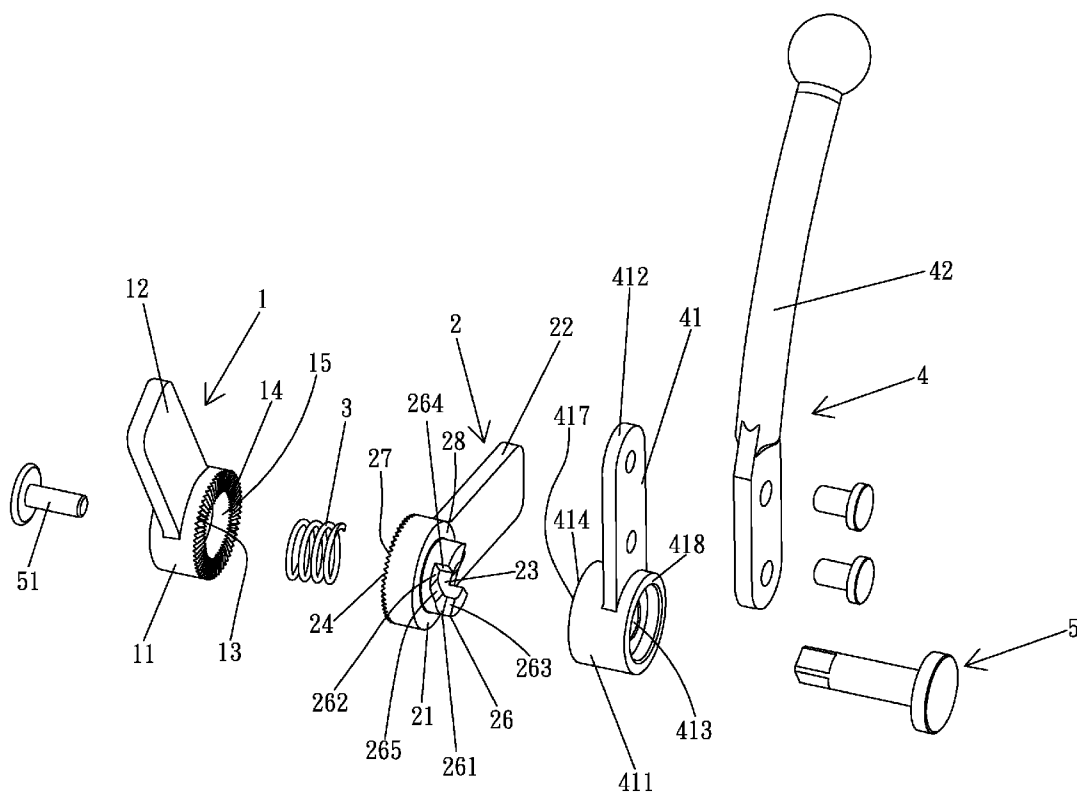




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(19) **United States**(12) **Patent Application Publication**  
**Lin**(10) **Pub. No.: US 2013/0313878 A1**(43) **Pub. Date: Nov. 28, 2013**(54) **ANGLE ADJUSTING/POSITIONING DEVICE  
FOR A BACKREST OF A CHAIR**(76) Inventor: **Chang Chen Lin**, Tainan County (TW)(21) Appl. No.: **13/481,838**(22) Filed: **May 27, 2012****Publication Classification**(51) **Int. Cl.**  
**A47C 3/00** (2006.01)(52) **U.S. Cl.**  
USPC ..... **297/362**(57) **ABSTRACT**

An angle adjusting/positioning device includes first and second sleeves fixed to a backrest and a seat of a chair. The first sleeve has a first axle hole and a first toothed portion. A second sleeve includes a second axle hole, a second toothed portion, and a positioning portion. A third sleeve has a third axle hole and an actuating portion. An axle extends through the first, second, and third axle holes. A handle fixed to the third sleeve is operable to move the actuating portion relative to the positioning portion, causing the second toothed portion to engage with or disengage from the first toothed portion. An angular position of the backrest relative to the seat is adjustable when the second toothed portion disengages from the first toothed portion. The angular position of the backrest is fixed when the second toothed portion engages with the first toothed portion.



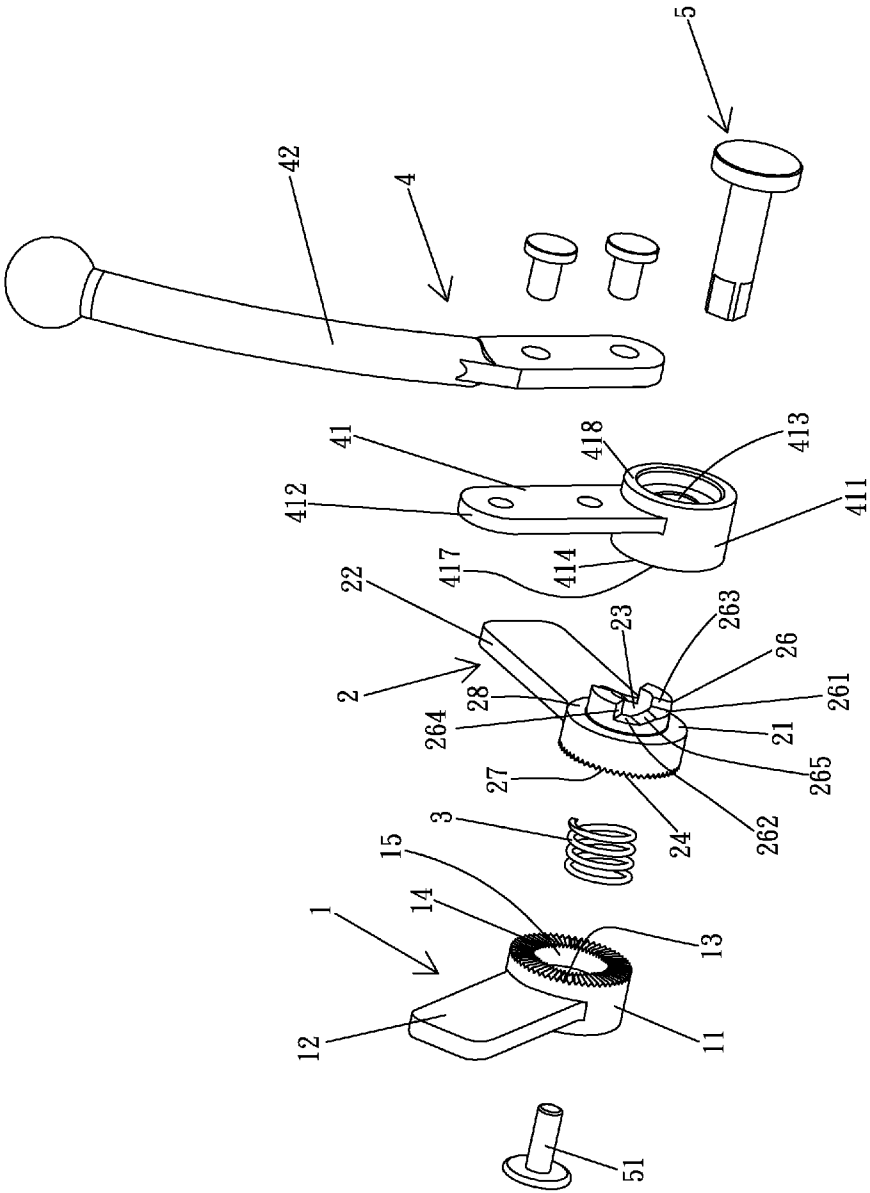


FIG. 1

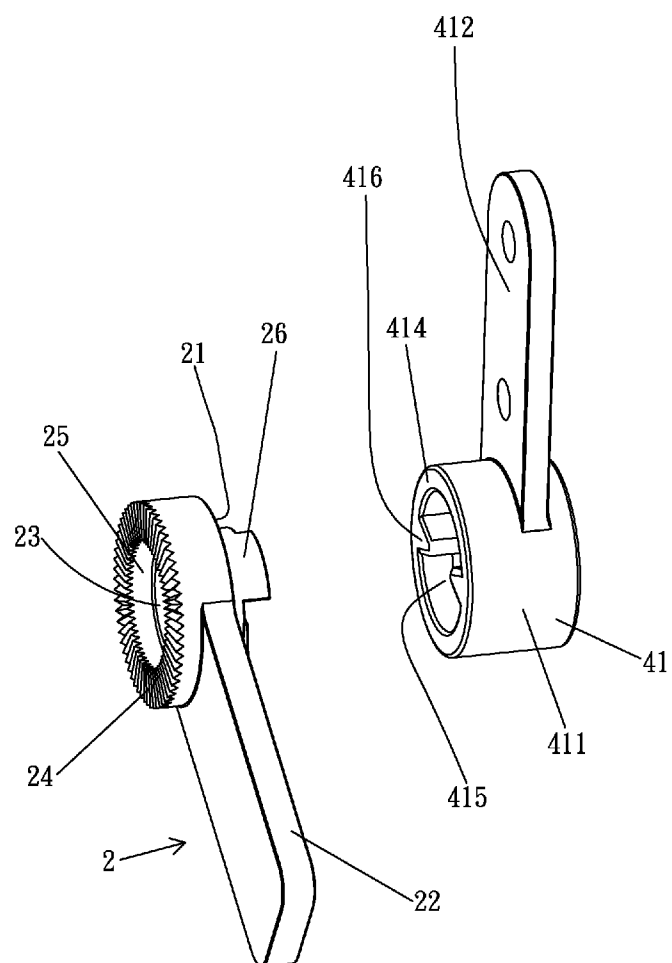


FIG. 2

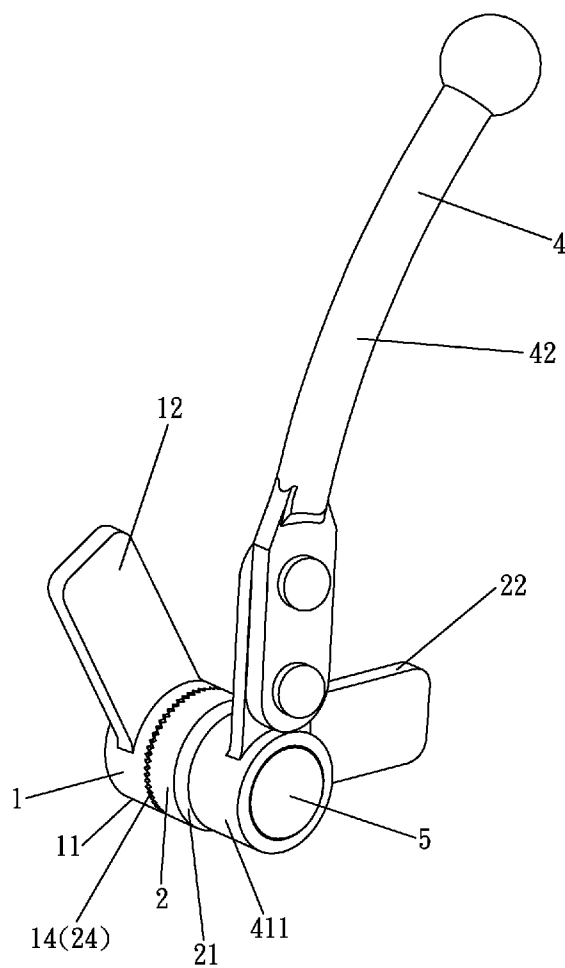


FIG. 3

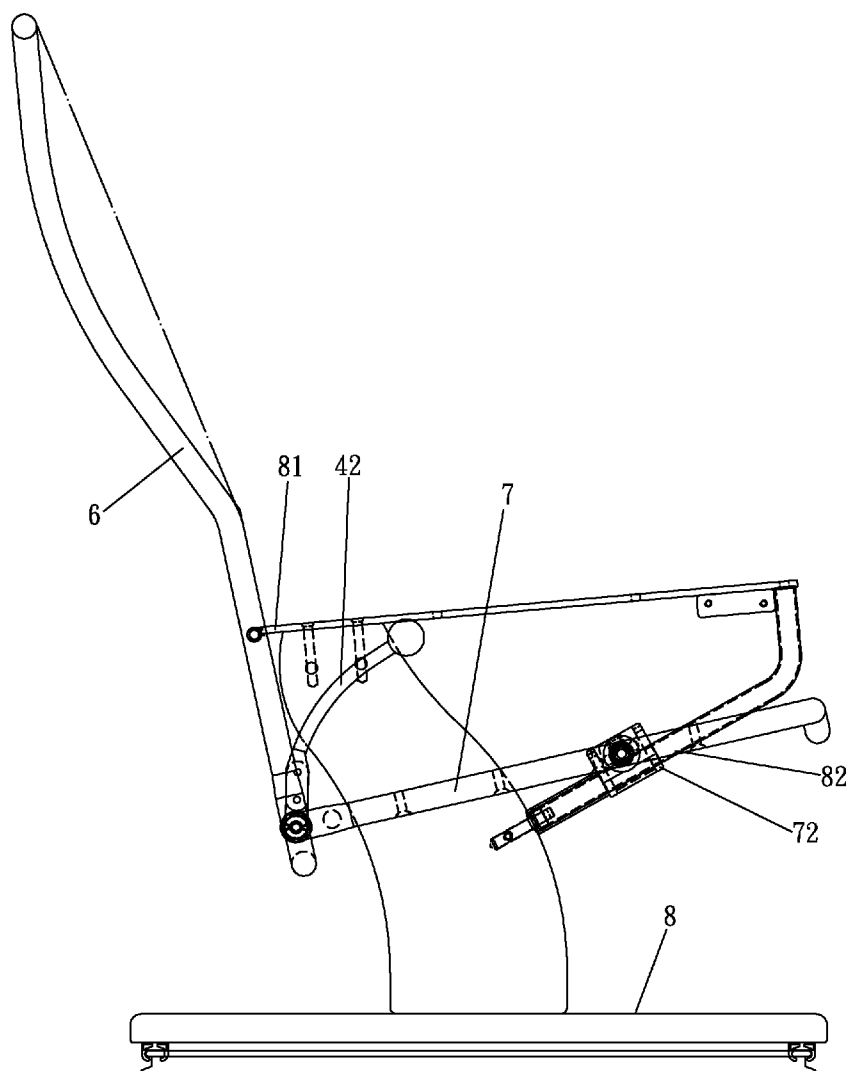
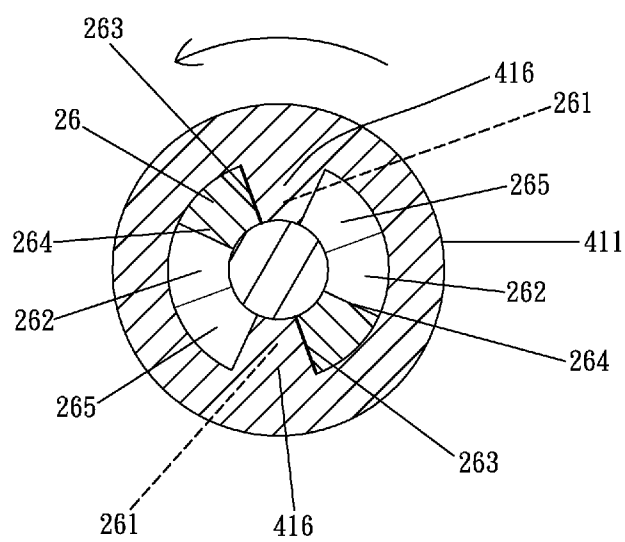


FIG. 4

FIG. 5



A-A

FIG. 6

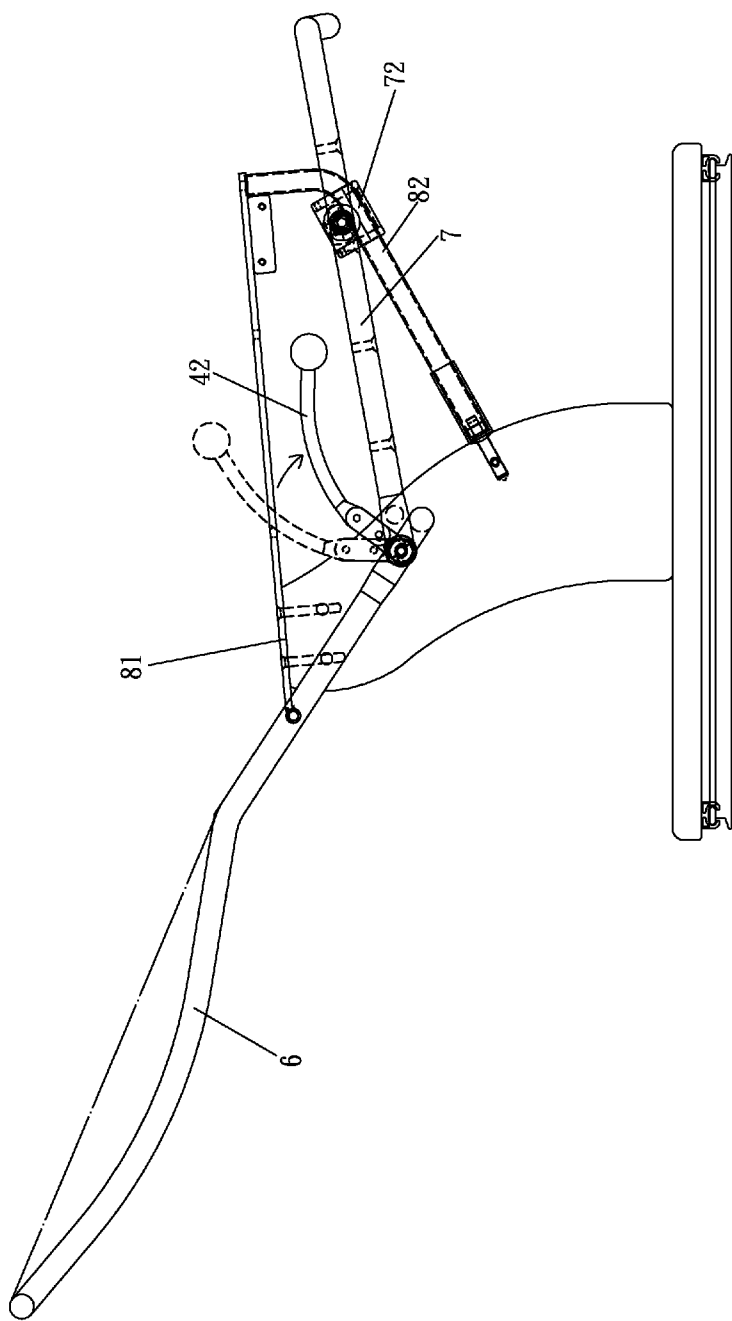
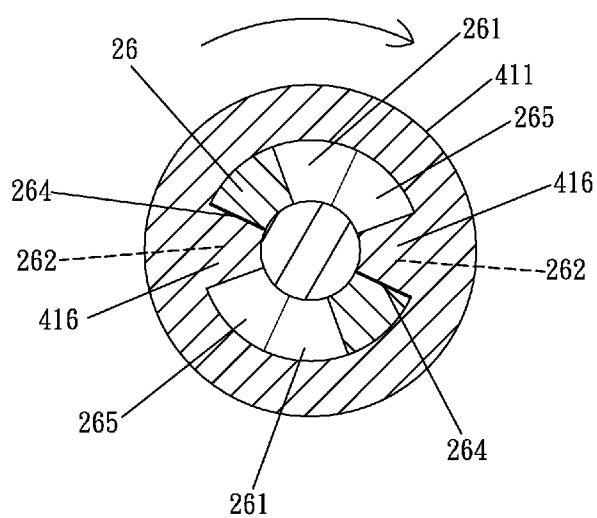


FIG. 7

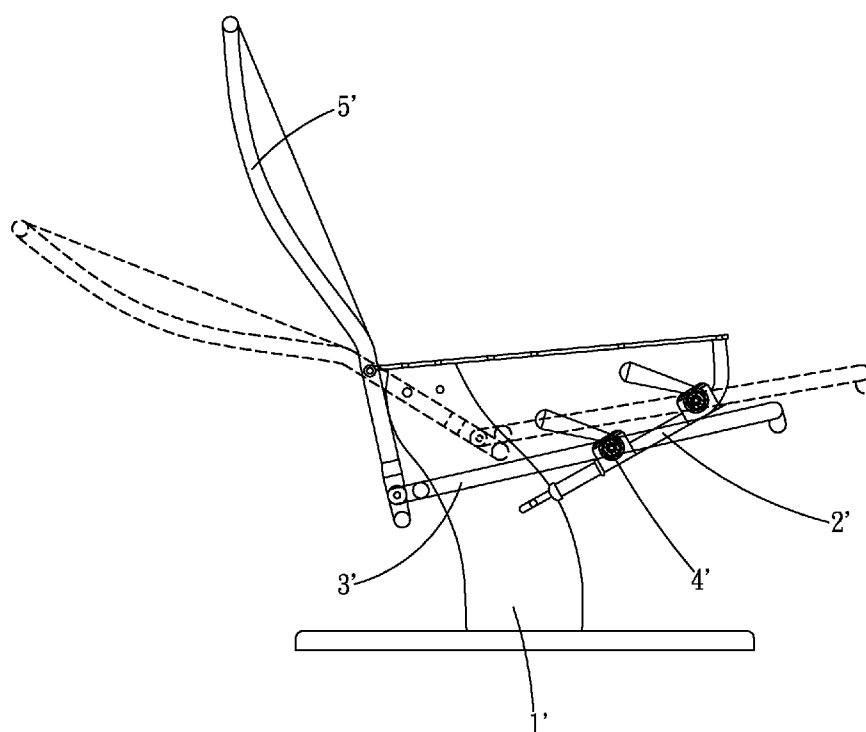


FIG. 8



B-B

FIG. 9



PRIOR ART

F I G . 10

## ANGLE ADJUSTING/POSITIONING DEVICE FOR A BACKREST OF A CHAIR

### BACKGROUND OF THE INVENTION

[0001] The present invention relates to an angle adjusting/positioning device for a backrest of a chair and, more particularly, to an adjusting device allowing easy operation in adjustment of an angular position of a backrest of a chair and providing reliable positioning for the backrest.

[0002] Conventional backrests of chairs are adjustable in angular positions to provide lying comfort. Conventional backrest adjusting devices generally include a chassis below the seat, with a lower end of the backrest coupled to the chassis that allows adjustment of the angular position of the backrest. However, the chassis is expensive and is not suitable for large chairs such as sofas and leisure chairs.

[0003] FIG. 10 shows a conventional chair having an adjustable device 4' for adjusting the angular position of a backrest 5' of the chair. A guiding rod 2' is fixed on a base 1' of the chair, and the adjusting device 4' is mounted to a seat 3' of the chair and around the guiding rod 2'. The clamping device 4' can clamp or release the guiding rod 2'. A lower end of the backrest 5' is pivotably connected to a rear of the seat 3'. When the clamping device 4' releases the guiding rod 2', the user can lie against the backrest 5' and, thus, move the backrest 5' rearward and move the seat 3' forward, providing lying comfort. The inclination angle or angular position of the backrest 5' is fixed when the clamping device 4' clamps the guiding rod 2'. An example of such a backrest adjusting device is disclosed in U.S. Pat. No. 7,736,925. However, the clamping device 4' in the clamping status may slide along the guiding rod 2' if the user exerts a large force against the backrest 5'. Improvement is, thus, required.

### BRIEF SUMMARY OF THE INVENTION

[0004] An objective of the present invention is to provide an adjusting device allowing easy operation in adjustment of an angular position of a backrest of a chair and providing reliable positioning for the backrest.

[0005] An angle adjusting/positioning device according to the present invention includes a first mounting seat adapted to be fixed to one of a backrest and a seat of a chair. The first mounting seat includes a first sleeve having a first axle hole. The first sleeve includes an end face having a first toothed portion. The angle adjusting/positioning device further includes a second mounting base adapted to be fixed to the other of the backrest and the seat of the chair. The second mounting base includes a second sleeve having a first side and a second side opposite to the first side. A second axle hole extends from the first side through the second side of the second sleeve. A second toothed portion is provided on the first side of the second sleeve and surrounds the second axle hole. The second sleeve further includes a positioning portion. An elastic element is mounted between the first and second sleeves. The elastic element biases the first and second toothed portions of the first and second sleeves to disengage from each other or engage with each other. A handle mechanism includes a handle seat having a third sleeve. A handle is fixed to the third sleeve. The third sleeve includes a third axle hole and an actuating portion. An axle extends through the third axle hole, the second axle hole, and the first axle hole of the handle seat, the second sleeve, and the first sleeve. The handle is operable to move the actuating portion relative to the

positioning portion, causing the second toothed portion to engage with or disengage from the first toothed portion. An angular position of the backrest relative to the seat is adjustable when the second toothed portion disengages from the first toothed portion. The angular position of the backrest is fixed when the second toothed portion engages with the first toothed portion.

[0006] The present invention will become clearer in light of the following detailed description of illustrative embodiments of this invention described in connection with the drawings.

### DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 shows an exploded, perspective view of an angle adjusting/positioning device for a backrest of a chair according to the present invention.

[0008] FIG. 2 shows a perspective view of a mounting seat and a handle member of the angle adjusting/positioning device of FIG. 1.

[0009] FIG. 3 shows a perspective view of the angle adjusting/positioning device of FIG. 1.

[0010] FIG. 4 shows a side view of a chair to which the angle adjusting/positioning device is mounted, with the angle adjusting/positioning device in a locking state.

[0011] FIG. 5 shows a partial, cross sectional view of the chair of FIG. 4.

[0012] FIG. 6 shows a cross sectional view taken along section line A-A of FIG. 5.

[0013] FIG. 7 shows a view similar to FIG. 5, with the angle adjusting/positioning device in a releasing state.

[0014] FIG. 8 shows a partial, cross sectional view of the chair of FIG. 7.

[0015] FIG. 9 shows a cross sectional view taken along section line B-B of FIG. 8.

[0016] FIG. 10 shows a schematic side view of a chair with a conventional adjusting device.

### DETAILED DESCRIPTION OF THE INVENTION

[0017] With reference to FIGS. 1-5, an angle adjusting/positioning device for a backrest of a chair according to the present invention is mounted to a connection between a backrest 6 and a seat 7 of a chair. A side of a backrest 6 is pivotably connected to a rear end of an armrest 81 located above a base 8 of the chair. The seat 7 includes a side having a receiving portion 72 receiving a guiding rod 82 including a lower end connected to the base 8 and an upper end connected to a front end of the armrest 81. According to the form shown, the angle adjusting/positioning device includes a first mounting base 1, a second mounting base 2, an elastic element 3, a handle mechanism 4, and an axle 5. The first mounting base 1 includes a first sleeve 11 and a tab 12 provided on an outer periphery of the first sleeve 11. The tab 12 is engaged in a receiving hole 61 in a lower end of the backrest 6. The first sleeve 11 includes a first axle hole 13. A first toothed portion 14 is formed on an end face of the first sleeve 14. The first axle hole 13 includes a first compartment 15 having an opening in the end face of the first sleeve 14 and surrounded by the first toothed portion 14 in the form shown.

[0018] The second mounting base 2 includes a second sleeve 21 having a first side 27 and a second side 28 opposite to the first side 27. The second sleeve 21 further includes an outer periphery extending between the first and second sides 27 and 28. A tab 22 is provided on the outer periphery of the

second sleeve 21. The tab 22 is engaged in a receiving hole 71 in a rear end of the seat 7. A second axle hole 23 extends from the first side 27 through the second side 28 of the second sleeve 2. A second toothed portion 24 is provided on the first side 27 of the second sleeve 21 and surrounds the second axle hole 23. The second axle hole 23 includes a second compartment 25 in the first side 27 and surrounded by the second toothed portion 24 in the form shown. A positioning portion 26 is formed on the second side 28 of the second sleeve 21 and surrounds the second axle hole 23. In the form shown, the positioning portion 26 includes two diametrically opposed first positioning grooves 261 and two diametrically opposed second positioning grooves 262. Each of the first and second positioning grooves 261 and 262 includes a bottom wall. A spacing between the bottom wall of each first positioning groove 261 to the second side 28 of the second sleeve 21 is larger than a spacing between the bottom wall of each second positioning groove 262 and the second side 28 of the second sleeve 21. An inclined surface 265 extends between each first positioning groove 261 and a corresponding second positioning groove 262. The positioning portion 26 further includes a first stop wall 263 extending perpendicularly to the bottom wall of each first positioning groove 262, with the bottom wall of the first positioning groove 262 located between the inclined surface 265 and the first stop wall 263. Furthermore, the positioning portion 26 further includes a second stop wall 264 extending perpendicularly to the bottom wall of each second positioning groove 262, with the bottom wall of the second positioning groove 262 located between the inclined surface 265 and the second stop wall 264. However, the positioning portion 26 can include only one first positioning groove 261, only one second positioning groove 262, and only one inclined surface 265.

[0019] The first toothed portion 14 of the first sleeve 11 engages with the second toothed portion 24 of the second sleeve 21, with the first axle hole 13 aligned with the second axle hole 23, with the first compartment 15 of the first axle hole 13 facing and aligned with the second compartment 25 of the second axle hole 23. The elastic element 3 is received in the first and second compartments 15 and 25 of the first and second axle holes 13 and 23. The elastic element 3 provides elastic force for operation of the first and second mounting bases 1 and 2. In the form shown, the elastic element 3 biases the first and second toothed portions 14 and 24 of the first and second mounting bases 1 and 2 to disengage from each other.

[0020] The handle mechanism 4 includes a handle seat 41 having a third sleeve 411. The third sleeve 411 includes a first face 417 and a second face 418 opposite to the first face 417. The third sleeve 411 further includes an outer periphery extending between the first and second faces 417 and 418. A tab 412 is provided on the outer periphery of the third sleeve 411. A handle 42 is fixed to the tab 412. A third axle hole 413 extends from the first face 417 through the second face 418. The third axle hole 413 includes an actuating portion 414 in the form shown having a receiving groove 415 in the first face 417 for receiving the positioning portion 26. This provides an aesthetically pleasing appearance. The receiving groove 415 includes a wall having two positioning members 416 each of which is selectively engaged in one of the first and second positioning grooves 261 and 262. However, the receiving groove 415 can include only one positioning member 416.

[0021] The axle 5 is extended through the third, second, and first axle holes 413, 23, and 13 of the handle seat 41, the

second sleeve 21, and the first sleeve 11, with a bolt 51 fixed to an end of the axle 5 to position the axle 5.

[0022] The handle 42 can be operated to cause engagement or disengagement between the first and second toothed portions 14 and 24 of the first and second sleeves 11 and 21. When each positioning member 416 of the handle seat 41 is in the first positioning groove 261, the positioning member 416 can abut against the first stop wall 263 to cause engagement of the first and second toothed portions 14 and 24. The elastic element 3 is compressed to fix the angular position of the backrest 6, as shown in FIGS. 4-6.

[0023] With reference to FIGS. 7-9, when it is desired to adjust the angular position of the backrest 6, the handle 42 is operated to pivot the third sleeve 411 of the handle seat 41 relative to the positioning portion 26 of the second sleeve 21. Each positioning member 416 of the handle seat 41 is moved into the second positioning groove 261 and abuts against the second stop wall 264, causing disengagement of the first toothed portion 14 from the second toothed portion 24 under the returning force of the elastic element 3. Thus, the angular position of the backrest 6 can be adjusted. The inclined surfaces 265 allow smooth movement of the positioning members 416. After adjustment, the handle 42 is moved in a reverse direction to move the positioning members 416 back into the first positioning grooves 261, engaging the first toothed portion 14 with the second toothed portion 24 and fixing the angular position of the backrest 6, as shown in FIGS. 4-6. The operation is convenient and smooth.

[0024] By providing the first and second toothed portions 14 and 24, the angle adjusting/positioning device according to the present invention is more reliable than conventional clamping. The first and second mounting bases 1 and 2 can be pivotably connected to the backrest 6 and the seat 7 by other provisions. Furthermore, the first and second mounting bases 1 and 2 can be coupled with the seat 7 and the backrest 6, respectively.

[0025] Although specific embodiments have been illustrated and described, numerous modifications and variations are still possible without departing from the essence of the invention. The scope of the invention is limited by the accompanying claims.

1. An angle adjusting/positioning device for a backrest of a chair, with the angle adjusting/positioning device comprising:

a first mounting seat adapted to be fixed to one of a backrest and a seat of a chair, with the first mounting seat including a first sleeve having a first axle hole, with the first sleeve including an end face having a first toothed portion;

a second mounting base adapted to be fixed to another of the backrest and the seat of the chair, with the second mounting base including a second sleeve having a first side and a second side opposite to the first side, with a second axle hole extending from the first side through the second side of the second sleeve, with a second toothed portion provided on the first side of the second sleeve and surrounding the second axle hole, with the second sleeve further including a positioning portion;

an elastic element mounted between the first and second sleeves, with the elastic element biasing the first and second toothed portions of the first and second sleeves to disengage from each other or engage with each other;

a handle mechanism including a handle seat having a third sleeve, with a handle fixed to the third sleeve, with the third sleeve including a third axle hole and an actuating portion; and

an axle extending through the third axle hole, the second axle hole, and the first axle hole of the handle seat, the second sleeve, and the first sleeve, with the handle operable to move the actuating portion relative to the positioning portion, causing the second toothed portion to engage with or disengage from the first toothed portion, with an angular position of the backrest relative to the seat being adjustable when the second toothed portion disengages from the first toothed portion, with the angular position of the backrest being fixed when the second toothed portion engages with the first toothed portion.

2. The angle adjusting/positioning device as claimed in claim 1, with the positioning portion formed on the second side of the second sleeve, with the positioning portion including first and second positioning grooves each having a bottom wall, with a spacing between the bottom wall of the first positioning groove to the second side of the second sleeve being different from a spacing between the bottom wall of the second positioning groove to the second side of the second sleeve.

3. The angle adjusting/positioning device as claimed in claim 2, with the spacing between the bottom wall of the first positioning groove to the second side of the second sleeve being larger than the spacing between the bottom wall of the second positioning groove to the second side of the second sleeve, with an inclined surface extending between the first positioning groove and the second positioning groove.

4. The angle adjusting/positioning device as claimed in claim 3, with the actuating portion of the handle seat includ-

ing a receiving groove receiving the positioning portion, with the receiving groove including a wall having a positioning member, with the positioning member selectively engaged in one of the first and second positioning grooves to engage the second toothed portion with the first toothed portion or to disengage the second toothed portion from the first toothed portion.

5. The angle adjusting/positioning device as claimed in claim 1, with the first axle hole including a first compartment in the end face of the first sleeve, with the second axle hole including a second compartment in the first side, with the elastic element received in the first and second compartments.

6. The angle adjusting/positioning device as claimed in claim 5, with the first sleeve of the first mounting base including a first tab on an outer periphery thereof, with the first tab adapted to be engaged with a lower end of the backrest, with the second sleeve of the second mounting base including a second tab on an outer periphery thereof, with the second tab adapted to be engaged with a rear end of the armrest, with the third sleeve of the handle seat including a third tab on an outer periphery thereof, with the handle fixed to the third tab.

7. The angle adjusting/positioning device as claimed in claim 6, with the chair including a guiding rod having a lower end connected to the base and an upper end connected to a front end of the armrest, with the seat including a side having a receiving portion, with the guiding rod received in the receiving portion, with the lower end of the backrest including a first receptacle receiving the first tab, with the rear end of the backrest including a second receptacle receiving the second tab.

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