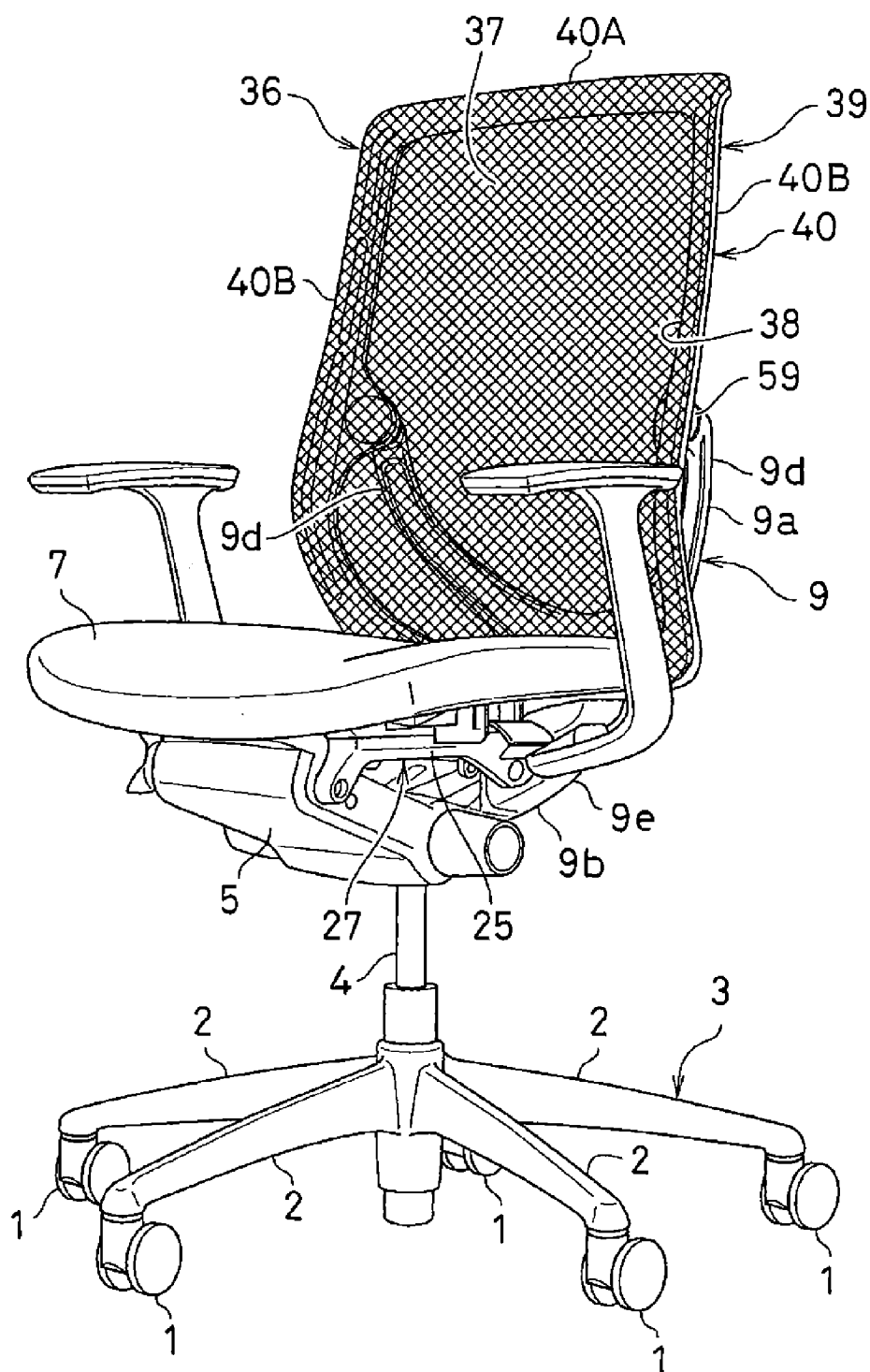


FIG. 8

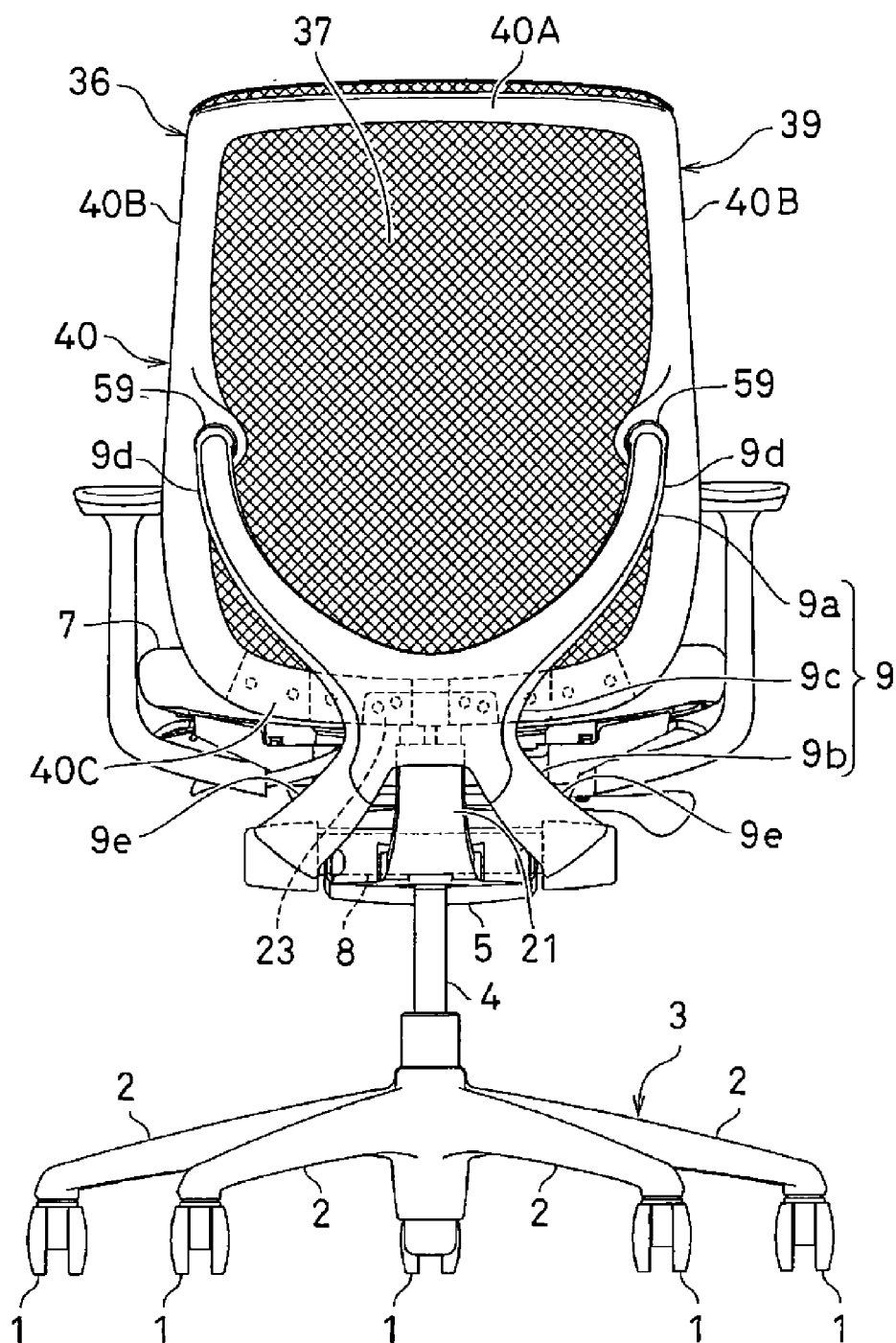


FIG. 9

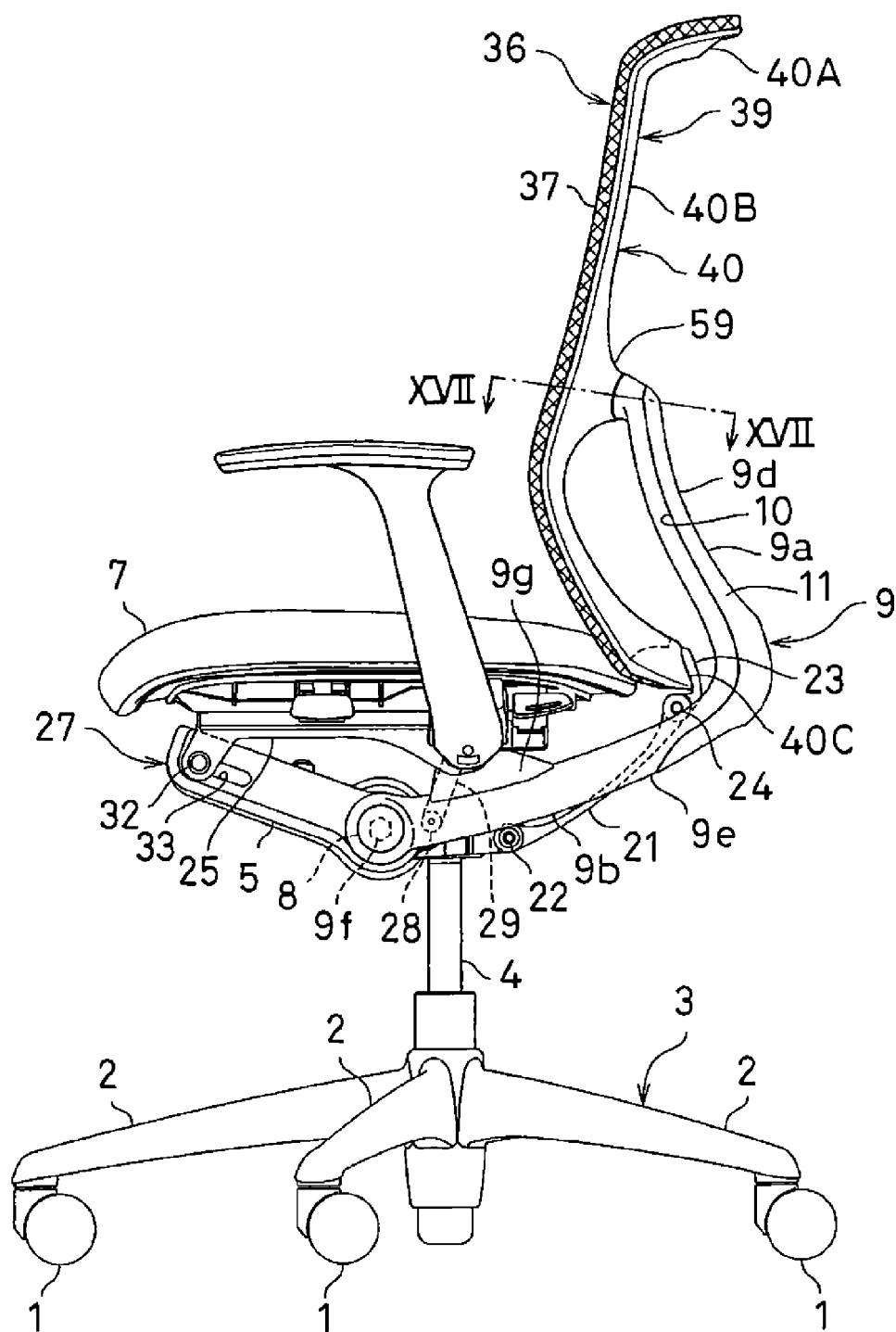


FIG. 10

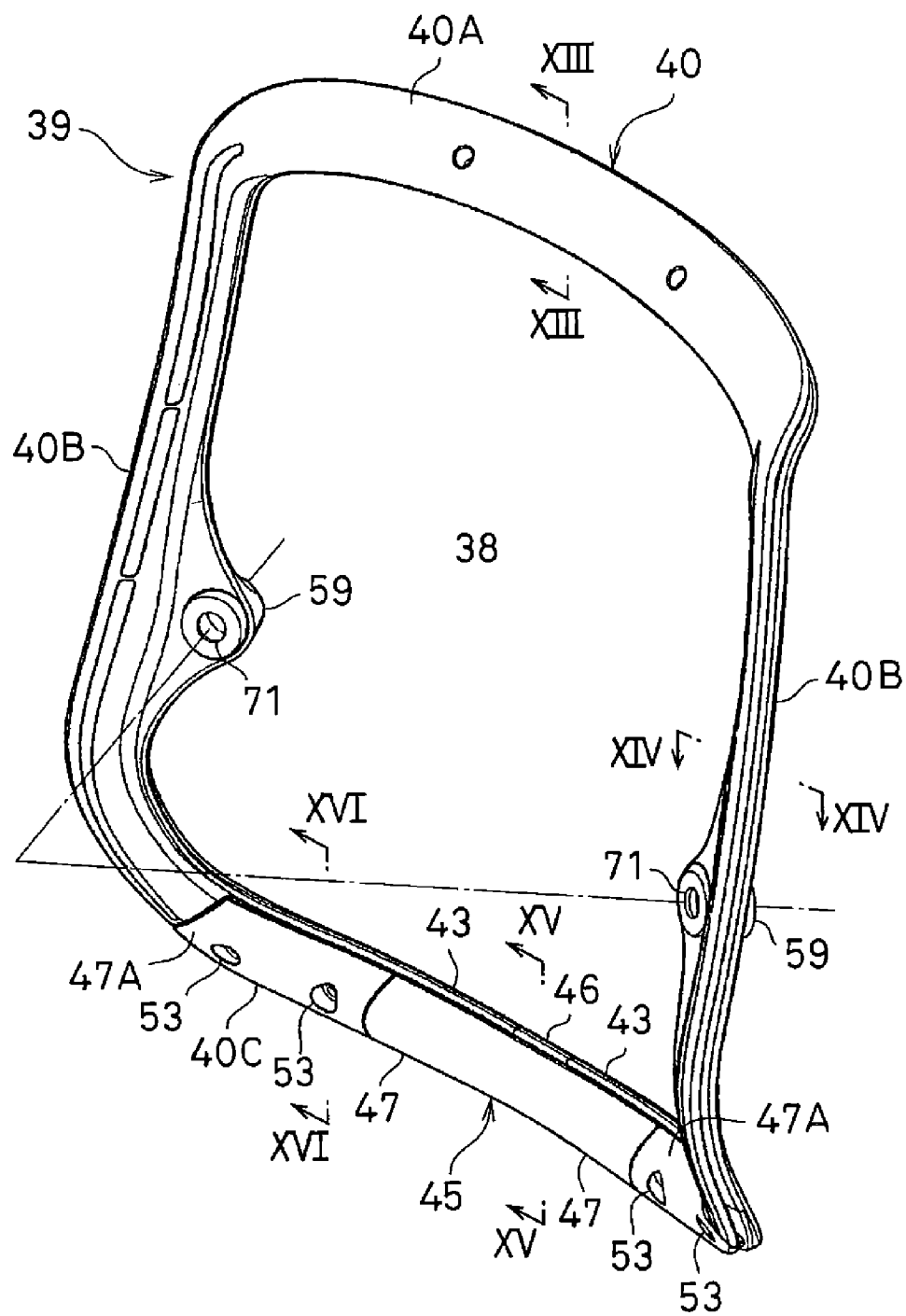


FIG. 11

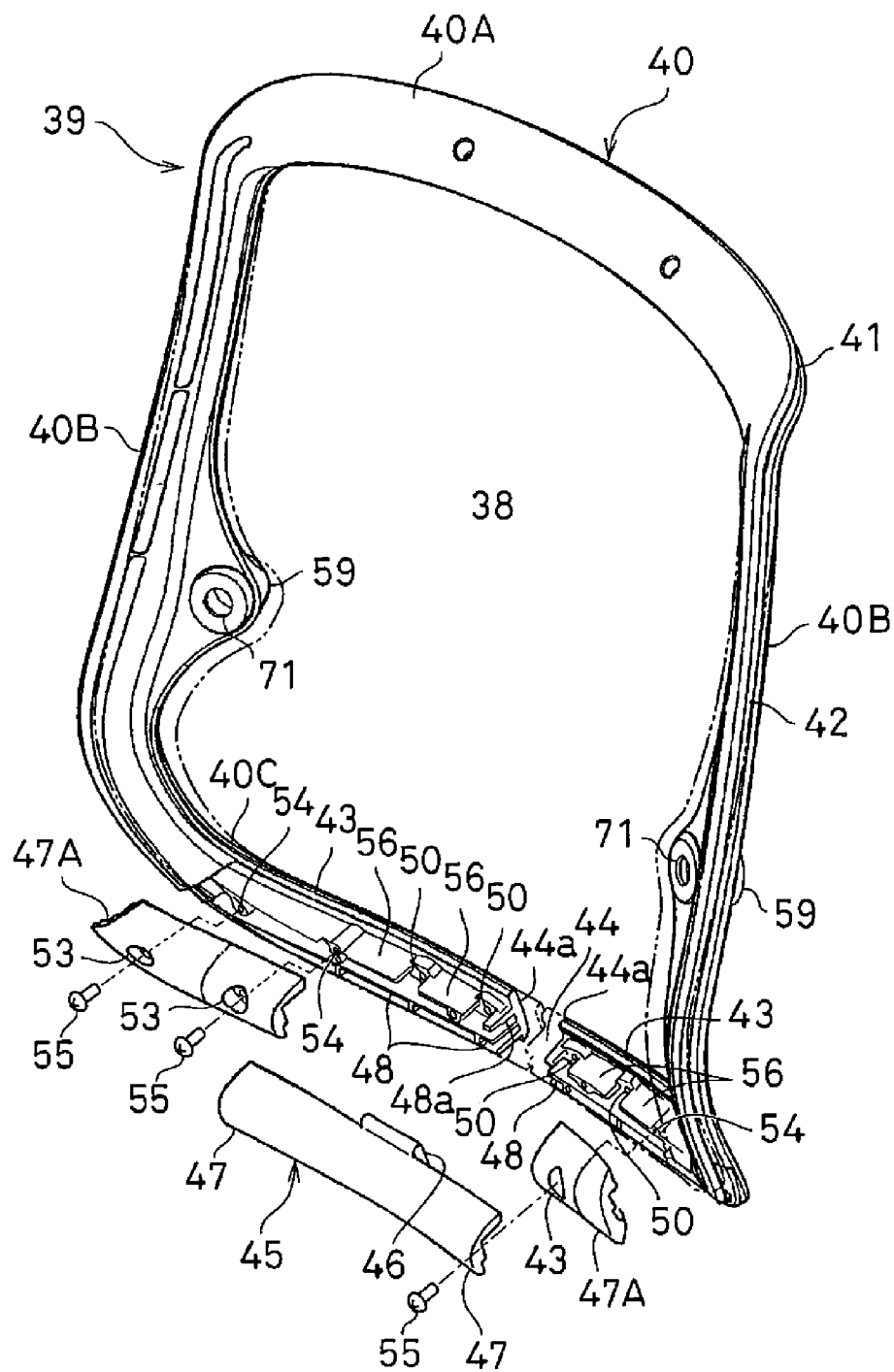


FIG. 12

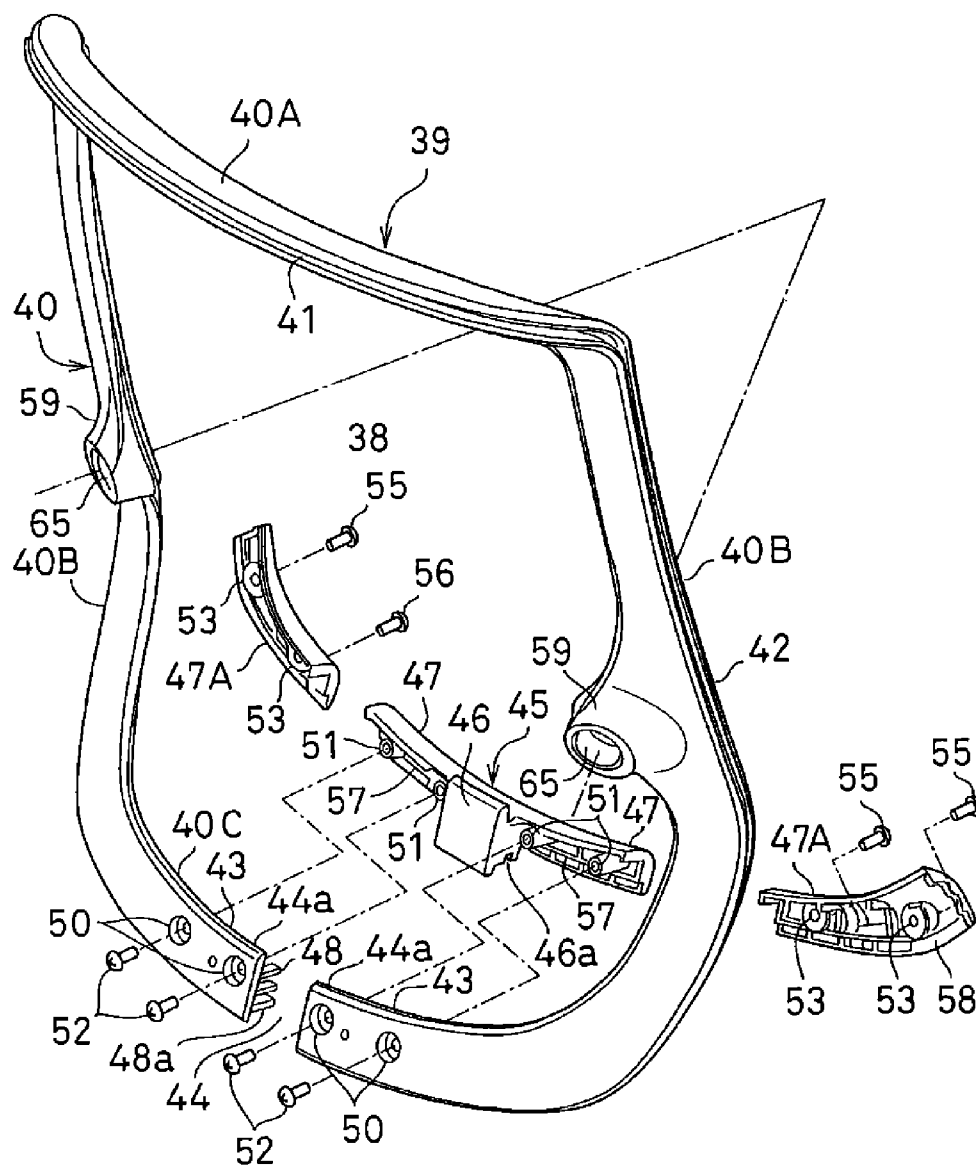


FIG. 13

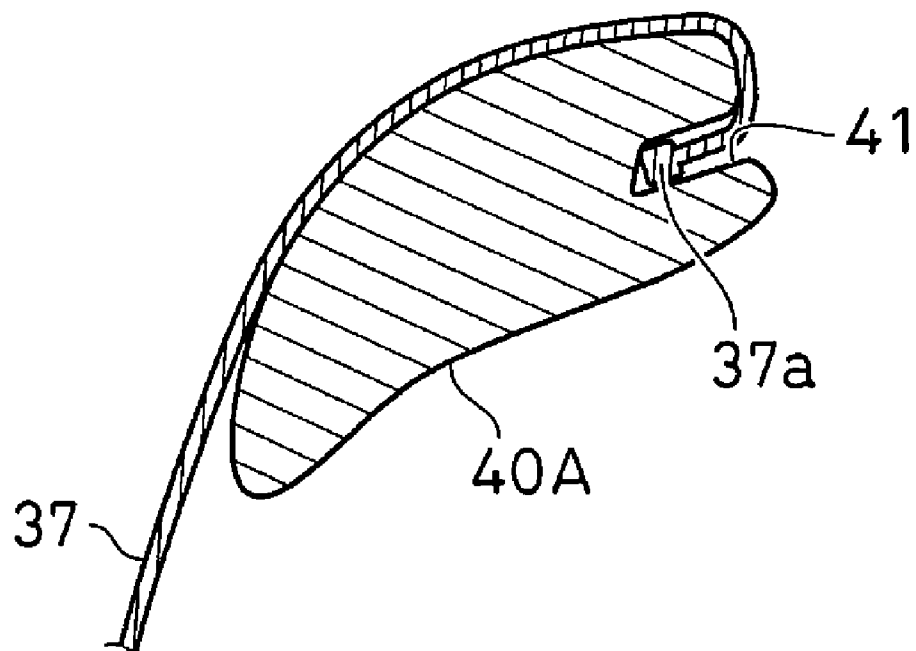


FIG. 14

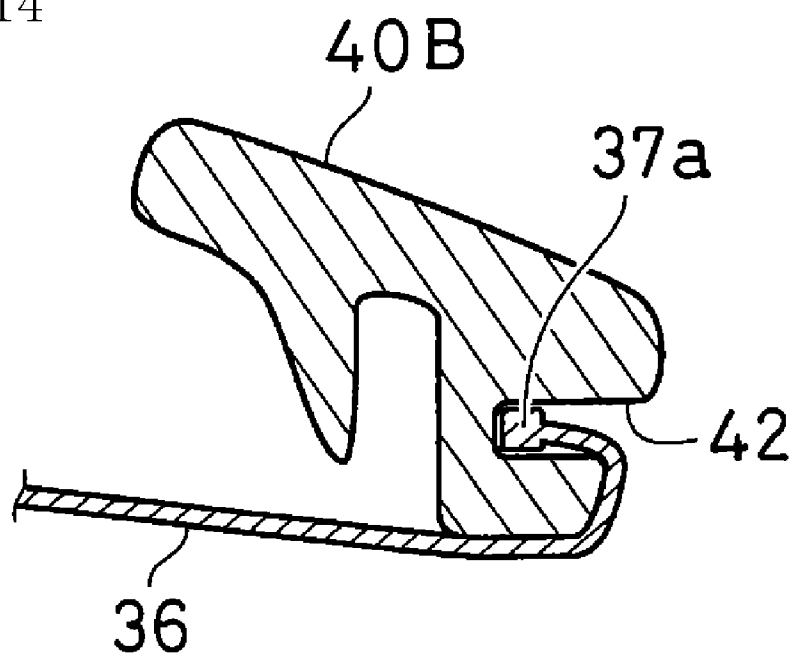


FIG. 15

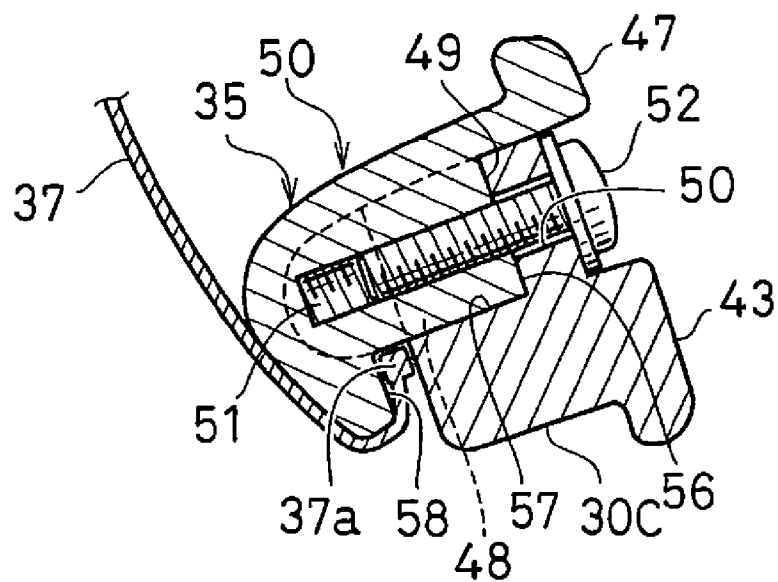


FIG. 16

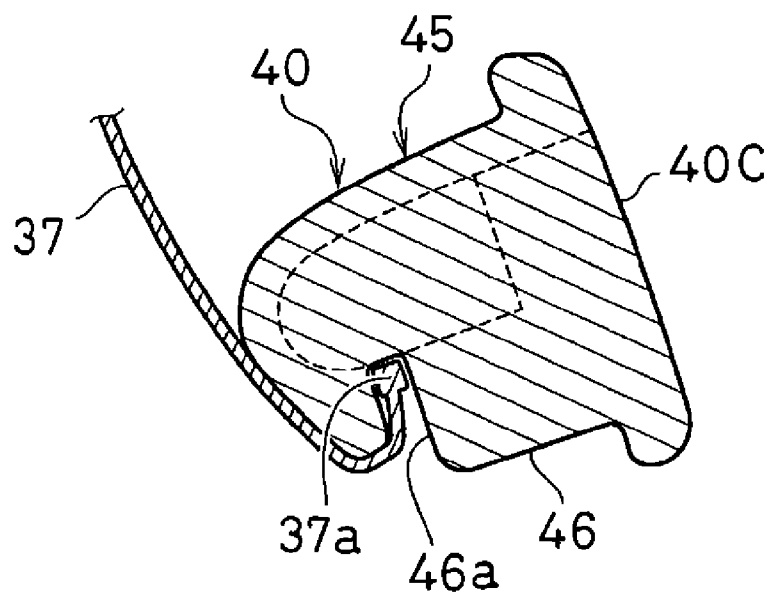


FIG. 17

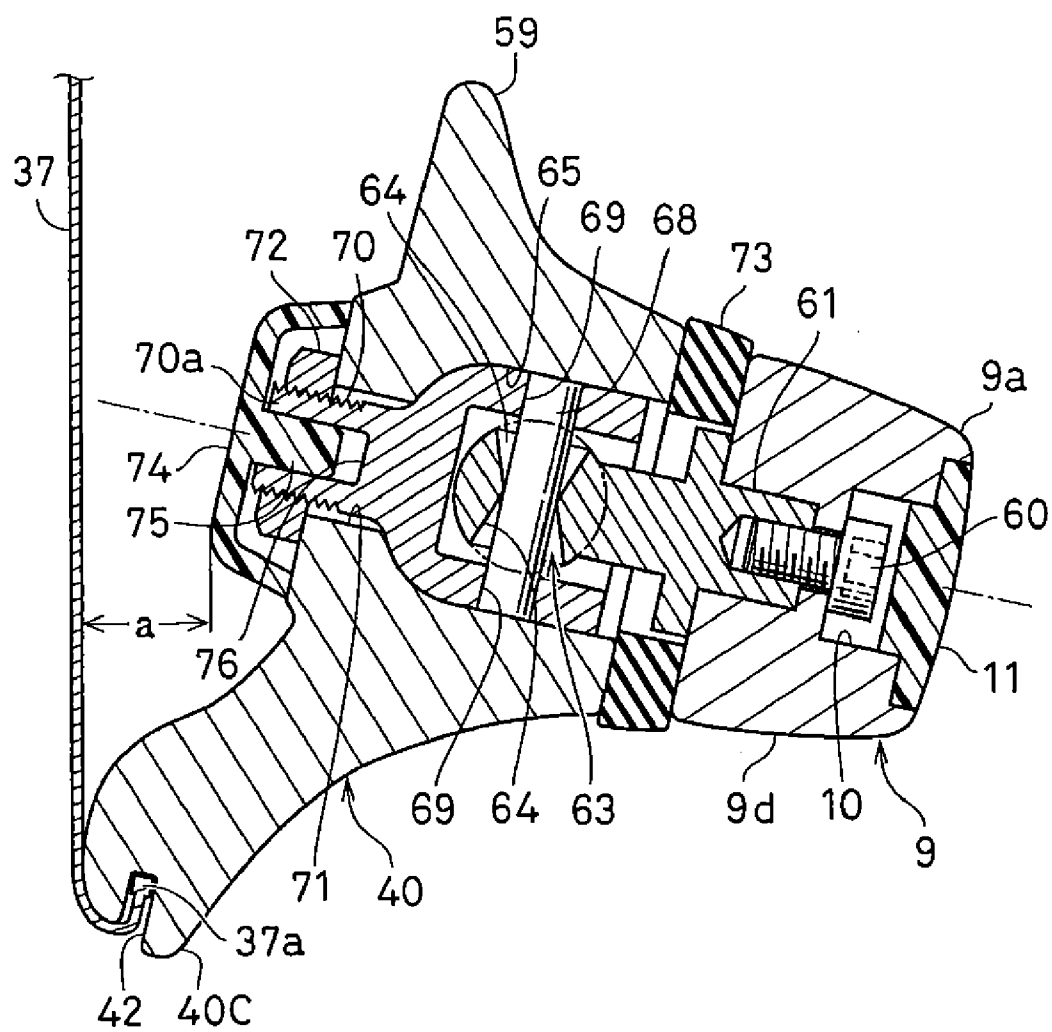
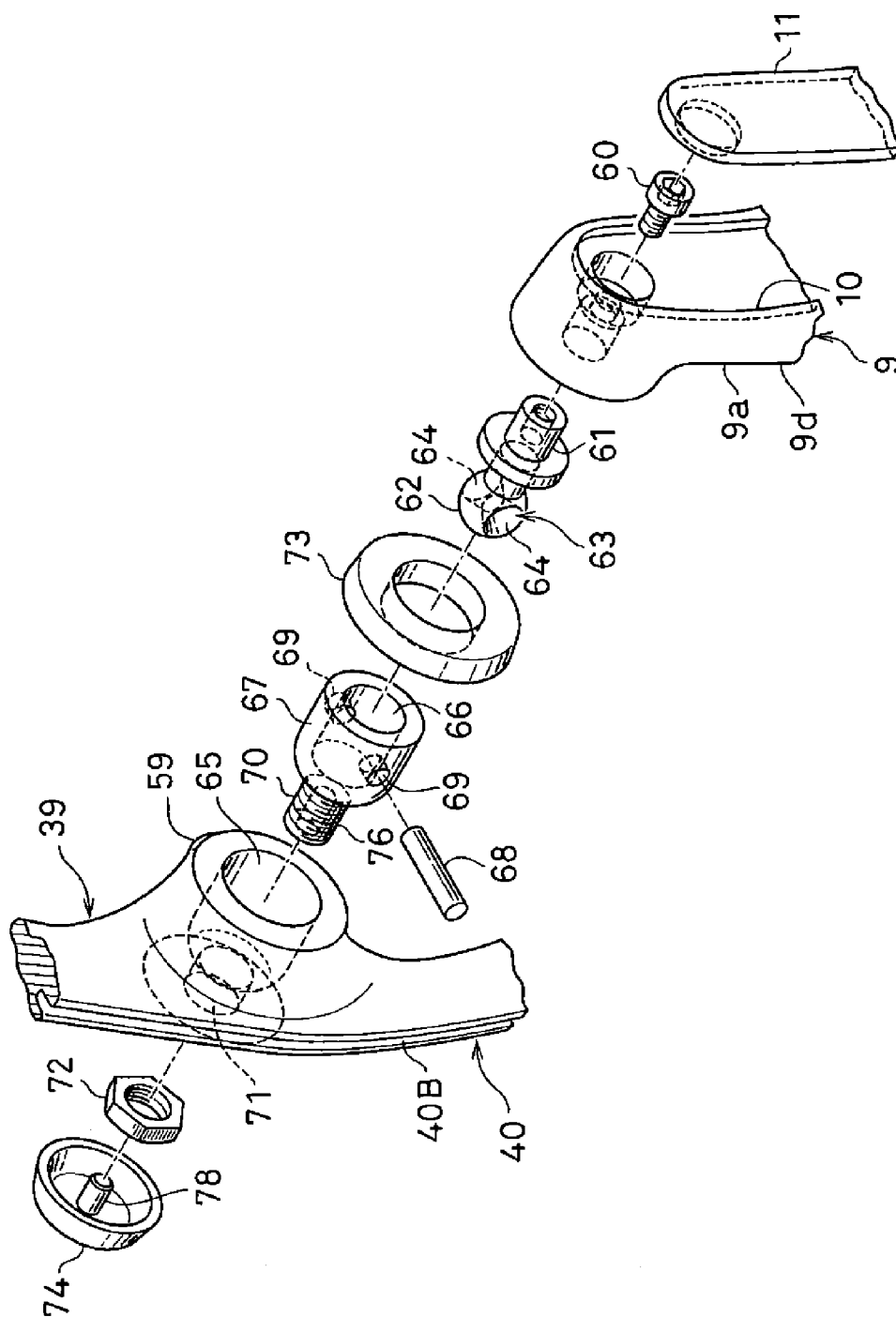


FIG. 18



CHAIR

TECHNICAL FIELD

[0001] The present invention relates to a chair in which a backrest support rod has an “L” shape.

BACKGROUND ART

[0002] A conventional chair comprises an “L”-shaped backrest support rod which comprises a vertical portion and a forward portion via a curved portion. When the chair turns, the backrest support rod comes in contact with something and is likely to damage it or be damaged by it slightly. For example, Patent Literature 1 discloses that the back surface and side are covered with soft material.

[0003] In Patent Literature 2, connection between a leg frame and a back frame is covered with a connection cover in which two covering portions opens and closes with a hinge.

Patent Literature 1: JP2002-136388A

Patent Literature 2: JP2000-14478A

DISCLOSURE OF THE INVENTION

Problems to be Solved by the Invention

[0004] However, in Patent Literature 1, the lower surface of the forward portion of the backrest support rod comes in contact with an upper corner of an object on the floor and is likely to damage it or to be damaged by it slightly. It is necessary to mount the cover for each of a pair of backrest support rods, so that the number of parts increases. It is also inconvenient to mount it.

[0005] In Patent Literature 2, the cover itself becomes complicated in structure and increase costs.

[0006] In view of the disadvantages in the prior art, it is an object to provide a chair that prevents a backrest support rod from damaging something or being damaged thereby slightly if the rod comes in contact with it, the number of parts being reduced, its structure being simplified and readily assembled.

[0007] It is another object of the invention to provide a chair in which a backrest frame for a backrest and a backrest support rod comprise a simple structure and can firmly be connected.

Means for Solving the Problems

[0008] The foregoing problems will be solved by the present invention.

[0009] (1) A chair comprises:

[0010] a leg;

[0011] a support base supported by the leg;

[0012] a seat supported by the support base;

[0013] an L-like backrest support rod comprising a vertical portion, a forward portion and a curved portion between the vertical portion and the forward portion, a front part of the forward portion being mounted to the support base;

[0014] a backrest supported by the vertical portion of the backrest support rod; and

[0015] a protective cover covering at least a part from a rear surface to a lower surface of the curved portion of the backrest support rod.

[0016] When the chair turns, the backrest support rod is likely to come in contact with something. The backrest support rod is prevented from scraping it or being scraped by it slightly. Especially, the lower surface of the forward portion

of the backrest support rod comes in contact with an upper corner. The backrest support rod is prevented from being damaged or from damaging it slightly.

[0017] (2) In the chair of the item (1), the protective cover is made of cushioning material.

[0018] It improves cushioning effect if the backrest support rod comes in contact with something during turning of the chair.

[0019] (3) In the chair of the item (1), the protective cover is made of soft synthetic resin or rubber.

[0020] It improves cushioning effect if the backrest support rod comes in contact with something during turning of the chair.

[0021] (4) In the chair of the item (1), the vertical portion comprises a pair of vertical rods divided from the curved portion upward, the forward portion comprising a pair of forward rods divided from the curved portion forward, the protective cover comprising a curved covering portion, a vertical covering portion and a forward covering portion, the curved covering portion of the protective cover covering the rear surface of the curved portion, the vertical covering portion formed with the curved covering portion to cover a rear surface of each of the pair of vertical rods, the forward covering portion being integrated with the curved covering portion to cover a lower surface of each of the pair of forward rods.

[0022] The backrest can securely be supported only by one backrest support rod. The protective cover may be single, thereby reducing the number of parts, simplifying the structure and achieving easy assembling.

[0023] Furthermore, the protective cover comprises the vertical covering portion for covering the rear surface of the vertical rod and the forward covering portion for covering the lower surface of the forward rod, facilitating positioning of the protective cover.

[0024] (5) In the chair of the item (4), the backrest support rod has an “X” shaped crossed part formed by the vertical portions and the forward portions, a center of the “X” shaped crossed part being covered with the curved covering portion which is wider than each of the pair of vertical rods and/or each of the pair of forward rods and which projects rearward hemispherically.

[0025] The backrest can be supported more securely to keep its balance good. The backrest support rod has no corner in the rear surface thereby avoiding concentration of stress and providing good appearance.

[0026] (6) In the chair of the item (4) or (5), a groove for mounting the backrest is formed in the rear surface of the vertical rod of the backrest support rod, an elastic projection in a front surface of an upper end of each of the vertical covering portions of the protective cover pressingly fitting in the groove.

[0027] The end of the vertical covering portion of the protective cover can be mounted to the backrest support rod securely so as to make it more difficult for the end to be removed. The groove for mounting the backrest is covered, so that good appearance is provided.

[0028] (7) In the chair of the item (1), a gap is formed between a rear surface of the backrest support rod and a front surface of the protective cover, at least part of the protective cover corresponding to the gap being made of elastic material.

[0029] If something comes in contact with the rear surface of part corresponding to the gap of the protective cover, the

protective cover is elastically deformed so that the part comes into the gap, thereby improving cushioning effect of the protective cover.

[0030] (8) In the chair of the item 1, the backrest comprises a backrest frame which comprises an opening in a middle and a frame member in which stretched material is stretched to cover the opening, the backrest frame having a pair of protrusions projecting toward each other.

[0031] The backrest frame of the backrest can easily be molded.

[0032] In reclining, load adding to the backrest frame acts in a direction of curving of the backrest frame following backward inclining of the backrest. The protrusion improves bending strength of the backrest frame.

[0033] Furthermore, the protrusion provides a broad area required to connect the backrest frame to the backrest support rod, so that the backrest frame can be connected to the backrest support rod firmly in simple structure.

[0034] (9) In the chair, the pair of protrusions projects backward.

[0035] The protrusion projects backward thereby improving strength of the backrest frame.

[0036] (10) In the chair of the item (8), a rear surface of the pair of protrusions is mounted to an upper part of the backrest support rod.

[0037] It improves connecting strength between the backrest frame and the backrest support frame.

[0038] (11) In the chair of the item (10), the upper part of the backrest support rod is pivotally mounted to the protrusion via a transverse pivot shaft to turn in all directions within a limited range.

[0039] The backrest which follows motion of an occupant can turn smoothly with respect to the backrest support rod.

[0040] (12) In the chair of the item (11), cushioning material made of soft elastic material is held between the protrusion and the backrest support rod.

[0041] It prevents the connection between the backrest frame and the upper part of the backrest support rod from being worn or damaged if the chair is used for a long time.

ADVANTAGES OF THE INVENTION

[0042] According to the present invention, if the backrest support rod comes in contact with something during turning of the chair, it is securely prevented for the backrest support rod from damaging it or being damaged thereby slightly. It can provide a chair which is simple in structure, reduces the number of parts, and is readily assembled.

[0043] The backrest frame of the backrest can firmly be connected to the backrest support rod in a simple structure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0044] [FIG. 1] A front elevational view of the first embodiment of a chair according to the present invention.

[0045] [FIG. 2] A side elevational view thereof.

[0046] [FIG. 3] A back elevational view thereof.

[0047] [FIG. 4] An enlarged cross sectional view taken along the line IV-IV in FIG. 3.

[0048] [FIG. 5] An enlarged cross sectional view taken along V-V in FIG. 2.

[0049] [FIG. 6] A side elevational view when the backrest support rod is inclined backward.

[0050] [FIG. 7] A perspective view of the second embodiment of a chair according to the present invention.

[0051] [FIG. 8] A back elevational view thereof.

[0052] [FIG. 9] A side elevational view thereof.

[0053] [FIG. 10] An enlarged perspective view of a frame when stretched material is not stretched.

[0054] [FIG. 11] A front explosive perspective view of the frame when the stretched material is not stretched.

[0055] [FIG. 12] A rear perspective view of the frame.

[0056] [FIG. 13] An enlarged cross sectional view taken along the line XIII-XIII in FIG. 10.

[0057] [FIG. 14] An enlarged cross sectional view taken along the line XIV-XIV in FIG. 10 when the stretched material is stretched.

[0058] [FIG. 15] An enlarged cross sectional view taken along the line XV-XV in FIG. 10 when the stretched material is stretched.

[0059] [FIG. 16] An enlarged cross sectional view taken along the line XVI-XVI in FIG. 10 when the stretched material is stretched.

[0060] [FIG. 17] An enlarged cross sectional view taken along the line XVII-XVII in FIG. 9 to show connection between the frame and the backrest support frame.

[0061] [FIG. 18] An exploded perspective view showing connection between the frame and the backrest support frame.

BEST MODE FOR CARRYING OUT THE INVENTION

[0062] Embodiments of the present invention will be described with respect to appended drawings. FIGS. 1-6 show the first embodiment of a chair according to the present invention.

[0063] As shown in FIGS. 1 and 2, the chair comprises a leg 3 which consists of five leg rods 2 radially disposed. Each of the five leg rods 2 has a caster 1 at the end. In the center of the leg 3, a telescopic leg strut 4 having a gas spring (not shown) stands, and the upper end of the leg strut 4 is fixed to the rear part of a support base 5.

[0064] The support base 5 has an opening at the top and is hollow. The opening is covered with a detachable cover (not shown).

[0065] In the support base 5, there is provided forcing means (not shown) for forcing a backrest 6 to stand up and forcing means (not shown) for forcing a seat 7 forward. But they do not relate to the present invention and are not illustrated or described.

[0066] Through the rear part of the support base 5, a hexagonal pivot shaft 8 is disposed to rotate on its own axis. At each end of the pivot shaft 8 from the side walls of the support base 5, the front end of backrest support rod 9 supporting the backrest 6 is fixed to turn together via the pivot shaft 8. The pivot shaft 8 is forced counterclockwise in FIG. 2 or in a direction where the backrest 6 and the backrest support rod 9 rise by forcing means (not shown) such as a torsion coil spring in the support base 5.

[0067] The backrest support rod 9 comprises a vertical portion 9a and a forward portion 9b via a curved portion 9c and has an L-shape. The vertical portion 9a comprises a pair of vertical rods 9d, 9d' divided from the curved portion 9c, and the forward portion 9b comprises a pair of forward rods 9e, 9e' divided from the curved portion 9c. In hexagonal holes 9f, 9f' at the front ends of the pair of forward rods 9e, 9e', each end of the pivot shaft 8 is fixed.

[0068] In FIGS. 3 and 4, right and left vertical rods 9d, 9d' of the backrest support rod 9 extend upward obliquely from the

curved portion 9c. Forward rods 9e, 9e extend forward and downward, so that the backrest support rod 9 is formed like an X as seen from the back. The curved portion 9c is wider than the vertical portion 9d and the forward rod 9e, and the backrest support rod 9 projects rearward like a sphere.

[0069] A continuous shallow groove 10 is formed in the whole surface of the curved portion 9c and the vertical portions 9d, 9d of the backrest support rod 9, and in the rear surface and the lower part of the lower surface of the forward rods 9e, 9e. The groove 10 fits with a protective cover 11 covering the rear surface of the backrest support rod 9. The protective cover 11 is secured with adhesive or fastener to the backrest support rod 8, or screwed, if required.

[0070] The thickness of the protective cover 11 is almost equal to the depth of the groove 10 to make the protective cover 11 coplanar with the backrest support rod 9.

[0071] The protective cover 11 is made of soft synthetic resin, rubber or other cushioning material, and comprises a curved covering portion 11a covering the rear surface of the curved portion 9c of the backrest support rod 9, a vertical covering portion 11b and a forward covering portion 11c covering the lower surface of the forward rod 9e.

[0072] In the rear surface of the upper portion of the vertical portion 9d of the backrest support rod 9, there is formed a groove 12 for mounting the backrest 6. In the groove 12, an elastic projection 11d of a vertical covering portion 11b of the protective cover 11 pressingly fits to allow the protective cover 11 to be joined to the backrest support rod 9 securely, so that the end of the vertical covering portion 11b is unlikely to come off. The groove 12 is covered, so that good appearance can be provided.

[0073] Between the rear surface of the backrest support rod 9 and the front surface of the protective cover 11, there is formed a gap (not shown). The protective cover 11 is made of elastic material at least at part corresponding to the gap. When something comes in contact with the rear surface of the part of the protective cover 11 corresponding to the gap, the part comes into the gap, so that the protective cover 11 is elastically deformed, thereby improving cushioning of the protective cover 11.

[0074] The protective cover 11 is provided in the backrest support rod 9, preventing the backrest support rod 9 from being damaged by or damaging something slightly when the chair turns. The backrest support rod 9 is not scraped or scrapes something on the floor if the lower surface of the forward portion 9b of the backrest support rod 9 comes in contact with it.

[0075] The backrest 6 is curved and made of elastically-deformable soft synthetic resin covered with cushioning material and an external cover (not shown). The backrest 6 can turn around a transverse axis at the upper end of the vertical rods 9d, 9d and around an axis deviated from the transverse axis at a certain angle.

[0076] In order to support the backrest 6 as above, in FIG. 5, a shaft 13 projects from the front surface of the upper end of the vertical rod 9d of the backrest support rod 9. The end of the shaft 13 engages in a hole 14 of a receiver 16 fixed to the rear surface of the backrest 6. An axial hole 15 is formed at the end of the shaft 13, and a bolt 17 fits in the axial hole 15. The bolt 17 is fixed at each end to a tubular portion 16a of the receiver 16.

[0077] The shaft 13 has a spherical end 13a in which an axial hole 15 is formed. The internal diameter of the axial hole

15 is almost equal to the external diameter of the bolt 17 in the middle. The axial hole 15 has tapers 15b, 15b.

[0078] In the embodiment in FIG. 5, 17 denotes the bolt which passes through the tubular portion 16a of the receiver 16 and the axial hole 15 of the spherical end 13a of the shaft 13. A nut 17a fits at the end of the bolt 17, so that the bolt 17 and shaft 13 are prevented from disengaging from the tubular portion 16a and axial hole 15 and from the hole 14 respectively. Instead of the bolt, it may be a pin. And the bolt 17 is disposed transversely, but may be parallel with the rear surface of the backrest slightly inclined. The shaft 13 and the tubular portion 16a are covered with an elastically-deformable cover 18.

[0079] A brim 13b is formed in the middle of the shaft 13 and is in contact with the front surface of the upper end of the vertical rod 9d. A proximal end 13c of the shaft 13 engages in an axial hole 19. With a screw 20 which fits in the groove 12 at the rear surface of the upper end of the vertical rod 9d, the shaft 13 is firmly fixed to the upper end of the vertical rod 9d.

[0080] The hole 14 is corresponding in shape to the spherical end of the shaft 13.

[0081] The shaft 13 may project rearward from the rear surface of the backrest 6, and the hole 14 may be formed in the front surface of the upper end of the vertical rod 9d of the backrest support rod 9 to face the shaft 13.

[0082] With such simple structure where the bolt 17 engages in the axial hole 15 of the shaft 13, the backrest 6 can turn not only around a transverse axis but also in a direction slightly deviating from the axis. Thus, without expensive means such as a ball joint, the backrest 6 provides a chair comfortable to sit in.

[0083] The rear part of the support base 5 is coupled to the lower part of the backrest 6 via a connecting rod 21. When the backrest support rod 9 is inclined backward, the lower part of the backrest 6 is pushed backward with respect to the backrest support rod 9 by the connecting rod 21 which turns backward and downward.

[0084] The support base 5 is coupled to the front end of the connecting rod 21 with a transverse shaft 22, and the rear end of the connecting rod 21 is fixed to the lower end of a metal fitting 23 projecting downward of the backrest 6 with a shaft 24.

[0085] The connecting rod 21 is made of an arcuate rigid body in which center of curvature is positioned above or below the connecting rod 21 and disposed between the forward rods 9e and 9e to make it more difficult for the connecting rod 21 to be seen from outside.

[0086] When the backrest support rod 9 is inclined backward in FIG. 6 in reclining, the connecting rod 21 is inclined backward together. Owing to difference between the center of curvature of the backrest support rod 9 or pivot shaft 8 and the center of curvature of the connecting rod 21 or shaft 22, the lower part of the backrest 6 is pushed backward by the rear end of the connecting rod 21, so that the backrest 6 turns around the bolt 17 in a standing direction opposite to a backward-inclining direction or a turning direction of the backrest support rod 9.

[0087] The rear and front parts of a seat support 25 which adjusts a longitudinal position of the seat 7 are supported on the support base 5 with rear support means 26 and front support means 27 for guiding the rear and front parts to move backward and downward with backward inclining of the backrest support rod 9.

[0088] In the rear support means 26, a link 29 is pivotally mounted via a transverse shaft 30 at the upper end to the rear end of the seat support 25 behind the pivot shaft 8 of the backrest support rod 9 to the support base 5. The link 29 is pivotally mounted at the lower end via a transverse shaft 28. The shaft 30 at the upper end of the link 29 moves in a slot 31 behind the shaft 28 of the link 29 in the forward rod 9e of the backrest support rod 9.

[0089] The slot 31 is formed in an upward projection 9g slightly behind the hexagonal hole 9f of the forward rod 9e of the backrest support rod 9.

[0090] In the front support means 27, a transverse shaft 32 at the front end of the seat support 25 moves in a slot 33 of the support base 5.

[0091] The shaft 32 is always forced forward by forcing means (not shown) in the support base 5.

[0092] Instead of the front support means 27, as described in Patent Literature 1, the upper end of an upward support link in the front of a support base may be coupled to the front of a seat, so that the support link is inclined backward. (not shown)

[0093] As mentioned above, in the chair, when an occupant sits back against the backrest 6, the backrest 6 is elastically deformed such that the middle projects backward from the sides. The elastic deformation of the backrest 6 is allowed by slightly inclining the bolt 17 in the axial hole 15 of the shaft 13.

[0094] Together with the backrest 6, the backrest support rod 9 is inclined backward against force of the forcing means in the support base 5, so that the connecting rod 21 is inclined backward around the shaft 22.

[0095] The connecting rod 21 is inclined backward faster than the backrest support rod 9. The shaft 22 of the connecting rod 21 is positioned behind the pivot shaft 8 of the backrest support rod 9. Thus, the lower end of the backrest 6 is pushed backward of the shaft 24 at the rear end of the connecting rod 21. The backrest 6 turns around a transverse axis or the bolt 17 perpendicular to the backrest support rod 9 in a standing direction opposite to a turning direction or backward-inclining direction of the backrest support rod 9.

[0096] In reclining, even when the backrest support rod 9 is inclined backward, the backrest 6 is prevented from inclining backward and kept in an upright position. While the occupant sits in a backward-inclined comfortable position, one can naturally turn one's eyes and arms forward and downward and can type on the keyboard in a suitable position.

[0097] Furthermore, to a conventional chair basic structure, the simple structure in which the support base 5 is connected to the lower part of the backrest 6 via the connecting rod 21 is added. One can type on the keyboard in a suitable position. It is not necessary to construct a longitudinally bendable backrest or provide the backrest supported by complicated structure. So the chair itself can be simplified.

[0098] With backward inclining of the backrest support rod 9, the shaft 30 moves backward and downward through the slot 31 of the upward projection 9g to make the link 29 inclined backward.

[0099] The link 29 is inclined backward faster than the backrest support rod 9. The shaft 28 of the link 29 is positioned behind the pivot shaft 8 of the backrest support rod 9. The shaft 30 moves backward larger than the slot 31 of the backrest support rod 9 and moves backward through the slot 31. By the motion of the shaft 30, the rear part of the seat support 25 is moved backward and downward.

[0100] When the backrest support rod 9 is inclined backward, the seat 7 moves backward greatly. When the backrest support rod 9 inclines backward, the lower part of the backrest 6 is pushed back by the rear end of the connecting rod 21. Then, the rear part of the seat 7 is moved backward greatly, preventing the lower end of the backrest 6 from leaving the rear part of the seat 7 and achieving a comfortable position to sit in.

[0101] When the rear part of the seat support 25 moves backward and downward with the shaft 30, the front part of the seat support 25 is moved backward and downward smoothly against force of the forcing means in the support base 5 by moving the shaft 32 along the slot 33 backward and downward.

[0102] When the backrest support rod 9 inclines backward, the lower end of the backrest 6 is pushed back by the connecting rod 21, so that the backrest 6 turns with respect to the backrest support rod 9 to keep its upright position. Following motion of the lower part of the backrest 6, the seat 6 moves greatly backward and downward. The occupant turns one's eyes and arms forward and downward naturally and can type on the keyboard in a suitable position.

[0103] FIGS. 7 to 18 shows the second embodiment of a chair according to the present invention.

[0104] The same numerals are allotted to the same or similar members as those in the first embodiment and are not described.

[0105] In the first embodiment, the backrest 6 is made of elastically deformable soft synthetic resin or those with cushioning material and skin. In the second embodiment, a backrest 36 comprises a mesh.

[0106] In FIGS. 10-12, the backrest 36 comprises mesh-like stretched material 37 and a backrest frame 39 which covers an opening 38 with the stretched material 37.

[0107] The frame 39 is made of synthetic resin and comprises rectangular main frame 40 comprising a horizontal upper frame 40A, a pair of vertical side frames 40B, 40B that is inclined backward and a horizontal lower frame 40C.

[0108] In FIG. 13, the upper frame 40A of the main frame 40 has an arcuate front surface and a cross section which gets thicker backward. The upper frame 40A has a transverse engagement groove 41 in which an edge 37a at the periphery of the stretched material 37 fits.

[0109] In FIG. 14, the side frame 40B has a cross section which gets thinner toward the opening 38, and has an engagement groove 42 in which the edge 37a of the stretched material 37 fits. The engagement groove 42 communicates with the engagement groove 41.

[0110] In FIGS. 11 and 12, the lower frame 40C comprises two portions in a direction of thickness except part of the lateral ends. One of the two portions is a basic portion 43 at the rear side. The middle of the basic portion 43 is partially cut away to form a space 44 between facing ends 44a, 44a which is coupled by a coupling frame 45 covering the basic portion 43.

[0111] On the middle of the coupling frame 45, a fitting portion 46 projects backward and fits in the space 44. The fitting portion 46 has almost the same distance as that between the facing ends 44a and 44a in the initial state of the main frame 40.

[0112] The connecting rod 21 is pivotally mounted at the rear end to the metal fitting 23 via the shaft 24 at the lower end of the frame 39 of the backrest 36. The metal fitting 23 is fixed to the rear surface of the basic portion 43 over between the facing ends 44a and 44a of the space 44.

[0113] In reclining of the backrest 36, the basic portion 43 can elastically be deformed against load by the connecting rod 21 to the middle of the rear surface of the basic portion via the metal fitting 23.

[0114] The coupling frame 45 has a pair of fixing portions 47, 47 spreading from each side of the fitting portion 46 to the front surface of the facing ends 44a, 44a of the space 44 of the basic portion 43.

[0115] The rear surface of the fixing portion 47 is in contact with the front surface of the facing ends 44a, 44a of the space 44 over between the facing ends 44a and 44a of the space 44 and is fixed on the front surface of the basic portion 43.

[0116] The lower frame 40C comprises the basic portion 43 and the coupling frame 45 connected to each other, and has a thick cross section having hollow part. A plurality of ribs 48, 49 projects longitudinally of the chair in the hollow part.

[0117] The side of the rib 49 along the space 44 of the basic portion 43 acts as a contact portion 48a being in contact with the end face of the fitting portion 46.

[0118] A bolt-passing hole 50 is formed close to the rib 48 of the basic portion 43. Close to the rib 49 on the fixing portion 47 of the coupling frame 45, a plurality of female-thread holes 51 is formed at each side of the fitting portion 46.

[0119] In FIG. 15, a bolt 52 engages in the female-thread hole 51 through the bolt-passing hole 50. With the bolt 52, the fixing portion 47 of the coupling frame 45 is fixed to the basic portion 43.

[0120] The fixing portion 47 of the coupling frame 45 is divided to form a divided portion 47A in which a plurality of bolt-passing holes 53 is formed. A bolt 55 is inserted through the bolt-passing hole 53 into a female-thread hole 54, so that the divided portion 47A is fixed to the front surface of the basic portion 43.

[0121] By dividing the fixing portion 47 of the coupling frame 45, when the backrest 36 is inclined backward, the basic portion 43 is easily deformed against load applying to the middle of the rear surface of the basic portion 43 and stress is dispersed. And the basic portion 43 increases allowable range in machining precision.

[0122] Close to the female-thread hole 51 of the coupling frame 45, there is a projecting portion 56 which engages with a step 57 close to the bolt-passing hole 50 of the basic portion in coupling.

[0123] On the rear surface of the coupling frame 45, a stepped portion 58 is formed and faces the front surfaces of the facing ends 44a, 44a of the space 44 of the basic portion 43 to communicate with the engagement groove 42 of the side frame 40B and an engagement groove 46a on the lower surface of the fitting portion 46. The edge 37a of the stretched material 37 engages with the stepped portion 58.

[0124] The edge 37a of the stretched material 37 wraps from the front surface backward around the main frame 40 on the engagement grooves 41, 42 and the stepped portion 58 on the periphery of the main frame 40, so that the stretched material 37 spreads over the front surface to cover the opening 38 of the frame 39.

[0125] Accordingly, the stretched material 38 is stretched over the whole front surface of the frame 39, thereby providing good impression in appearance.

[0126] The stretched material 37 may be high-tension plastic fibers or other elastic fibers knitted or woven like a net or mesh. Alternatively it may be made of fabrics, synthetic resin sheet or porous sheet.

[0127] Then, how to stretch the stretched material 37 over the frame 39 will be described.

[0128] First, the coupling frame 45 is removed from the main frame 40 while the divided portion 47A of the fixing portion 47 remains in the basic portion 43. As shown by a dot-dash line in FIG. 11, the side frames 40B, 40B of the main frame 40 is elastically deformed against their elastic forces to enable the facing ends 44a, 44a to approach each other.

[0129] The stretched material 37 is wound around the periphery of the main frame 40 from the front to the back to allow the edge 37a of the stretched material 37 to engage in the engagement grooves 41, 42, 46a in the periphery of the frame 40, so that the stretched material 37 is mounted to the periphery of the main frame 40.

[0130] Then, the side frames 40B of the main frame 40 is widened by elastic returning force to the initial state. While additional tension is applied to the stretched material 37, the basic portion 43 is mounted to the front surface of the basic portion 43. The engagement portion 46 of the coupling frame 45 comes in contact with the contact portions 48a of the facing ends 44a, 44a. The fixing portions 47, 47 of the coupling frame 45 is mounted to the lower frame 40C with the bolts 52 to allow the facing ends 44a, 44a of the space 44 to be coupled to each other.

[0131] Without complicated machining, the stretched material 37 can efficiently be stretched, and tension of the stretched material can uniformly held all over the frame.

[0132] To mount the coupling frame 45 to the front surface of the basic portion 43, a downward nail is provided on the upper edge and the divided portion 47A, and an upward nail is provided on the lower edge of the rear of the rear surface of the fixing portion 47 thereby effectively preventing the basic portion 43 from sliding off vertically.

[0133] The upper part of the backrest support rod 9 is pivotally mounted to the rear part of the frame 39.

[0134] As shown in FIG. 10, a pair of protrusions 59 projects toward the opening 38 in the middle of the height of the side frames 40B of the main frame 40.

[0135] In FIG. 8, to the rear end of the protrusion 59, the upper end of the vertical rod 9d of the backrest support rod 9 is pivotally coupled substantially around a transverse axis and around slightly different direction from the axis, following reclining of the backrest 36.

[0136] The protrusions 59 have axes which meet each other forward in conformity with the concave shape of the frame 39 in FIGS. 10 and 12 and tilt forward and upward in conformity with an inclination angle of the frame 39 in FIG. 9.

[0137] In FIGS. 17 and 18, in the upper end of the vertical rod 9d of the backrest support rod 9, the shaft 61 is fixed with a screw 60. At the front end of the shaft 61, a sphere 61 has a transverse axial hole 63.

[0138] The axial hole 63 has taper portions 44, 46 which narrow toward a center of the sphere.

[0139] A protrusion 59 of the side frame 40B has an engagement hole 65 through which a receiving tube 67 having a receiving hole 66 fits.

[0140] The sphere 62 of the shaft 61 is in sliding contact with the receiving hole 66 of the receiving tube 67. A pin 68 is inserted in the axial hole 63, and the ends of the pin 68 engages in engagement holes 69 to allow the shaft 61 to be coupled with the receiving tube 67.

[0141] A bolt shaft 70 projects at the front end of the receiving tube 67. The bolt shaft 70 projects through a through hole 71 of the engagement hole 65 of the protrusion 59. A project-

ing end 70a engages with a nut 72 to allow the receiving tube 67 to be fixed in the engagement hole 65 of the protrusion 59 firmly.

[0142] The upper end of the vertical rod 9d of the backrest support rod 9 is coupled to the rear end of the protrusion 59 to turn around an axis of the pin 68 and around slightly different direction.

[0143] Between the front surface of the upper end of the vertical rod 9d and the rear end face of the protrusion 59, cushioning material 73 made of soft elastic material such as elastomer is held.

[0144] The cushioning material 73 prevents a connection between the frame 39 and the backrest support rod 9 from being worn or damaged.

[0145] A cap 74 covers a connection the nut 72 and the projecting shaft 70a of the bolt shaft 70 to prevent exposing to outside.

[0146] A fixing rod 75 pressingly fits in a fixing hole 76 in the bolt shaft 70 to allow the cap 74 to be mounted to the front surface of the protrusion 59.

[0147] A gap "a" is formed between the front surface of the cap and the rear surface of the stretched material 37. When the backrest 36 is reclined, even if the stretched material 37 is bent backward by the back of the occupant, the gap "a" prevents the backrest from coming in contact with the cap 74. The elastically-deformed cap 74 provides cushioning.

[0148] The present invention is not limited to the embodiments. Various modifications may be made.

1. A chair comprising:
 - a leg;
 - a support base supported by the leg;
 - a seat supported by the support base;
 - an L-like backrest support rod comprising a vertical portion, a forward portion and a curved portion between the vertical portion and the forward portion, a front part of the forward portion being mounted to the support base;
 - a backrest supported by the vertical portion of the backrest support rod; and
 - a protective cover covering at least a part from a rear surface to a lower surface of the curved portion of the backrest support rod.
2. The chair of claim 1 wherein the protective cover is made of cushioning material.
3. The chair of claim 1, wherein the protective cover is made of soft synthetic resin or rubber.
4. The chair of claim 1, wherein the vertical portion comprises a pair of vertical rods divided from the curved portion and extending upward, the forward portion comprising a pair

of forward rods divided from the curved portion forward, the protective cover comprising a curved covering portion, a vertical covering portion and a forward covering portion, the curved covering portion of the protective cover covering the rear surface of the curved portion, the vertical covering portion formed with the curved covering portion to cover a rear surface of each of the pair of vertical rods, the forward covering portion being integrated with the curved covering portion to cover a lower surface of each of the pair of forward rods.

5. The chair of claim 4, wherein the backrest support rod has an "X" shaped crossed part formed by the vertical portions and the forward portions, a center of the "X" shaped crossed part being covered with the curved covering portion which is wider than each of the pair of vertical rods and/or each of the pair of forward rods and which projects rearward hemispherically.

6. The chair of claim 4, wherein a groove for mounting the backrest is formed in the rear surface of the vertical rod of the backrest support rod, an elastic projection in a front surface of an upper end of each of the vertical covering portions of the protective cover pressingly fitting in the groove.

7. The chair of claim 1, wherein a gap is formed between a rear surface of the backrest support rod and a front surface of the protective cover, at least part of the protective cover corresponding to the gap being made of elastic material.

8. The chair of claim 1, wherein the backrest comprises a backrest frame which comprises an opening in a middle and a frame member in which stretched material is stretched to cover the opening, the backrest frame having a pair of protrusions in a middle of its height, the pair of protrusions projecting each other.

9. The chair of claim 8, wherein the pair of protrusions projects backward.

10. The chair of claim 8, wherein a rear surface of the pair of protrusions is mounted to an upper part of the backrest support rod.

11. The chair of claim 10, wherein the upper part of the backrest support rod is pivotally mounted to the protrusion via a transverse pivot shaft to turn in all directions within a limited range.

12. The chair of claim 11, wherein cushioning material made of soft elastic material is held between the protrusion and the backrest support rod.

* * * * *