



(11)

**EP 2 820 974 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**07.01.2015 Bulletin 2015/02**

(51) Int Cl.:  
**A47C 1/026 (2006.01)**

(21) Application number: **13184698.2**

(22) Date of filing: **17.09.2013**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB  
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO  
PL PT RO RS SE SI SK SM TR**  
Designated Extension States:  
**BA ME**

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(30) Priority: **05.07.2013 CN 201310282220**

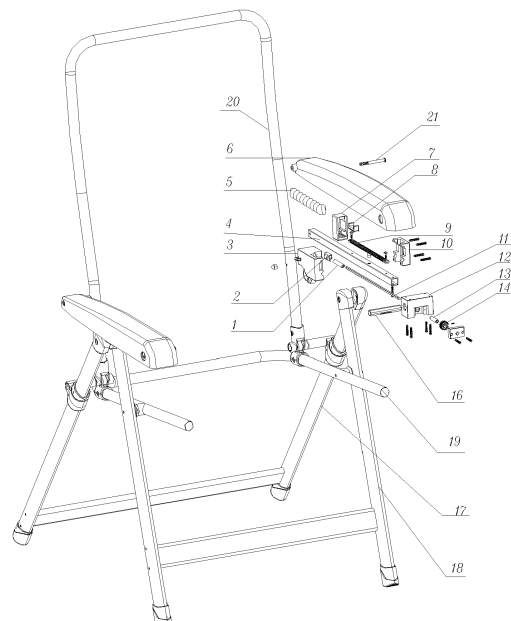
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Remarks:

Amended claims in accordance with Rule 137(2)  
EPC.

(54) **Chair with adjustable backrest**

(57) A chair with an adjustable backrest includes a backrest support (20), a seat cushion support (19), and an adjusting mechanism. The adjusting mechanism includes: a rack (9) articulated at an articulated point to the backrest support (20), wherein a rotation axis of the backrest support (20) is perpendicular to a central axis of the rack (9), and a distance from the articulated point to the rotation axis is larger than zero; a toothed block (8) engagable with the rack (9); a positioning member (3,10) fixed relative to the seat cushion support (19), the toothed block (8) is provided in the positioning member and is slidable along a first straight line, the rack (9) is provided in the positioning member (3,10) and is slidable along a second straight line parallel to the central axis of the rack (9) and perpendicular to the first straight line; and wherein a control mechanism for controlling the toothed block (8) in the positioning member (3,10).



**Fig. 1**

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## Description

**[0001]** This application claims the benefit of priority to Chinese patent application No. 201310282220.3, titled "CHAIR WITH ADJUSTABLE BACKREST" and filed with the Chinese State Intellectual Property Office on July 5, 2013, the entire disclosure of which is incorporated herein by reference.

## FIELD OF THE INVENTION

**[0002]** The present application relates to the filed of living goods, particularly to a chair with an adjustable backrest.

## BACKGROUND OF THE INVENTION

**[0003]** The chair is a seat provided with a backrest and a cushion. Generally, each of two sides of the chair is provided with an armrest. In order to meet peoples' various requirements for the inclination angle of the backrest in using the chair and to make the chair comfortable in any situation, a chair with an adjustable backrest is designed. That is, the inclination angle of the backrest of the chair can be adjusted by a related adjusting mechanism according to actual requirement. It is apparent that, the chair with the adjustable backrest is improved in function compared with the chair that can not be adjusted. Thus the chair with the adjustable backrest meets different requirements of people on the inclination angle of the backrest and significantly improves the application range and comfort degree of the chair.

**[0004]** However, in the prior art, the inclination angle of the backrest of the chair is generally adjusted by an adjusting mechanism provided with multiple coupling positions, with each coupling position corresponded to one inclination angle of the backrest. In the above manner employing the coupling position, generally, a position limiting groove is provided in the armrest of the chair, and a coupling component is coupled in the position limiting groove. In order to provide sufficient coupling strength, the end of the coupling component for coupling with the position limiting groove is configured to have sufficient thickness, and thus the position limiting groove coupled with the coupling component should have sufficient width and depth. Therefore, in the actual manufacturing process, the number of the position limiting groove is limited. Since the position of the position limiting groove corresponds to the specific inclination angle of the backrest, and the number of the position limiting groove is limited, the position number of the chair with the adjustable backrest is limited by this manner. Therefore the selection range of the inclination angle of the backrest is limited, and the requirement of one person for some certain inclination angles of the backrest of the chair can not be completely satisfied (for example, this kind of chair can not provided the user with an inclination angle of the backrest between two positions). Moreover, when people ad-

justs the inclination angle of the backrest of the chair, the coupling component and the position limiting groove are coupled and disconnected manually, and the position relationship between the coupling component and the position limiting groove is adjusted and aligned manually, thus the operation thereof is arduous.

**[0005]** In view of the above, an urgent technical problem to be solved by the person skilled in the art is to increase the select range of the inclination angle of the backrest of the chair with the adjustable backrest, meet the requirement of the user for freely selecting a certain inclination angle from the select range of the inclination angle of the backrest of the chair, and simplify the adjusting manner of the inclination angle of the backrest.

## SUMMARY OF THE INVENTION

**[0006]** In view of this, it is provided according to the present application a chair with an adjustable backrest, which increases selection range of the inclination angle of the backrest and meets the requirement of the user for freely selecting some certain inclination angles of the chair.

**[0007]** For achieving the above object, the present application provides the following technical solutions.

**[0008]** A chair with an adjustable backrest which includes a backrest support, a cushion support, and an adjusting mechanism for adjusting an angle formed by the backrest support and the cushion support, the adjusting mechanism includes:

**[0009]** a rack provided with a first tooth, a rotation axis of the backrest support is perpendicular to a central axis of the rack, the rack is articulated to the backrest support, and a distance from an articulated point between the rack and the backrest support to the rotation axis is larger than zero;

**[0010]** a toothed block provided with a second tooth engagable with the first tooth;

**[0011]** a positioning member, a position of the positioning member is fixed relative to that of the cushion support, the toothed block is provided in the positioning member in a way that the toothed block is slidable to and fro along a first straight line, the rack is provided in the positioning member in such a way that the rack is slidable to and fro along a second straight line, the second straight line is parallel to the central axis of the rack, and the first straight line is perpendicular to the second straight line;

**[0012]** a control mechanism for controlling the sliding of the toothed block in the positioning member to thereby control a distance between the first tooth and the second tooth.

**[0013]** Preferably, the chair with the adjustable backrest further includes a tooth case, the tooth case is provided in the positioning member in a way that the tooth case is slidable to and fro along the first straight line, the toothed block is fixed in the tooth case, the rack is run through the tooth case, and the control mechanism controls the sliding of the tooth case in the positioning mem-

ber to control the distance between the first tooth and the second tooth.

**[0014]** Preferably, in the chair with the adjustable backrest, the control mechanism includes:

**[0015]** a cam provided with a control protrusion; and

**[0016]** an operating mechanism for controlling the rotation of the cam, and the tooth case is controlled to slide along the first straight line by the control protrusion when the cam is rotated.

**[0017]** Preferably, in the chair with the adjustable backrest, the cam is rotatably provided in the tooth case.

**[0018]** Preferably, in the chair with the adjustable backrest, the operating mechanism includes:

**[0019]** a gear, with rotation of which the cam is rotated;

**[0020]** an operating rod which is provided, in an axial direction thereof, with a third tooth engaged with a tooth of the gear; and

**[0021]** a protecting case, in which the gear and the operating rod are provided, and an operating end of the operating rod is protruded out of the protecting case.

**[0022]** Preferably, the chair with the adjustable backrest further includes a driving rod, the gear and the cam are coaxial with the driving rod, one end of the driving rod is slidably extended in a connecting hole of the cam and is circumferentially coupled to and limited by the connecting hole, the other end of the driving rod is extended into the protecting case and is fixedly connected to the gear, and an end of the rack that is not articulated to the backrest support is fixedly connected to the protecting case.

**[0023]** Preferably, the chair with the adjustable backrest further includes a sliding tube which is fixed in an armrest cover of the chair with the adjustable backrest; and

**[0024]** wherein both ends of the rack are fixedly connected to the sliding tube, the rack and the sliding tube are provided in the positioning member in a way that the rack and the sliding tube are slidable to and fro along the second straight line, and one end of the sliding tube is articulated to the backrest support and the other end thereof is fixedly connected to the protecting case.

**[0025]** Preferably, the chair with the adjustable backrest further includes a reset spring, one end of the reset spring is connected to the backrest support, and the other end thereof is connected to the positioning member.

**[0026]** Preferably, in the chair with the adjustable backrest, a connecting end of a front supporting leg and a rear supporting leg is articulated to the positioning member.

**[0027]** Assuming that the chair with the adjustable backrest according to the embodiment of the present application is originally in a state that, the first tooth on the rack is separated from the second tooth on the toothed block, that is, they are not engaged with each other. At this time, the position of the cushion support is fixed relative to that of the positioning member, and the rack is slidable in the positioning member. When the rack is slid in the positioning member, the angle between the backrest support and cushion support will be changed, there-

by the inclination angle of the backrest of the chair can be adjusted freely. When the inclination angle of the backrest is determined, the user can control the control mechanism to further the toothed block to slide in the positioning member such that the first tooth is engaged with the second tooth. At this time, one end of the rack is articulated to the backrest support, and the rack is connected and fixed to the positioning member via the toothed block, thereby the position of the rack is fixed relative to that of the cushion support, and thus the inclination angle of the backrest is fixed. When it is required to readjust the inclination angle of the backrest of the chair with the adjustable backrest, the toothed block is controlled, by the control mechanism, to slide reversely in the positioning member such that the backrest of the chair can be adjusted, and then continue the above operation can be performed.

**[0028]** In the above technical solutions, the inclination angle of the backrest of the chair with the adjustable backrest is fixed through the engaging of toothed block with the rack. Therefore the adjustable range of the inclination angle of the backrest is determined by the length of first tooth extended along the central axis of the rack, and the specific inclination position of the backrest is determined by a specific position of the first tooth engaged with the toothed block. Since the distance between adjacent first teeth on the rack can be set based on the actual requirement, and the distance is generally set to be very short (for example, to be one or two millimeter), it can be seen that for the chair with the adjustable backrest according to the embodiment of the present application, the adjustable range of the inclination angle of the backrest is large, meanwhile, the requirement of the user for selecting various specific inclination positions of the backrest can be met. Thereby the adaptability and the comfort degree of the chair are improved.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0029]** In order to clearly illustrate technical solutions according to the embodiments of the present application or in the prior art, drawings to be used in the description of the prior art or the embodiments will be described briefly hereinafter. Apparently, the drawings described hereinafter are only some embodiments of the present application, and other drawings may be obtained by those skilled in the art according to the drawings without creative work.

**[0030]** Figure 1 is an exploded schematic view of an internal structure of an armrest of a chair according to an embodiment of the present application;

**[0031]** Figure 2 is a partial exploded schematic view of an adjusting mechanism of the chair according to the embodiment of the present application;

**[0032]** Figure 3 is a schematic view showing an installing structure of a reset spring of the chair according to the embodiment of the present application;

**[0033]** Figure 4 is a schematic view showing an overall

structure of the chair according to the embodiment of the present application; and

**[0034]** Figures 5 is a right view of the chair according to the embodiment of the present application.

**[0035]** Reference signs in the figures:

1. first sleeve, 2. cam, 3. left shell, 4. sliding tube, 5. reset spring,
6. armrest cover, 7. tooth case, 8. toothed block, 9. rack, 10. right shell,
11. driving rod, 12. protecting case, 13. second sleeve, 14. gear,
16. operating rod, 17. rear supporting leg, 18. front supporting leg,
19. cushion support, 20. backrest support, 21. pin.

#### DETAILED DESCRIPTION OF THE INVENTION

**[0036]** It is provided according to the present application a chair with an adjustable backrest, which increases the selection range of the inclination angle of the backrest, and satisfies the requirements of the user for freely selecting some certain inclination angles of the backrest.

**[0037]** Hereinafter, technical solutions in embodiments of the present application will be described clearly and completely in conjunction with the accompanying drawings in the embodiments of the present application. Apparently, the described embodiments are only a part of the embodiments of the present application, but not all of the embodiments. All other embodiments obtained by those skilled in the art based on the embodiments in the present application without creative work fall within the protection scope of the present application.

**[0038]** Referring to Figures 1 to 5, Figure 1 is an exploded schematic view of an internal structure of an armrest of a chair according to an embodiment of the present application; Figure 2 is a partial exploded schematic view of an adjusting mechanism of the chair according to the embodiment of the present application; Figure 3 is a schematic view showing an installing structure of a reset spring of the chair according to the embodiment of the present application; Figure 4 is a schematic view showing an overall structure of the chair according to the embodiment of the present application; and Figure 5 is a right view of the chair according to the embodiment of the present application.

**[0039]** The chair with the adjustable backrest according to the embodiment of the present application includes a backrest support 20, a cushion support 19, and an adjusting mechanism for adjusting an angle formed by the backrest support 20 and the cushion support 19. The adjusting mechanism includes a rack 9 provided with a plurality of first teeth, a toothed block 8 provided with a second tooth, a positioning member and a control mechanism. Among which, for facilitating the manufacturing, the positioning member according to the present embodiment includes a left shell 3 and a right shell 10; and the first teeth on the rack 9 are arranged in order along the

central axis of the rack 9. The rotation axis of the backrest support 20 (it is known that in adjusting an inclination angle of the backrest, the backrest support 20 will be rotated about a certain straight line, which straight line is the rotation axis of the backrest support) is perpendicular to the central axis of the rack 9. The rack 9 is articulated to the backrest support 20, and the distance from the articulated point to the rotation axis of the backrest support 20 is larger than zero (thereby the backrest support 20 can be pushed to incline forward and backward to adjust the inclination angle thereof under through the rack 9). The second tooth on the toothed block 8 can be engaged with the first tooth on the rack 9. The position of the positioning member is fixed relative to that of the cushion support 19, that is, the connection relationship between the positioning member and the cushion support 19 and the relative position relationship of connecting points between the positioning member and the cushion support 19 will not be changed. The toothed block 8 is provided in the positioning member in a way that the toothed block 8 is slidable along a first straight line. The rack 9 is provided in the positioning member in a way that the rack 9 is slidable along a second straight line. The second straight line is in parallel to the central axis of the rack 9, and the first straight line is perpendicular to the second straight line so as to adjust the disengagement and engagement of the rack 9 and the toothed block 8. The control mechanism is configured to control the sliding motion of the toothed block 8 in the positioning member, so as to control the distance between the toothed block 8 and the rack 9 to thereby control the engaging motion and disengaging motion of the first tooth and the second tooth.

**[0040]** Referring to the partial exploded schematic view of the adjusting mechanism shown in Figure 2, assuming that the chair with the adjustable backrest according to the embodiment of the present application is originally in a state in which the backrest is adjustable, that is, the first tooth on the rack 9 is separated from the second tooth on the toothed block 8, that is, they are not engaged with each other. At this time, the position of the cushion support 19 is fixed relative to that of the positioning member, and the rack 9 is slidable in the positioning member. Since the rotation axis of the backrest support 20 is perpendicular to the central axis of the rack 9, and the distance from the rotation axis to the articulated point between the rack 9 and the backrest support 20 is larger than zero, when the rack 9 is slid in the positioning member, the angle between the backrest support 20 and cushion support 19 will be changed. Thereby the inclination angle of the backrest of the chair can be adjusted freely.

**[0041]** When the inclination angle of the backrest is determined, the user can control the control mechanism to further control the toothed block 8 to slide in the positioning member, such that the distance between the rack 9 and the toothed block 8 is reduced, until the first tooth is engaged with the second tooth. At this time, one end of the rack 9 is articulated to the backrest support 20,

and the rack 9 is connected and fixed to the positioning member through the toothed block 8, while the position of the positioning member is fixed relative to that of the cushion support 19, therefore the position of the rack 9 is fixed relative to that of the cushion support 19, and thus the inclination angle of the backrest is fixed. When it is required to readjust the inclination angle of the backrest of the chair with the adjustable backrest, the toothed block 8 is controlled, by the control mechanism, to slide reversely in the positioning member to increase the distance between the rack 9 and the toothed block 8, until the first tooth is disengaged from the second tooth such that the backrest of the chair can be adjusted, then the above operation can be performed.

**[0042]** In the above technical solutions, the inclination angle of the backrest of the chair with the adjustable backrest is fixed through the engagement between toothed block 8 and the rack 9. Therefore the adjustable range of the inclination angle of the backrest is determined by the length of the first teeth extended along the central axis of the rack 9, and the specific inclination position of the backrest is determined by the specific position of the first tooth engaged with the toothed block 8. Since the distance between adjacent first teeth on the rack 9 can be set based on the actual requirement, and the distance is generally set to be very short (for example, to be one or two millimeter), it can be seen that, for the chair with the adjustable backrest according to the embodiment of the present application, the adjustable range of the inclination angle of the backrest is large, meanwhile, the requirement of the user for selecting various specific inclination positions of the backrest can be met. Thereby the adaptability and the comfort degree of the chair are improved.

**[0043]** In one embodiment, as shown in Figures 1 and 2, the adjusting mechanism of the chair with the adjustable backrest includes a tooth case 7. The toothed block 8 is fixed in the tooth case 7, and the tooth case 7 is provided in the positioning member in such a way that the tooth case 7 is slidable along the first straight line, therefore the toothed block 8 is slidable to and fro along the first straight line. The rack 9 runs through the positioning member and the tooth case 7 in such a way that the rack 9 is slidable along the above second straight line. It should be noted that, since a relative movement between the toothed block 8 and the rack 9 in the tooth case 7 is required, and the toothed block 8 is driven to be close to or away from the rack 9 through the moving of the tooth case 7, the through hole in the tooth case 7 through which the rack 9 is run is configured to have a larger section than that of the rack 9. That is, the through hole is large enough to allow the rack 9 to move relatively in the tooth case 7.

**[0044]** In order to further optimize the above technical solution, as shown in Figures 2 to 1, in the adjusting mechanism for the chair with the adjustable backrest described above, the control mechanism for controlling the sliding of the toothed block 8 (or for controlling the tooth

case 7) includes a cam 2 provided with a control protrusion, and an operating mechanism provided with a gear 14, an operating rod 16 and a protecting case 12. The cam 2 is rotatably provided in the tooth case 7, and is rotated with the rotation of the gear 14. When the cam 2 is rotated, the control protrusion on the cam 2 abuts against the tooth case 7 such that the tooth case 7 is slid in the positioning member along the first straight line, to further control the disengagement and engagement between the toothed block 8 and the rack 9, achieving the relative sliding or locking between the toothed block 8 and the rack 9, thereby controlling the changing of the inclination angle of the backrest. The operating rod 16 is provided, in the axial direction thereof, with a third tooth which is engaged with the tooth of the gear 14. The gear 14 and the operating rod 16 are provided in the protecting case 12, and the operating end of the operating rod 16 is protruded out of the protecting case 12, such that the user can press the operating rod 16 to rotate the gear 14 rotate, and thus to control the rotation of the cam 2, thereby achieving the controlling of the disengagement or engagement between the toothed block 8 and the rack 9. Apparently, the control mechanism for controlling the sliding of the toothed block 8 is not limited to the arrangement described herein, other specific forms may be made by those skilled in the art. For example, a button may be provided to directly press the tooth case 7 such that it is slid in the positioning member, to control the toothed block 8 such that it is disengaged from the rack 9, and a spring is provided such that the tooth case 7 can return to its original position to control the toothed block 8 to engage with the rack 9. Alternatively, a knob which is connected to the cam 2 may be provided to control the rotation of the cam 2. Therefore the control mechanism is not limited by the present application.

**[0045]** Referring to Figures 1 and 2, in the present embodiment, the adjusting mechanism of the chair with the adjustable backrest further includes a sliding tube 4, and the sliding tube 4 is fixed in the armrest cover 6 of the chair. Since the front supporting leg 18 and the rear supporting leg 17 of the chair with the adjustable backrest are fixedly connected to the cushion support 19, respectively, the connecting end of the front supporting leg 18 and the rear supporting leg 17 may be connected to the positioning member in the adjusting mechanism. In addition, both ends of the rack 9 are fixedly connected to the sliding tube 4. Therefore, the rack 9 together with the sliding tube 4 are provided in the positioning member in such a way that the rack 9 and the sliding tube 4 are slidable to and fro along the second straight line. Meanwhile, one end of the sliding tube 4 is articulated to the backrest support 20, and the other end of the sliding tube is fixedly connected to the protecting case 12. In one embodiment, one end of the sliding tube 4 and one end of the armrest cover 6 are articulated to the backrest support 20 via the pin 21, and the protecting case 12 is provided in the other end of the armrest cover 6 and is articulated to the end of the sliding tube 4. Here, the portion

of each side of the armrest cover 6 corresponded to one of two operating ends of the operating rod 16 that is protruded out of the protecting case 12 is provided with a through hole, which two through holes allow the two operating ends of the operating rod 16 to be protruded out, such that the user can easily adjust the inclination angle of the backrest by pressing the operating rod 16.

**[0046]** In the above embodiment, the operating mechanism for controlling the rotation of the cam further includes a driving rod 11. The gear 14 and the cam 2 are coaxial with the driving rod 11, and one end of the driving rod 11 is extended in the protecting case 12 and is fixedly connect to the gear 14. Meanwhile, the end of the rack 9 that is not articulated to the backrest support 20 is fixedly connected to the protecting case 12. The other end of the driving rod 11 is slidably extended in the connecting hole of the cam 2 and is circumferentially coupled to and limited by the connecting hole. The arrangements manner of the driving rod 11 and the cam 2 may be various in specific embodiments. For example, the connecting rod 11 has a square cross-section, and the connecting hole on the cam 2 for connecting with the connecting rod 11 also has a square shape. Alternatively, the connecting rod 11 has a square cross-section, and if the connecting hole on the cam 2 for connecting to the connecting rod 11 has a circular shape, a first sleeve 1 is employed to connect the cam 2 to the connecting rod 11, and a second sleeve 13 is employed to connect the gear 14 to the connecting rod 11; the center portion of each of the first sleeve 1 and the second sleeve 13 is provided with a square through hole, the square through hole on the first sleeve 1 is in clearance fit with the square cross-section of the connecting rod 11, and the outer wall of the first sleeve 1 is in interference fit with the circular connecting hole on the cam 2. However, it is not limited to the arrangements described herein, and it is easy for those skilled in the art to obtain other solutions to achieve the specific implementing manner in which relevant components are slidably connected and circumferentially coupled and limited. Therefore, the present application does not aim to limit the specific implementing manner.

**[0047]** In order to further optimize the above technical solution, as shown in Figure 3, the adjusting mechanism of the chair with the adjustable backrest further includes a reset spring 5. One end of the reset spring 5 is connected to the backrest support 20, and the other end thereof is connected to the positioning member. Therefore, during the adjusting of the inclination angle of the backrest, if the angle between the backrest support 20 and the cushion support 19 is too large, it only requires that the back of the user to be away from the backrest support 20, then the backrest support 20 that has been pressed downwards will be gradually pulled back under the restoring force of the reset spring 5, to reduce the inclination angle of the backrest. Thus, the operation for adjusting the inclination angle of the backrest is further simplified.

**[0048]** It can be seen from the above technical solution

that, in the present embodiment, a stepless adjusting of the inclination angle of the backrest is achieved by an unusual adjusting structure in the armrest cover 6, providing the user with any comfortable inclination angle within a certain range. Furthermore, in using, the inclination angle of the backrest of the chair can be adjusted by pressing the operating rod 16 at the front end of the armrest cover 6. That is the backrest can be adjusted by only one component, which simplifies the adjusting of the inclination angle of the backrest, and saves time and efforts.

**[0049]** For further optimizing the above technical solution, as shown in Figure 3, the connecting end of the front supporting leg 18 and the rear supporting leg is articulated to the positioning member, such that in adjusting the inclination angle of the backrest, the positioning member can be rotated relative to the connecting end within a certain degree. It is to be noted that since the amount of the relative rotation between the positioning member and the connecting end of the front supporting leg 18 and the rear supporting leg is small, the position of the positioning member relative to that of the cushion support 19 will not be affected.

**[0050]** Those skilled in the art can achieve or implement the present application with the above description of the embodiments, it is apparent that those skilled in the art may make various modifications to the embodiments, and the general principle defined herein can be implemented in other embodiments without departing from the spirit or the scope of the present application. Therefore, the present application should not be limited to the embodiments disclosed herein, but to be in accordance with the widest scope consistent with the principle and novel features disclosed herein.

## Claims

1. A chair with an adjustable backrest, comprising a backrest support (20), a cushion support (19), and an adjusting mechanism for adjusting an angle formed by the backrest support (20) and the cushion support (19), wherein the adjusting mechanism comprises:

a rack (9) provided with a first tooth, a rotation axis of the backrest support (20) is perpendicular to a central axis of the rack (9), the rack (9) is articulated to the backrest support (20), and a distance from an articulated point between the rack (9) and the backrest support (20) to the rotation axis is greater than zero;

a toothed block (8) provided with a second tooth engagable with the first tooth;

a positioning member, and a position of the positioning member is fixed relative to that of the cushion support (19), the toothed block (8) is provided in the positioning member in a way that

- the toothed block (8) is slidable to and fro along a first straight line, the rack (9) is provided in the positioning member in a way that the rack (9) is slidable to and fro along a second straight line, the second straight line is parallel to the central axis of the rack (9), and the first straight line is perpendicular to the second straight line; and a control mechanism for controlling the sliding of the toothed block (8) in the positioning member to control a distance between the first tooth and the second tooth.
2. The chair with the adjustable backrest according to claim 1, further comprising a tooth case (7) provided in the positioning member in a way that the tooth case (7) is slidable to and fro along the first straight line, the toothed block (8) is fixed in the tooth case (7), the rack (9) is run through the tooth case (7), and the control mechanism controls the sliding of the tooth case (7) in the positioning member to control the distance between the first tooth and the second tooth.
  3. The chair with the adjustable backrest according to claim 2, wherein the control mechanism comprises:
    - a cam (2) provided with a control protrusion; and an operating mechanism for controlling the rotation of the cam (2), wherein the tooth case (7) is controlled to slide along the first straight line by the control protrusion when the cam (2) is rotated.
  4. The chair with the adjustable backrest according to claim 3, wherein the cam (2) is rotatably provided in the tooth case (7).
  5. The chair with the adjustable backrest according to claim 3, wherein the operating mechanism comprises:
    - a gear (14), with rotation of which the cam (2) is rotated;
    - an operating rod (16) which is provided, in an axial direction thereof, with a third tooth engaged with a tooth of the gear (14); and
    - a protecting case (12), in which the gear (14) and the operating rod (16) are provided, wherein an operating end of the operating rod (16) is protruded out of the protecting case (12).
  6. The chair with the adjustable backrest according to claim 5, further comprising a driving rod (11), wherein the gear (14) and the cam (2) are coaxial with the driving rod, one end of the driving rod (11) is slidably extended in a connecting hole of the cam (2) and is circumferentially coupled to and limited by the connecting hole, the other end of the driving rod (11) is extended into the protecting case (12) and is fixedly connected to the gear (14), and an end of the rack (9) that is not articulated to the backrest support (20) is fixedly connected to the protecting case (12).
  7. The chair with the adjustable backrest according to claim 6, further comprising a sliding tube (4) fixed in an armrest cover (6) of the chair with the adjustable backrest; wherein, both ends of the rack (9) are fixedly connected to the sliding tube (4), the rack (9) and the sliding tube (4) are provided in the positioning member in a way that the rack (9) and the sliding tube (4) are slidable to and fro along the second straight line, and one end of the sliding tube (4) is articulated to the backrest support (20) and the other end of the sliding tube (4) is fixedly connected to the protecting case (12).
  8. The chair with the adjustable backrest according to claim 1, further comprising a reset spring (5), one end of the reset spring (5) is connected to the backrest support (20), and the other end of the reset spring (5) is connected to the positioning member.
  9. The chair with the adjustable backrest according to any one of claims 1 to 8, wherein a connecting end of a front supporting leg (18) and a rear supporting leg (17) is articulated to the positioning member.

#### Amended claims in accordance with Rule 137(2) EPC.

1. A chair with an adjustable backrest, comprising a backrest support (20), a seat cushion support (19), and an adjusting mechanism for adjusting an angle formed by the backrest support (20) and the seat cushion support (19), wherein the adjusting mechanism comprises:
  - a rack (9) provided with a plurality of first teeth, a rotation axis of the backrest support (20) is perpendicular to a central axis of the rack (9), the rack (9) is articulated to the backrest support (20) at an articulated point, and a distance from the articulated point to the rotation axis is greater than zero;
  - a toothed block (8) provided with a second tooth engagable with the plurality of first teeth;
  - a positioning member, and a position of the positioning member is fixed relative to that of the seat cushion support (19), the toothed block (8) is provided in the positioning member in a way that the toothed block (8) is slidable to and fro along a first straight line, the rack (9) is provided in the positioning member in a way that the rack (9) is slidable to and fro along a second straight line, the second straight line is parallel to the

central axis of the rack (9), and the first straight line is perpendicular to the second straight line; and

a control mechanism for controlling the sliding of the toothed block (8) in the positioning member to control a distance between the plurality of first teeth and the second tooth

the chair further comprising a tooth case (7) provided in the positioning member in a way that the tooth case (7) is slidable to and fro along the first straight line, the toothed block (8) is fixed in the tooth case (7), the rack (9) is run through the tooth case (7), and the control mechanism controls the sliding of the tooth case (7) in the positioning member to control the distance between the plurality of first teeth and the second tooth; wherein the control mechanism comprises:

a cam (2) provided with a control protrusion; and

an operating mechanism for controlling the rotation of the cam (2), wherein the tooth case (7) is controlled to slide along the first straight line by the control protrusion when the cam (2) is rotated; wherein the operating mechanism comprises:

a gear (14), with rotation of which the cam (2) is rotated;

an operating rod (16) which is provided, in an axial direction thereof, with a third tooth engaged with a tooth of the gear (14); and

a protecting case (12), in which the gear (14) and the operating rod (16) are provided, wherein an operating end of the operating rod (16) is protruded out of the protecting case (12).

2. The chair with the adjustable backrest according to claim 1, wherein the cam (2) is rotatably provided in the tooth case (7).

3. The chair with the adjustable backrest according to claim 1, further comprising a driving rod (11), wherein the gear (14) and the cam (2) are coaxial with the driving rod, one end of the driving rod (11) is slidably extended in a connecting hole of the cam (2) and is circumferentially coupled to and limited by the connecting hole, the other end of the driving rod (11) is extended into the protecting case (12) and is fixedly connected to the gear (14), and an end of the rack (9) that is not articulated to the backrest support (20) is fixedly connected to the protecting case (12).

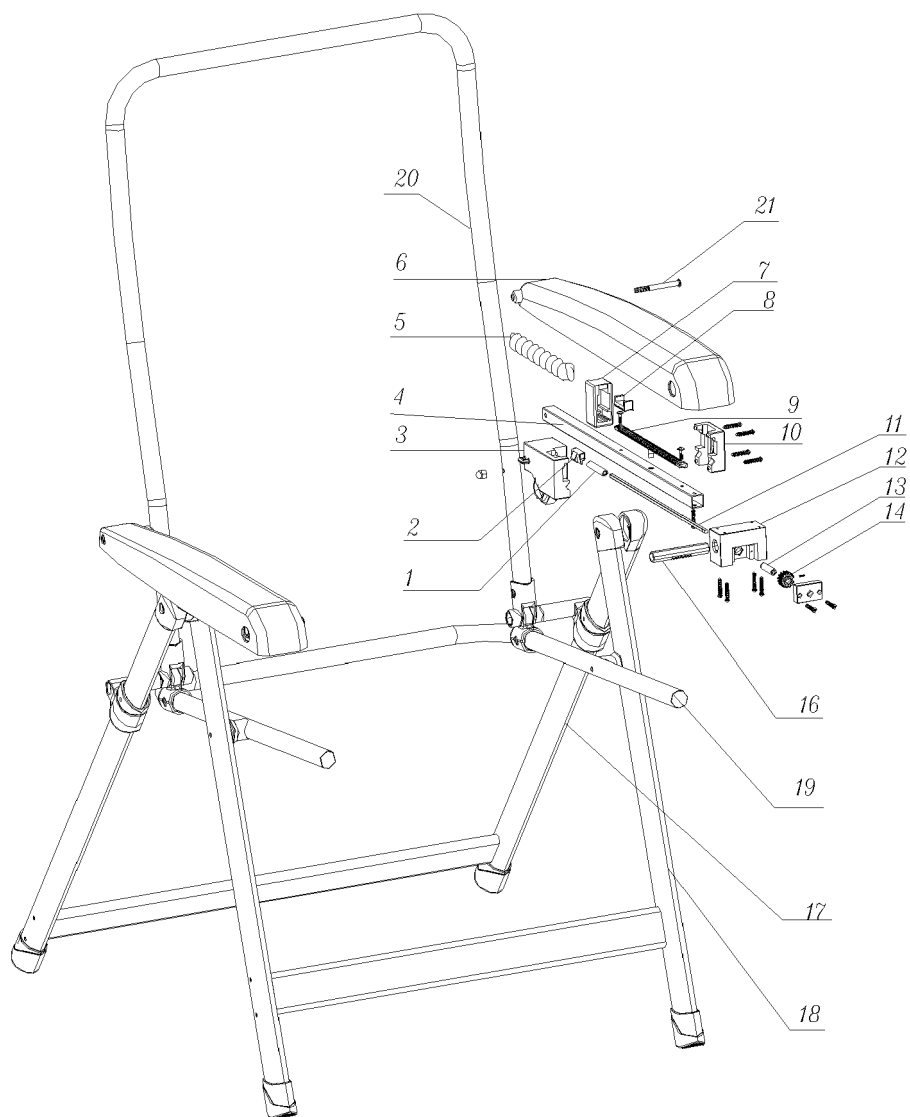
4. The chair with the adjustable backrest according to claim 3, further comprising a sliding tube (4) fixed in

an armrest cover (6) of the chair with the adjustable backrest; wherein,

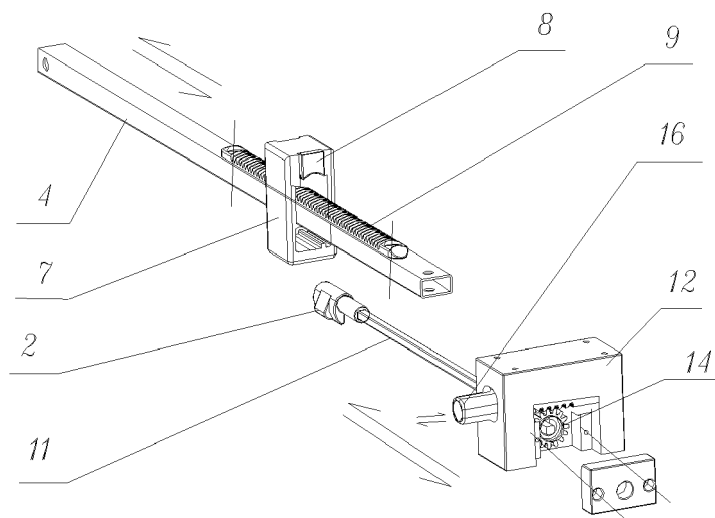
both ends of the rack (9) are fixedly connected to the sliding tube (4), the rack (9) and the sliding tube (4) are provided in the positioning member in a way that the rack (9) and the sliding tube (4) are slidable to and fro along the second straight line, and one end of the sliding tube (4) is articulated to the backrest support (20) and the other end of the sliding tube (4) is fixedly connected to the protecting case (12).

5. The chair with the adjustable backrest according to claim 1, further comprising a reset spring (5), one end of the reset spring (5) is connected to the backrest support (20), and the other end of the reset spring (5) is connected to the positioning member.

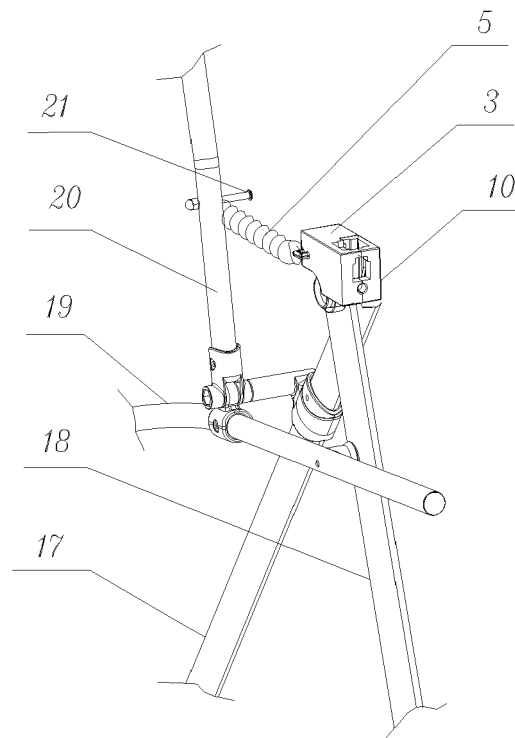
6. The chair with the adjustable backrest according to any one of claims 1 to 5, wherein a connecting end of a front supporting leg (18) and a rear supporting leg (17) is articulated to the positioning member.



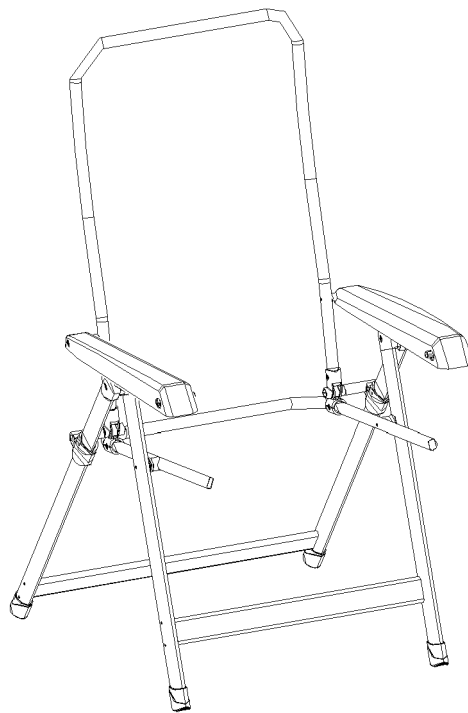
**Fig. 1**



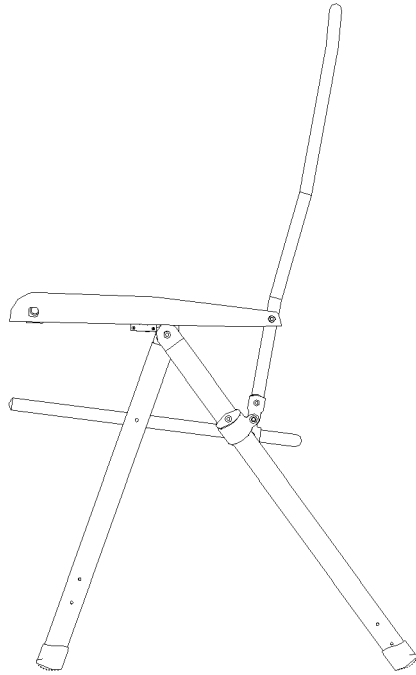
**Fig. 2**



**Fig. 3**



**Fig. 4**



**Fig. 5**



## EUROPEAN SEARCH REPORT

 Application Number  
 EP 13 18 4698

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                     |                                                                                                                                        |                                                                                                                                                                                                                                                                              |                                         |
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| Place of search<br>The Hague                                                                                                                                                                                            |                                                                                                                                        | Date of completion of the search<br>26 November 2013                                                                                                                                                                                                                         | Examiner<br>Kus, Slawomir               |
| CATEGORY OF CITED DOCUMENTS                                                                                                                                                                                             |                                                                                                                                        | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                         |
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