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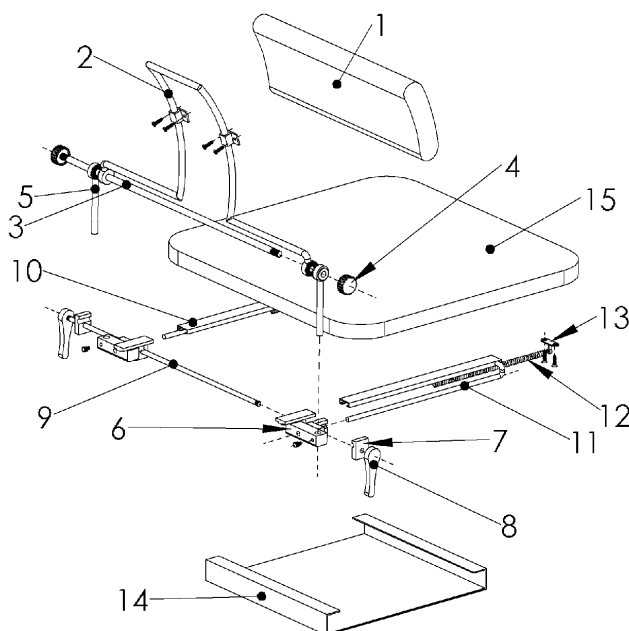
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(54) **CHAIR**

(57) The present invention relates to a changeable chair properly supporting a worker's body. A chair, on a chair seat or a chair frame, comprising guide rails which are fixed to the chair seat in a forward and backward direction, and movers which are coupled to the guide rails and are moved in a forward and backward direction of the chair,

characterized in that the chair with a chair back which is movable in a forward and backward direction of the chair comprises a brake device which fixes the movements of the movers, and the brake device comprises brake pieces which receive the operation of a brake lever, and then are compressed to a fixed region of the chair and fix the movers.

Fig. 3



Description

Technical Field

[0001] The present invention relates to a changeable chair properly supporting a worker's body, even when the worker working in a chair leans his/her body forward or backward, or moves towards and sits on the front or rear end of a chair seat.

Background Art

[0002] Because a worker who is working in a chair feels cumulative fatigue, especially on his/her back due to his/her sitting posture as time passes by, a variety of more effective methods have been provided. The various methods are mostly to optimize the shape of a backrest into the shape of a human body, or to provide a backrest with proper elasticity, and specifically relate to optimization of the elasticity and the shape. However, when a worker in a chair leans his/her body forward or moves his/her buttocks towards the front end of a chair seat, these methods are completely useless because a backrest is distanced from the worker's back. Accordingly, although a method for moving a backrest towards the front or rear end of a chair is provided, methods for moving and fixing the backrest are greatly inconvenient, and a fixing device is mounted on either of the left or right side of the backrest, so that the backrest is twisted when the back of the worker is actually supported.

[0003] Therefore, fixing devices for fixing the movement of the backrest are required to be respectively provided on both of the left and right sides of the movable backrest, however, operating the each fixing device is greatly inconvenient, so that practicality is not expected at all and there are no instances to which the fixing devices are actually applied.

[0004] In addition, the provided method for fixing the backrest provides a fixing device in which holes are bored in proper points of a fixed chair body in a regular distance, and then pins are used in a part of the movable backrest to be inserted into the holes. Another method for fixing the backrest is performed by means of direct friction of a cam revolving around a fixed shaft.

[0005] Besides, when moving the backrest is performed, the backrest is always moved by means of a user's strength, and thus, when the size of the backrest is big, the user bears the burden.

[0006] In addition, because the regions that the backrest supports are slightly different from each other according to body types of people, the best responding method is to move the backrest upward and downward in order to adjust the height of the backrest. However, this operation for adjusting the height of the backrest is performed in such a way that a chair user leaves the chair, and then performs an additional process for adjusting the height of the backrest. Although such an operation is performed, proper regions to be supported are

different from each other whenever the chair user leans his/her body forward or backward, and thus, the user fails to sufficiently feel comfortable.

[0007] Besides, when leaning a body forward to work, a user sitting on a chair moves a chair with wheels toward a worktable as close as possible so that his/her back is supported by the backrest, or additionally inserts a backrest cushion between his/her back and the backrest so that his/her back is continuously supported. However, the supplementary backrest cushion sometimes is dropped from the chair, and fails to actively respond to a changeable distance between the user and the backrest because the thickness of the cushion is unchangeable.

[0008] When a worker leans his/her body forward, or moves his/her body towards the front end of a chair seat, a chair with wheels solves the above-mentioned problem to a certain degree, but not sufficiently, and quickly responds to the problem.

[0009] Accordingly, a chair with a moveable back, which is provided until now due to the above-mentioned reasons, fails to provide convenience more than a chair with wheels, so that there are no instances commercially realized.

[0010] It is preferable that, when a user completely leans his/her body backward on a backrest in order to rest in a chair, the backrest is tilted backward at a slight angle. To achieve this, conventional chairs have elasticity to respond to the tilting. However, elasticity has a force continuously restoring to the original position, and thus, the user has to consciously apply strength to resist against the force. Moreover, a chair seat maintains a horizontal state differently from the backrest, so that the user's body slips forward.

[0011] In addition, the user moves close to a worktable and make motions which lean his/her body forward as well as move his/her lower legs backward. This is because such a motion may be comfortable to the user while at work according to characters of the work. However, a chair seat is still maintained horizontal, thereby failing to respond to the worker's posture.

[0012] In case of some chair seats, a device for slightly adjusting an inclination of the chair seat is provided on the bottom of the chair seats. However, an angle of inclination is insufficient for both rest and work, or elasticity is inappropriate for the user, and thus, the chair seats are particularly unhelpful to the user and not widely used.

Disclosure

Technical Problem

[0013] The most active method for supporting the back of a user leaning his/her body forward or moving his/her buttocks to the front end of a chair seat is to move a backrest in response to postures of the user. However, inconvenience in usage is required to be removed in order to realize the movable backrest.

[0014] A pre-applied method for fixing a moveable backrest is performed by means of a device in which holes are bored in proper positions of a fixed body of the chair, and then pins are used in a part of the moving backrest to be inserted into the holes. In this method, the positions in which the movable chair back is fixed are formed in a regular distance, and an impact is generated when the pins are inserted and removed. Another provided method is performed by means of direct friction of a cam revolving around a fixed shaft. This method requires a large force to obtain large friction for fixing the backrest, and causes severe wear due to a narrow frictional contact surface. It is preferable that the movement of the backrest is fixed at any desired positions. The operating method of brakes for fixing the backrest has to be convenient and definite, and durability has to be assured so that severe wear, etc. is not caused.

[0015] The brakes are required to be operated identically on the left and right sides in order to prevent the backrest from being twisted due to the brake operated on either of the left or right side, and another problem, that is, inconvenience of operation, does not have to be caused. Also, a configuration in which operations of the added components are not disturbed is required to be provided.

[0016] In addition, a backrest is always moved by means of a user's strength, and thus, the user bears the burden when the size of the backrest is big. Therefore, it is preferable to move the backrest merely using a small amount of strength, considering motion characteristics of a human body.

[0017] It is preferable that, even when a user moves his/her body forward or backward to support his/her back, the backrest most properly supports the whole body regions of the user.

[0018] Besides, it is preferable that, when a user sitting on a chair leans his/her body forward to work, etc., the user does not use a backrest cushion or leave the chair, and a mechanism which actively responds to a changing distance between the user and a backrest is provided.

[0019] It is preferable to easily adjust the height of a backrest not only according to the body type of a user, but also without the user leaving the chair.

[0020] In addition, it is preferable that, when a user moves his/her body close to a worktable and then makes motions which lean his/her body forward as well as move his/her lower legs backward, a chair seat is tilted forward at a determined angle and corresponds to his/her posture.

[0021] Here, it is preferable that tilting torque are different from each other when the user leans his/her body forward and backward, so that corresponding elasticity are provided to respectively respond to the torque different from each other. For the users desiring to rest in a chair, it is preferable that the backrest is tilted backward at a slight angle, that a fixing device for fixing the tilted backrest is configured so as not to provide the user with another stress caused due to elasticity restoring to the

original position, and that a chair seat is tilted backward along with the backrest so that his/her buttocks do not slip. Here, a mechanism which has a sufficient fixing force in proportion to the tilting torque is required to be configured.

Technical Solution

[0022] Provided is a device for fixing the movement of a backrest in which the operation of a brake is initiated by means of the operation which enables brake pieces to adhere to a fixed body after the brake pieces receive the operation of a brake lever, and here, surfaces are enabled to become rougher so that friction is properly generated between the brake and the fixed bodies receiving the operation of the brake pieces, and thus, the movement of the backrest is fixed at any positions by means of a sufficient fixing force even though a small amount of strength is applied.

[0023] The brake is configured so as to perform an operation in the left and right sides of a chair, and the left and right brakes are easily operated through a single operation by configuring an interlocker which interlocks the operations of the left and right brakes with each other.

The height of the backrest is adjustable so that the backrest may respond to the body type of a user. An elastic element having a tensile force is configured in a front end of a mover so that the movement of the backrest is easily performed. When the user's body leans backward, backrests supporting the region of the lumbar vertebra of the user as well as a region above the region of the lumbar vertebra are respectively configured so as to respond to the leaning body.

[0024] When the above-mentioned configuration is made, a space is secured by mounting a cover on the bottom of a chair seat so that the movement of the interlocker which interlocks left and right brake pieces with each other is not disturbed. The brake pieces receiving the operation of a brake lever move left and right or forward and backward and are compressed on a fixed region, so as to fix the movement of the backrest. When a user sitting on a chair leans his/her body forward to work, etc., the backrest is rotatable so as to actively respond to a changeable distance between the user and the backrest. A mechanism for adjusting the height of the backrest is configured so that the user may easily adjust the height of the backrest without leaving his/her chair. Different magnitude of elasticity responds to different magnitude of strength applied when the user tilts the backrestward and forward. The corresponding elasticity is handled through a compression spring system and a tension spring system, and each of the systems has a tension adjustment mechanism. A brake mechanism is configured so as to prevent buttocks of the user from slipping by causing the chair seat to be tilted when the user leans his/her body backward against the backrest as well as to have a sufficient fixing force at any angles.

Advantageous Effects

[0025] A backrest is moved, so that the backrest is positioned to support the back of a chair user leaning his/her body forward to work or moving his buttocks to the front end of a chair seat. To fix the movable backrest, the operation of a brake is initiated by means of the operation which enables brake pieces to adhere to a fixed body after the brake pieces receive the operation of a brake lever. Here, surfaces are enabled to become rougher so that friction is properly generated between the brake pieces and the fixed body receiving the operation of the brake, and thus, the movement of the backrest is fixed even though a small amount of strength is applied. Accordingly, this method remarkably reduces wear of a contact surface in comparison with a direct friction method which merely depends upon strong friction of a cam, thereby distinctly increasing the durability of the fixed body, and softly fixing the backrest at any desired positions without a noise, considering that the fixing force is obtained through penetration of pins.

[0026] Such a brake is operated on both sides of the chair rather than one side, and thus, the backrest is prevented from being twisted when strength is applied to the backrest. In addition, the operations of the left and right brakes are easily initiated through a single operation by configuring an interlocker which interlocks the operations of these left and right brakes with each other, so that, an inconvenience that the brakes are separately operated is prevented.

[0027] When the above-mentioned configuration is made, a space is secured by mounting a cover on the bottom of a chair seat so that the movement of the interlocker which interlocks left and right brake pieces with each other is not disturbed. Therefore, the chair may be used as a floor chair. Also, a general chair may be realized by mounting chair legs on the bottom of the cover. Alternatively, a chair body with a single supporting spindle may be mounted on the bottom of the cover, so that a height adjustment device as well as a chair with wheels may be configured. The backrest may properly support a user's back according to the body type of the user by adding a height adjustment function to the backrest. The backrest is always moved by means of the user's strength, so that, the user bears the burden when the size of the backrest is big. However, an elastic member having a tensile force which is applied forward is configured in a backrest mover so that the backrest may be moved using a small amount of strength according to motion characteristics of a human body, and thus, there is no need to inconveniently pull the backrest forward, and there is also no difficulty to push the backrest backward using a human back with great strength, considering the posture of a human body.

[0028] It is preferable that the region of the lumbar vertebra is mostly supported by the backrest when the user moves his/her body forward, and the head as well as the whole back region of the user are supported when the

user completely leans his/her body backward, however, it is impossible to meet these expectations together using a single backrest. Accordingly, a backrest which supports the head and the region of the thoracic vertebra is disposed behind a movable backrest, that is, independently from the moving backrest, so that, the head as well as the whole back region are supported when the user desires to completely lean his/her back backward in order to be supported. Therefore, the backrest properly supports the user, not only when the backrest is moved forward, but also when the user moves his/her body backward to adopt a posture of rest.

[0029] Besides, when a user sitting on a chair leans his/her body forward to work, a backrest may more properly respond to the user's posture and support the user through the movement of the backrest for actively responding to a changeable distance between the user and the backrest as well as another method in which an upper end of the backrest is rotated to support the user, without the help of a backrest cushion or the user leaving the chair.

[0030] A system for adjusting the height of a backrest is configured so as to respond to the fact that the supported region of the chair user is changeable according to the body type and motion of the user. Here, the backrest is configured so that the motion for adjusting the height may be performed in a state in which the user is sitting on the chair, and thus, convenience is maximized.

[0031] When the user desiring to rest in the chair leans his/her body backward onto the backrest, a chair seat is tilted backward along the tilting backrest so that buttocks of the user are prevented from slipping on the chair seat. The function for preventing the chair seat from slipping enables a chair seat to be tilted forward at a determined angle and to respond to the user's posture when the user moves his/her body close to a worktable and then makes motions which lean his/her body as well as move his/her lower legs forward, so that the user's convenience is maximized.

[0032] As described above, when the chair seat is tilted forward or backward, elastic forces occurring when the chair seat is tilted forward and backward have different magnitudes from each other. Therefore, the chair seat may respond to the leaning body of the user by configuring an elastic element responding to each motion so as to have different elastic forces, so that convenience is provided to a human body. The legs of the user may be freely moved in front of the chair, because the above-mentioned elastic element is disposed in the rear of the chair.

[0033] A brake mechanism having a sufficient fixing force at an inclined angle is configured so as to remove a restoring force of the backrest which causes the user another stress due to restoring elasticity against the tilting chair seat, so that the backrest is easily fixed and provides comfort because the restoring force does not affect the backrest.

Description of Drawings

[0034]

FIG. 1 illustrates an embodiment in which a whole configuration is included.

FIG. 2 illustrates a movable backrest system including left and right brake pieces which adhere to auxiliary rails in a perspective view.

FIG. 3 illustrates a movable backrest system including left and right brake pieces which adhere to auxiliary rails in an exploded view.

FIG. 4 illustrates a system for adjusting the height of a backrest and a movable backrest system including left and right adhesive brake pieces in a perspective view.

FIG. 5 illustrates a system for adjusting the height of a backrest and a movable backrest system including left and right adhesive brake pieces in a rear perspective view.

FIG. 6 illustrates a system for adjusting the height of a backrest and a movable backrest system including left and right adhesive brake pieces in a rear exploded perspective view.

FIG. 7 illustrates a system for adjusting the height of a backrest and a movable backrest system including up and down adhesive brake pieces in a front perspective view.

FIG. 8 illustrates a system for adjusting the height of a backrest and a movable backrest system including up and down adhesive brake pieces in a rear exploded perspective view.

FIG. 9 illustrates a configuration including an inclination adjustment unit in a perspective view.

FIG. 10 illustrates region B of the inclination adjustment device in FIG. 9 in a detail view.

FIG. 11 illustrates a chair including an inclination adjustment device mounted on a chair structure in an exploded view.

FIG. 12 illustrates a compression spring assembly and a tension spring assembly mounted on a chair in a detail view (an equilibrium state).

FIG. 13 illustrates a compression spring assembly and a tension spring assembly in an exploded view.

FIG. 14 illustrates a state in which a compression spring is operated (a compressed state).

FIG. 15 illustrates a state in which a tension spring is operated (an extended state).

FIG. 16 illustrates a brake mechanism for fixing an inclination of a chair seat in an exploded view.

Best Mode

[0035] FIG. 1 illustrates an embodiment in which a whole configuration of the present invention is included.

[0036] Hereinafter, the present invention is described in detail with reference to the accompanying drawings.

[0037] FIGS. 2 to 8 separately illustrate a chair seat on

which a movable backrest is mounted.

[0038] FIGS. 1 to 10 illustrate states in which guide rails 10 are fixed to a chair seat or a chair body, and movers 6 coupled to the guide rails are included so that a backrest may be moved forward and backward. The backrest comprises a backrest 1 making contact with a user's body, a structure 2 supporting the backrest, movers 6 coupled to the structure, and guide rails 10 coupled to the movers in order to guide the movements of the movers. A lower end of an upper structure 2 supporting the backrest and an upper end of a lower structure 5 are coupled to each other so as to be rotated forward and backward by means of a connecting rod 3 penetrating both of the lower and upper ends, thereby configuring joints. The connecting rod 3 connects the left joint and the right joint so that both of the joints are interlocked with each other.

[0039] Screws are formed inside either through hole of the upper structure 2 or the lower structure 5 among the through holes inside connection regions of the upper structure 2 and the lower structure 5 connected by means of the connecting rod 3, and the screws are coupled to other screws formed in both ends of the connecting rod 3. Here, it is preferable that the left and right screws form threads in an opposite direction. Stoppers 4 are formed on the both ends of the connecting rod 3, and the each stopper 4 has a function of a knob. The left and right joints are respectively moved in an opposite direction along the connecting rod 3 when a user rotates the stoppers 4, so that the connection regions of the upper structure 2 and the lower structure 5 adhere to each other.

[0040] Here, when contact surfaces of the connection regions of the upper structure 2 and the lower structure 5 adhere to each other by means of the rotation of the stoppers 4, unevennesses for providing a sufficient fixing force against a rotational force generated when the user is supported are formed. The connecting rod 3 forms the stoppers 4 which are used as knobs on the both ends, is a connecting pin which connects the upper structure 2 and the lower structure 5, and has a function of an interlocker which interlocks the operations of the left and right stoppers with each other, thereby providing convenience that either of the left and right stoppers may be operated. The stoppers 4 may be configured so as to be practically rotated within 180 degrees, and screws have the same function as a cam. Accordingly, in this case, the screws include the meaning of the cam and perform the role of the cam.

[0041] The lower structure 5 of the backrest is coupled to the movers in such a way that the upper structure is inserted into through holes formed in the movers 6 moving along the guide rails 10 in an upward and downward direction, so that the user may adjust the height of the upper structure up and down. Also, Stoppers 16 which are fixing means for fixing the upward and downward movement of the backrest structure are mounted on one side of the movers 6, and the backrest structure is fixed at a desired height by tightening the stoppers 16. The

stoppers 16 may be operated by means of screw coupling, or by means of friction generated by the use of a cam.

[0042] The guide rails 10 are fixed on a chair seat 15, and, in case of an integrated chair in which a chair seat and a lower body are fixed to each other and unchangeable, the guide rails may be fixed to the chair seat 15 or a chair body. Brakes which are fixing means for controlling the movements of the movers 6 are coupled to the movers 6.

[0043] FIGS. 2 and 3 illustrate configurations of a movable backrest system including left and right brake pieces 7 which adhere to auxiliary rails 11.

[0044] The auxiliary rails 11 are fixed to a chair seat or the bodies of guard rails 10. Brake pieces 7 are coupled in front of movers 6, and the brake pieces 7 are pressed to the auxiliary rails 11 by operating a brake lever 8, because the auxiliary rails 11 are disposed between the brake pieces 7, and thus, the movers are fixed. Unevennesses are formed on a contact surface of the auxiliary rails 11 and the brake lever 8, so that resistance against slipping is increased when the brakes are operated (not shown). Once the brake lever 8 is operated, the operation of the brake lever 8 affects the brake in the far side by means of a connecting rod 9 which interlocks the operations of the left and right brakes with each other.

[0045] The connecting rod 9 and the brake pieces 7 are coupled to each other by means of screws. And, when the screws coupling the left and right brake pieces 7 are formed in an opposite direction, a balanced force is provided to the left and right brake pieces, so that the brake pieces are properly resisted against an external torque twisting the left and right brake pieces. The auxiliary rails 11 are separately configured and used as a brake frame in which the brake pieces 7 are operated. Here, because obtaining a slight amount of flexibility due to the shape of the auxiliary rails 11, the auxiliary rails absorb change caused by the operation of the brakes, and enable the brake pieces 7 to be pressed in a balanced manner, and thus, the brakes are definitely operated.

[0046] FIGS. 4 to 6 illustrate configurations of a brake system including left and right adhesive brake pieces in a movable backrest.

[0047] In FIGS. 4 to 6, brakes pieces 7 are coupled in front of movers 6 so as to move left and right, and the tops of the brake pieces 7 are guided to the guide rails 10 and move forward and backward together with movers 6. A connecting rod 9 is coupled to the brake pieces 7 in a penetrating manner, and the connecting rod 9 and the brake pieces 7 are coupled by means of screws. Right-handed and left-handed screws are used together, so that the brake pieces 7 provided in an opposite direction approach each other, and then adhere to or move farther from a fixed region. Here, the fixed region refers to an immobile region in comparison with a moving fixer, and may be a chair seat, anything fixed to a chair seat such a guide rail, or any regions of a fixed chair body. That is, one end of the connecting rod 9 is fixed to a brake

lever 8, and the left and right brake pieces operated by means of the rotation of the brake lever 8 are moved in an opposite direction because screws are respectively coupled in an opposite direction, and thus, the brake pieces are pressed to guide rails 10, that is, the fixed regions, and the movements of the movers 6 are fixed. Here, contact surfaces between the brake pieces 7 and the guide rails 10 form unevennesses, or become rougher so that a backrest obtains a sufficient supporting power which prevents the backrest from being pushed when supporting a user.

[0048] The operation of the brake lever 8 practically merely uses a rotation smaller than a half rotation, and thus, screws affecting such a rotation have the same operation as a cam. That is, the screws are operated identically to the cam when threads are formed within 180 degrees. Accordingly, here, screw coupling includes the function and meaning of the cam. Any two brake pieces 7 may perform a braking operation by using the same types of screw.

[0049] In FIGS 4 to 6, four brake pieces 7 are configured, so that stable braking effects are expected, however, any two brake pieces may be omitted, and the functions are still effective even though the any two brake pieces are omitted. In addition, although a single brake piece 7 may perform a braking function, it is preferable that at least two or more brake pieces are used to perform a stable braking function.

[0050] In FIGS. 4 to 6, FIG. 7, and FIG. 8, brake pieces 7 are respectively coupled in front of the sides of the protrusions of movers 6 so as to be moved upward and downward, and the brake pieces 7 are moved forward and backward together with the movers 6 in a state in which the tops of the brake pieces are slightly distanced from guide rails 10. A connecting rod 9 is coupled to the left and right movers. Contact surfaces of the brake piece 7 and the connecting rod 9 make contact with each other in a state in which a cam 17 is formed in the connecting rod 9.

[0051] One end of the connecting rod 9 is fixed to a brake lever 8, and the rotation of the brake lever 8 is transferred to the cam 17 formed in the left and right sides of the connecting rod 9. And the left and right brake pieces 7 are moved upward by means of the operation of the cam 17 in order to be pressed to the guide rails 10, that is, the fixed region, and thus, the movements of the movers 6 are fixed.

[0052] Here, contact surfaces between the brake pieces 7 and the guide rails 10 form unevennesses, or become rougher so that a backrest obtains a sufficient supporting power which prevents the backrest from being pushed when supporting a user.

[0053] In FIGS. 7 and 8, the connecting rod 9 plays a role of a connecting pin coupling the brake pieces 7 each other as well as has a function for operating the brake pieces, while at the same time interlocking the brake pieces of the left and right brakes with each other and operating the brake pieces together. Accordingly, the back-

rest is stably supported in the left and right sides, thereby effectively resisting an external torque. Also, even any brake on the left or right side may be operated, and conveniently, such a braking effect may be obtained by means of a single operation of the brake on any side.

[0054] As shown in FIGS. 2 to 11, a cover 14 is mounted on the bottom of the chair seat, thereby securing a space in which the connecting rod 9 coupling the left and right brakes may be moved forward and backward without disturbance. In addition, in a state in which chair legs (a lower structure 92 of a chair) are not provided as shown in FIGS. 2 to 8, the cover may have a function such as a floor chair, and also, the cover 14 may play a role of a supporter against a floor.

[0055] In addition, the chair legs (a lower structure 92 of a chair) are provided on the bottom of the cover 14, so that a general chair may be realized. Alternatively, a chair body which comprises one chair leg, that is, a single supporting spindle, may be mounted on the bottom of the cover, and thus, a height adjustment device as well as a chair with wheels may be configured.

[0056] In order to easily move the backrest, especially to conveniently pull the backrest forward, elastic members 12, that is, spring elements are coupled to the front end of the movers 6 and to fixers fixed to the front end of the chair seat, and configured so that a tensile force is applied, and thus, the backrest may be moved toward the front end of the chair. Therefore, in case that a user sitting on a chair leans or moves his/her body forward, the backrest is moved forward along with his/her back moving forward by means of a tensile force of the extended elastic members 12, that is, the spring elements when the brake lever 8 is released, and then adheres to his/her back. After that, when the backrest is stopped at a proper position, the brake lever 8 is operated, so that the backrest is fixed and supports his/her back.

[0057] Conversely, in case that the user leans or moves his/her body backward, the backrest is in a freely movable state when the brake lever 8 is released, and here, the backrest is pushed backward when the user pushes the backrest backward using his/her back, and after that, the backrest is fixed at a desired position by means of the operation of the brake lever 8. In the above-mentioned process, the operation of pushing the backrest backward using the strength of a human back may be easily performed, considering the structure of a human back.

[0058] It is preferable that the region of the lumbar vertebra is mostly supported by the backrest when the user moves his/her body forward. On the other hand, it is preferable that the head as well as the whole back region of the user are supported when the user completely leans his/her body backward, however, it is impossible to meet these expectations together using a single backrest. Accordingly, a backrest which supports the head as well as the region of the thoracic vertebra of the user is additionally disposed behind the movable backrest which is configured at a lower height (shown in FIG. 1), so that, the

head as well as the whole back region of the user are supported when the user completely leans his/her body backward in order to be supported. Therefore, the backrest properly supports the user, not only when the backrest is moved forward, but also when the user moves his/her body backward to adopt a posture of rest.

[0059] FIGS. 4 to 9 illustrate a system for adjusting the height of a backrest mounted on a backrest 1.

[0060] In FIGS. 6 and 8, fixers 101 fixed to the backrest 1 are coupled to a structure 2 so as to be moved upward and downward.

[0061] A part of a structure 104 of the system for adjusting the height of a backrest is fixed to the backrest 1 by means of fixers 103, and extended lower parts of the structure 104 are formed in a parallel manner and have a fixing lug 106 protruded in the shape of a plate in a vertical direction against a horizontal rod disposed in the middle of the extended lower parts. Also, bored surfaces of regions upwardly protruded in the shape of a plate in the middle of brake operating pieces 105 are inserted into the horizontal rod, so that the rod of the structure 104 guides the brake operating pieces 105.

[0062] A spring 107 with a tensile force is inserted between the fixing lug 106 and the regions protruded in the shape of a plate in the middle of the brake operating pieces 105, so that the backrest 1 is fixed in such a way that both outside ends of the brake operating pieces 105 are interlocked with unevennesses formed in the backrest structure 2 (shown in FIGS. 4 to 9) by means of the tensile force. When adjusting the height of the backrest 1, a user enables the both outside ends of the brake operating pieces to be uninterlocked with the backrest structure 2 by grabbing knobs downwardly protruded from the brake operating pieces 105, and thus, the backrest 1 may be moved upward and downward along the backrest structure 2, and the user may adjust the height of the backrest 1 by applying his/her strength upward and downward in a state in which the user grabs the knobs of the brake operating pieces 105. When the user releases the knobs of the brake operating pieces 105 after adjusting a desired height, the ends of the brake operating pieces are again interlocked with the unevennesses formed in the backrest structure 2 (shown in FIGS. 4 to 9) by means of a restoring force of the spring 107, and thus, the backrest 1 is fixed.

[0063] The knobs of the brake operating pieces 105 are configured so as to be protruded more below than the bottom of the backrest 1, so that the chair user may adjust the height of the backrest by moving his/her hands backward without leaving the chair.

[0064] FIGS. 9 to 16 illustrate a structure of an inclination adjustment device mounted on a chair.

[0065] A chair seat regards a horizontal structural element 91 of a lower structure of a chair as a horizontal shaft, and the horizontal shaft is supported and fixed by a chair seat supporting member 90 of which one side is rotatably inserted and the other side is fixed to the bottom of the chair seat or a chair seat cover 14 covering the

bottom of the chair seat. That is, an upper end of the chair seat supporting member 90 is fixed to the bottom of the chair seat or the chair seat cover 14 covering the bottom of the chair seat, while a lower end of the chair seat supporting member is inserted into the horizontal structural element 91 so as to enable the chair seat to be rotated forward and backward.

[0066] As devices for absorbing a shock and restoring to the original position against the tilting caused due to the rotation of the chair, spring systems respectively respond to forward tilting and backward tilting of the chair are mounted in the rear of the chair, as shown in FIGS. 9 to 11. Because these spring systems are disposed in the rear, and the front of the chair is left empty, a space in which legs of a chair user may be freely moved is secured.

[0067] Hereinafter, configurations and operation states of these spring systems are separately described in the following states: an equilibrium state in which a chair is in a horizontal and stable state because a chair user does not apply an external force causing an inclination, an operation state in which a compression spring is compressed because the chair is tilted backward, and an operation state in which a tension spring is extended because the chair is tilted forward.

[An equilibrium state of a compression spring (shown in FIGS. 9 to 12)]

[0068] Both ends of a compression spring assembly which is mounted in a compressed state are fixed to an upper end unit 71 having a wide plate which can support the spring as well as a lower plate 74, and a restoring force of the spring is suppressed by long-linear expansion suppression connectors 72 which couple and connect the two plates together to prevent the plates from being spread from each other. An upper end of the expansion suppression connectors 72 are coupled to the upper end unit 71, and a lower end of the expansion suppression connectors pass through and are fixed to a rotation supporter 58 by means of a nut 75 which is a separation preventing means, so that the length of the compression spring is maintained. In case of a balanced state in which a chair seat is not tilted forward or backward, a restoring force of the spring becomes an equilibrium state in which any force is not applied to the chair seat.

[A compressed state of the compression spring (shown in FIG. 14)]

[0069] When a user rotates and tilts the chair seat backward, the compression spring assembly is operated and resists the tilting.

[0070] A compression force generated by means of the rotation of the chair seat is applied to the upper end unit 71 of the compression spring assembly through a compression spring guide unit 70 attached to the chair

seat, and thus, the spring receives the applied compression force. However, the expansion suppression connectors 72 are configured so as to penetrate the rotation supporter 58 and to freely protrude below the rotation supporter when the spring is compressed, so that only the compression spring is compressed and a restoring force is generated. In the course of this, an upper end of a tension spring assembly is fixed to the chair seat, and a lower end is not affected by the compression because a lower end unit 54 of the tension spring is configured so as to freely pass through a hole bored in the rotation supporter 58.

[A method for adjusting a pressure of the compression spring]

[0071] A spring pressure adjuster 76 is coupled to the rotation supporter 58 by means of screws, and adjusts the pressure by moving the lower plate 74 upward or downward when being moved upward or downward by means of the rotation of a knob 77.

[An equilibrium state of a tension spring (shown in FIGS. 9 to 12)]

[0072] A tension spring assembly which is mounted in an extended state is fixed to an upper end unit 51 and a lower end unit 54, and a distance between the two plates is prevented from being narrowed by means of a distance between the lower end unit 54 connected with a tension adjuster 56 through screws and a head region of the tension adjuster 56. In case of a balanced state in which a chair seat is not tilted forward or backward, an equilibrium state in which any force is not applied to the chair seat is made.

[An extended state of the tension spring (shown in FIG. 15)]

[0073] When a user rotates and tilts the chair seat forward, the tension spring assembly is operated and resists the tilting. When a tensile force generated by means of the rotation of the chair seat is applied to the upper end unit 51 of the tension spring assembly through a tension spring unit 50 attached to the chair seat as well as a rotation shaft pin 52, the tension adjuster 56 is suppressed from being moved upward by means of an upward movement suppressing element 55 which has a hole larger than the hole bored in the rotation supporter 58 and is coupled to the tension adjuster 56 through screws, and a lower end of the spring is fixed to the lower end unit 54 coupled to the tension adjuster 56 through screws is fixed, while the upper end unit 51 coupled to an upper end of the spring is separated from the head region of the tension adjuster 56 and extended upward, and thus, a restoring force returning to the original position is generated.

[0074] In the course of this, a semicircle-shaped pro-

trusion of the upper end unit 71 of the compression spring is freely separated from the compression spring guide unit 70, thereby not affecting the extension.

[A method for adjusting a pressure of the tension spring]

[0075] A user adjusts a tensile force of the tension spring by sufficiently moving the upward movement suppressing element 55 downward, and then fixing the rotation of the lower end unit 54 coupled to the tension adjuster 56 through screws and rotating a tension adjuster knob 57, and, after the adjustment, the user moves the upward movement suppressing element 55 onto the rotation supporter 58 again.

[0076] Because the chair seat performs a rotary motion, the rotation supporter 58 of the spring system has to be rotatably coupled to rotating couplers 59 of a chair structure 92, and maintain a stable angle against a restoring force of the compression spring and the tension spring.

[0077] Considering that each torque has a different magnitude when a person who sitting on a chair tilts the chair seat forward using his/her femoral region or when the person tilts the chair seat backward using his/her back and weight, elasticity of the compression spring and the tension spring are differently applied from each other. For example, a small torque is applied when the chair seat is tilted forward, so that a spring with small elasticity (here, a tension spring) is used to resist the tilting, while a big torque is applied when the chair seat is tilted backward, so that a spring with big elasticity (here, a compression spring) is used to resist the tilting. Accordingly, elastic members, that is, a compression spring and a tension spring, have restoring forces different from each other according to the change.

[0078] FIG. 16 illustrates an operating unit of a brake mechanism for fixing an inclination of a chair seat.

[0079] In the brake mechanism for fixing an inclination of the chair seat, a cam 85 is coupled to a bracket 86 configured on a brake case 84 through a rotation shaft 87. Brake pieces 81 and 120 respond to the motion of the cam, because guide units 88 and 89 of the brake pieces 81 and 120 are inserted into through holes of the brake case 84.

[0080] A circular brake frame 83 is fixed to the chair structure 92 as shown in FIGS. 9 to 11, and, when the user operates a brake stick 82 after rotating the chair seat at a desired angle, brake pieces 81 and 120 are moved to each other through the cam 85 fixed to the end of the brake stick 82, thereby pressing the brake frame between the brake pieces. Accordingly the chair seat is fixed at a desired angle of inclination.

[0081] The brake frame 83 may respond to a substantial angle of inclination, because it forms a circular shape, and also, the brake frame may bear a substantial torque against the rotation of the chair seat, because the radius of the circular brake frame is substantially large. Contact surfaces of the brake frame and the brake pieces form

unevennesses, or become rougher, so that a fixing force may be more effectively improved.

[0082] The above-mentioned chair according to the present invention can be implemented through a variety of modifications that will be possible within the scope of the appended claims, the detailed description, and the accompanying drawings, and therefore these modifications are in the scope of the present invention.

Mode for Invention

Industrial Applicability

[0083] People sitting on a chair and working, studying, conducting a research, performing an operation in front of a desk, a table, etc. often lean their backs forward, or repeat a posture which leans their backs backward in a backrest, considering characteristics of the types of work. Here, conventional chairs fail to sufficiently respond to and properly support postures of the people, and thus, as time passes by, fatigue is accumulated, work efficiency is reduced, and a bad posture is induced.

[0084] The present invention is provided so as to respond to changeable postures of the people most properly, especially suitable for them. The present invention may relieve their physical fatigue, increase work efficiency by helping their concentration, prevent a variety of diseases caused by bad postures from occurring, and help recovering from the diseases caused due to bad postures by inducing good postures.

Claims

1. A chair, on a chair seat or a chair frame, comprising guide rails which are fixed to the chair seat in a forward and backward direction, and movers which are coupled to the guide rails and are moved in a forward and backward direction of the chair, **characterized in that** the chair with a backrest which is movable in a forward and backward direction of the chair comprises a brake device which fixes the movements of the movers, and the brake device comprises brake pieces which receive the operation of a brake lever, and then are compressed to a fixed region of the chair and fix the movers.
2. The chair according to claim 1, wherein the brake device comprises an interlocker which interlocks left and right brake units with each other by means of either operation of the left or right brake device.
3. The chair according to claim 1 wherein a structure 2 supporting a backrest comprises a lower structure 5 having left and right ends which are extended downward, and the lower structure 5 is coupled to through holes of a mover, which are bored in an upward and downward direction, so as to adjust the height of the

backrest.

4. The chair according to claim 1 wherein the chair comprises tensioned elastic members 12 which are configured so that both ends of the tensioned elastic members are coupled to fixers 13 and the front of the movers 6 of the backrest. 5
5. The chair according to claim 1 wherein the chair further comprises an immobile backrest behind the movable backrest, separately from the movable backrest. 10
6. The chair according to claim 1 to 5 wherein the chair comprises a lower chair seat cover 14. 15
7. The chair according to claim 1 to 5 wherein brake pieces 7 are compressed to auxiliary rails 11 after receiving the operation of a brake lever, thereby fixing the movement of the backrest. 20
8. The chair according to claim 1 to 5 wherein the brake pieces 7 are compressed to a fixed region by means of a connecting rod 9 interlocking the operations of the left and right brake pieces with each other after receiving the operation of the brake lever, thereby fixing the movement of the backrest. 25
9. The chair according to claim 1 to 5 wherein the brake pieces 7 are compressed to the fixed region through an up-and-down movement of the brake pieces 7 by means of a cam 17 formed on the connecting rod 9 which interlocks the operations of the left and right brake pieces with each other after receiving the operation of the brake lever, thereby fixing the movement of the backrest. 30
10. The chair according to claim 1 to 5 wherein an upper structure 2 and the lower structure 5 of the backrest is rotatably coupled to a connecting rod 3, and the angle of the backrest may be adjusted through the operations of stoppers 4. 35
11. The chair according to claim 1 to 5 wherein the backrest has a height adjustment system which adjusts the height of a backrest 1 upward and downward, and is protruded more below than the bottom of the backrest so that a user sitting in the chair may grab knobs protruded backward from brake operating pieces 105 even in a sitting state. 40
12. The chair according to claim 10 wherein a part of a structure 104 of the system for adjusting the height of the backrest is fixed to the backrest 1, and extended lower parts of the structure are formed in a parallel manner and have a protruded fixing lug 106 between the extended lower parts; the brake operating pieces 105 are inserted along the structure on both sides 45

of the fixing lug, and a spring 107 is inserted between the fixing lug 106 and the brake operating pieces 105; and both outside ends of the each brake operating piece 105 are formed so as to be interlocked with unevennesses formed in the backrest structure 2. 50

13. The chair according to claim 1 to 5 wherein, the chair comprises a chair seat supporting member 90 of which the one end is fixed to the bottom of the chair seat and the other end is rotatably coupled to a horizontal structural element 91 formed in an upper end of a chair structure in a horizontal direction; and, when a user tilts the chair seat by rotating the chair seat forward or backward, elastic elements 53 and 73 which respond to the each tilting and have elasticity different from each other. 55
14. The chair according to claim 13 wherein the one elastic element comprises a compression spring; an upper end unit 71 and a lower end plate 74 which respectively fixes the top and the bottom of the compression spring; a spring pressure adjuster 76 which supports the lower end plate 74 and is coupled to a rotation supporter 58; linear expansion suppressing connectors 72 which not only connect the upper end unit 71 and the lower end plate 74 but also pass through the rotation supporter 58, and have lower ends fastened by means of separation preventing means 75; a compression spring guide unit 70 which is fixed to the chair seat and coupled to a protrusion of the upper end unit 71; and the rotation supporter 58 which is rotatably coupled to rotating couplers 59 mounted on the chair structure. 60
15. The chair according to claim 14, wherein the pressure of the compression spring is adjusted in such a way that the pressure adjuster 76 which supports the lower end plate 74 and is coupled to the rotation supporter 58 by means of screws is moved upward and downward, and thus, elasticity of the compression spring is controlled. 65
16. The chair according to claim 13 wherein the other elastic element comprises a tension spring; an upper end unit 51 and a lower end unit 54 which respectively fix the top and the bottom of the tension spring; a tension adjuster 56 which maintains the length of the spring between the upper end unit and the lower end unit; a tension spring unit 50 which is rotatably connected to the upper end unit 51 through a rotation shaft pin 52 and fixed to the chair seat; the rotation supporter 58 which is rotatably coupled to the rotating couplers 59 mounted on the chair structure; and an upward movement suppressing element 55 which is coupled to the tension adjuster 56 through screws and is configured below the rotation supporter 58. 70

17. The chair according to claim 16 wherein the pressure of the tension spring is adjusted in such a way that the tension adjuster 56 coupled to the upward movement suppressing element 55, which is larger than a hole in the rotation supporter, through screws is moved upward and downward below the hole bored in the rotation supporter 58 so that the lower end unit 54 which supports the upper end unit 51 and is coupled to the tension adjuster 56 through screws may pass through the rotation supporter, and thus, elasticity of the tension spring is controlled.
18. The chair according to claim 1 to 5 wherein the chair comprises a brake mechanism comprising: the chair seat supporting member 90 of which the one end is fixed to the bottom of the chair seat and the other end is rotatably coupled to the horizontal structural element 91 formed in the chair structure in a horizontal direction; and a circular brake frame 83 which is formed on the chair structure so as to be concentric around the rotation shaft 91 of the chair seat, and the brake mechanism is mounted on the chair seat and causes the brake frame 83 to be operated, so as to fix the rotation of the chair seat.
19. The chair according to claim 18 wherein the brake mechanism comprises a brake case 84 which is fixed to the chair seat or the cover, that is, a fixed region; brake pieces 81 which are coupled to the brake case; and a cam 85 which enables the brake pieces to be pressed to the brake frame 83 after receiving the operation of the brake stick.

Fig. 1

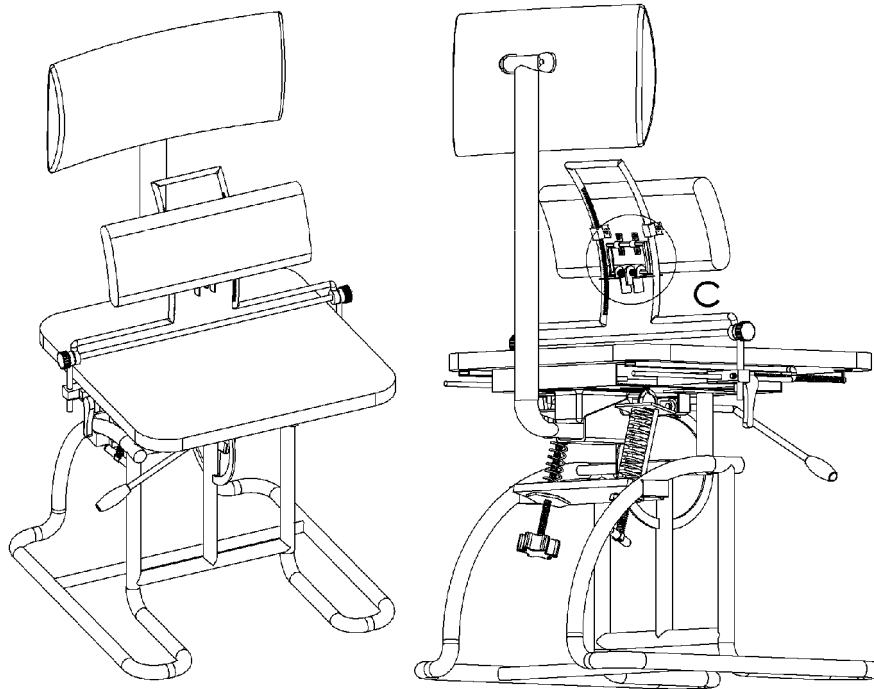


Fig. 2

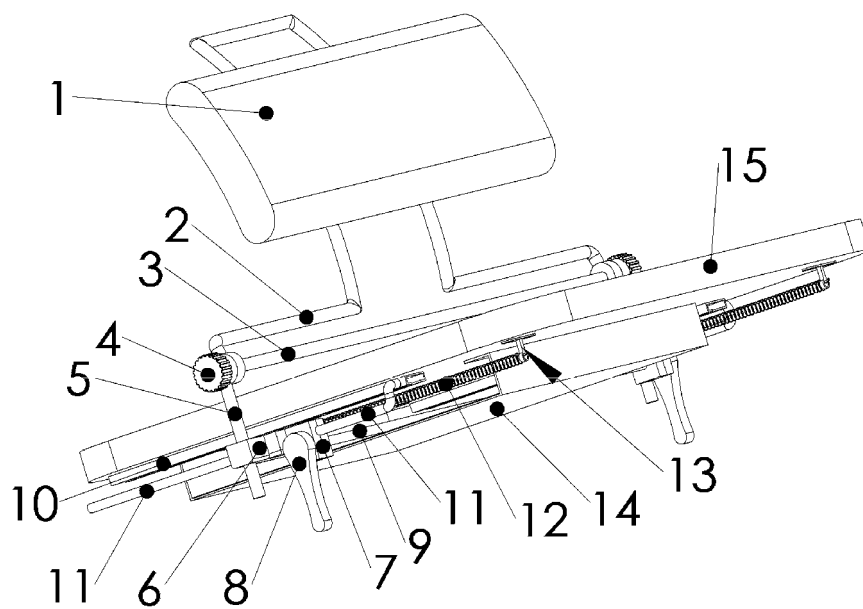


Fig. 3

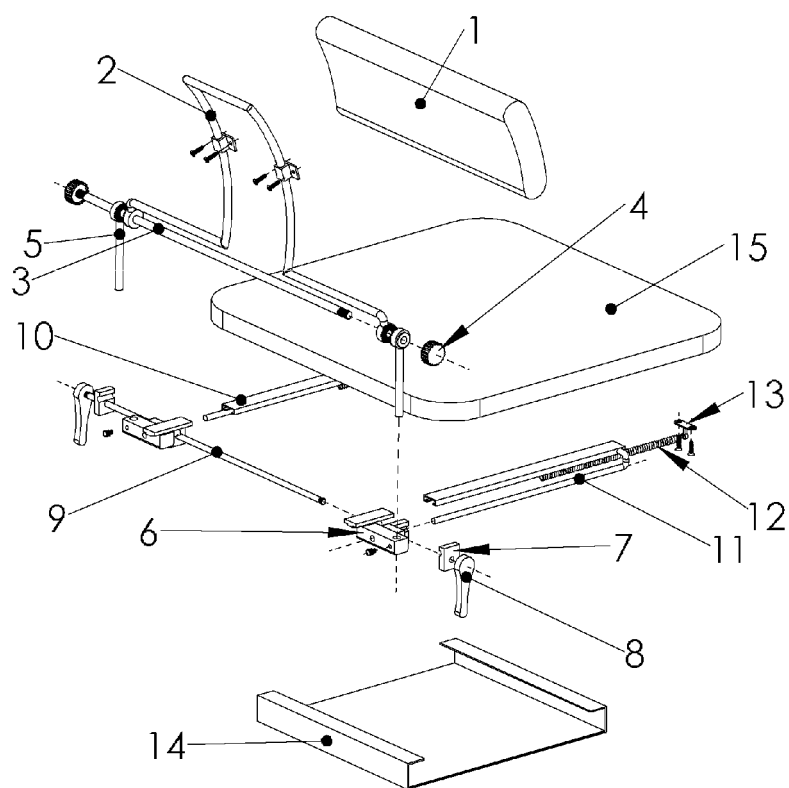


Fig. 4

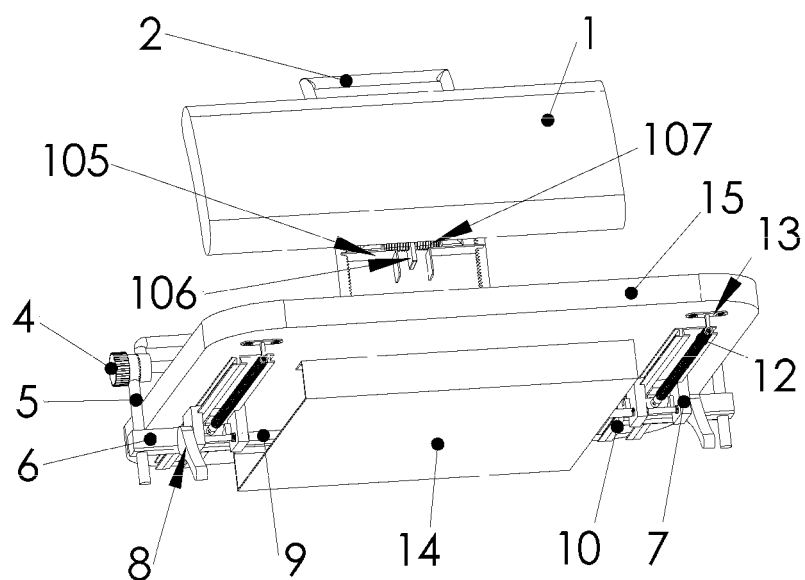


Fig. 5

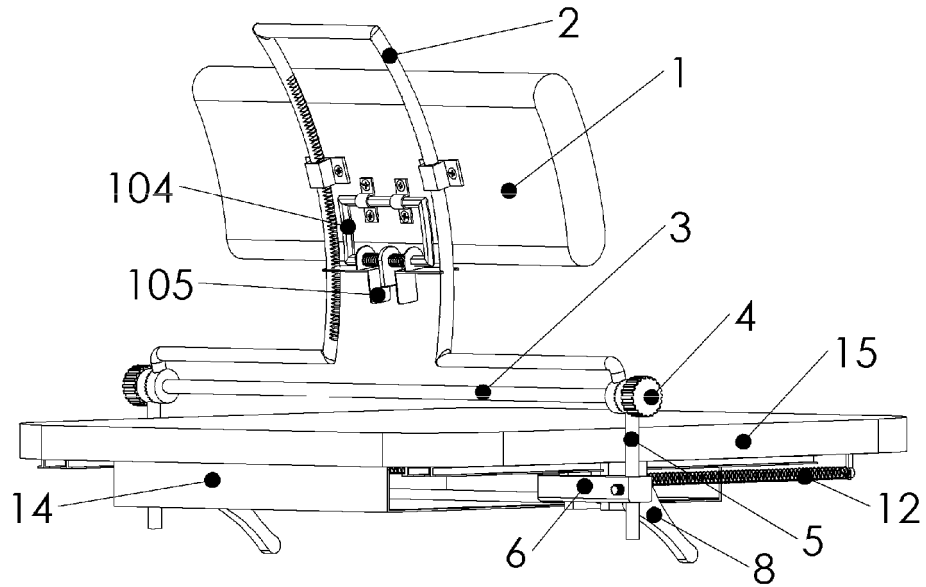


Fig. 6

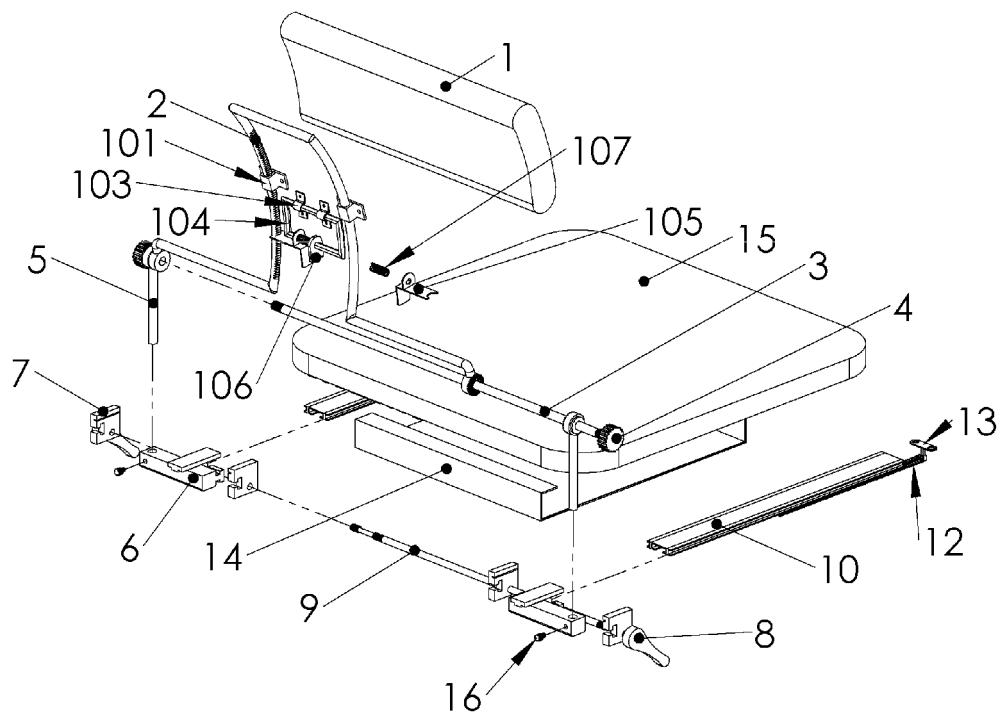


Fig. 7

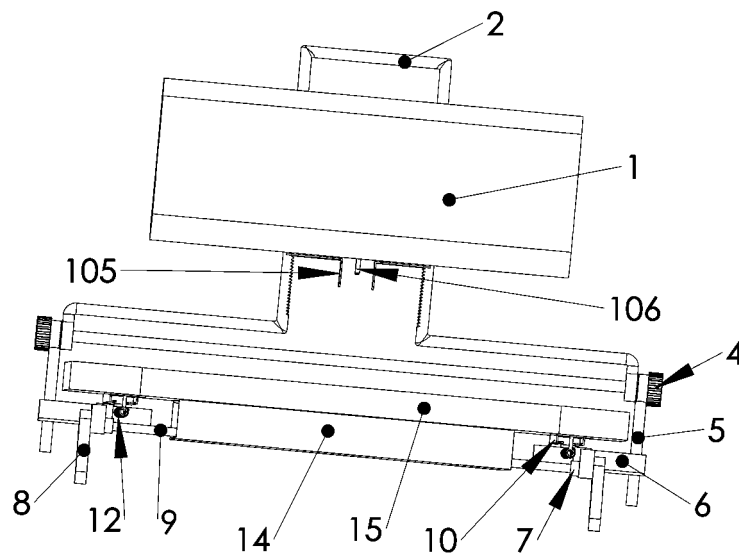


Fig. 8

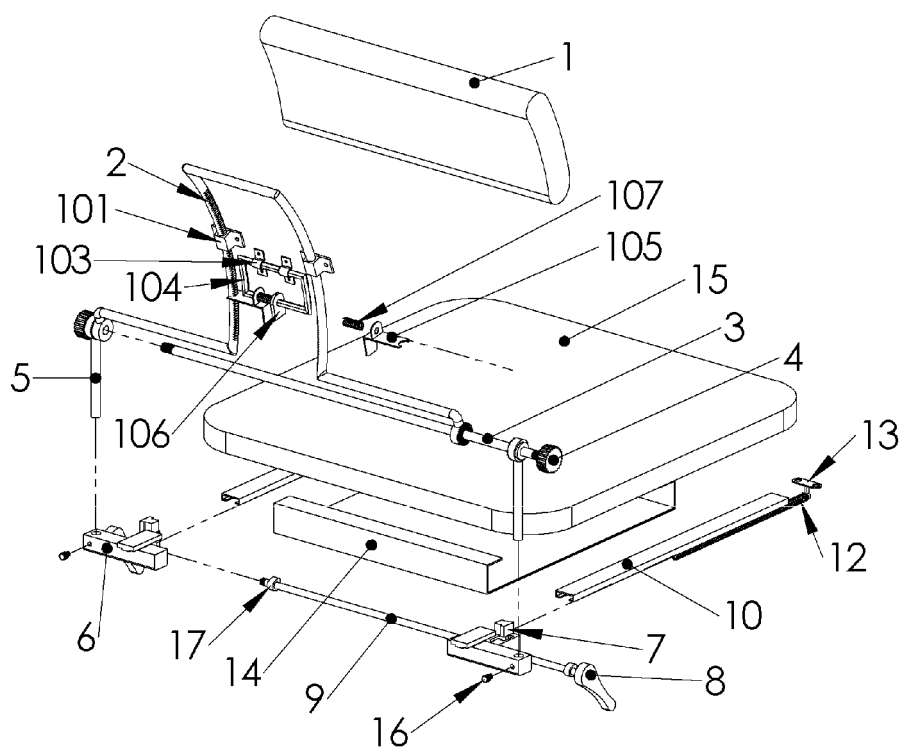


Fig. 9

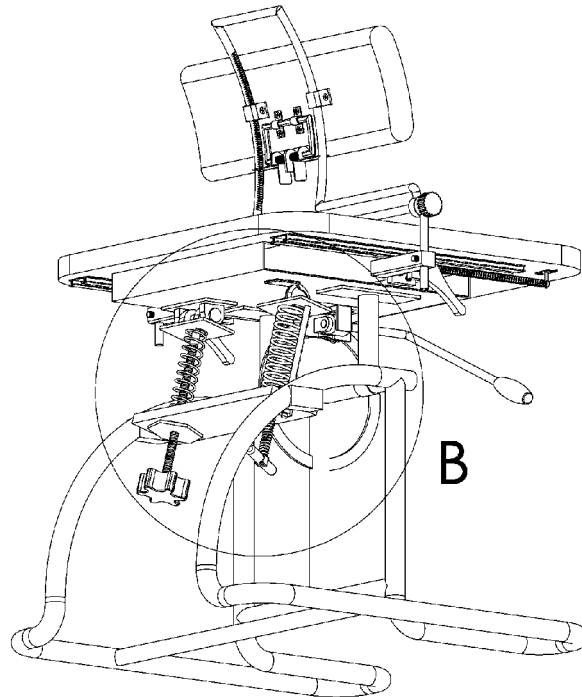


Fig. 10

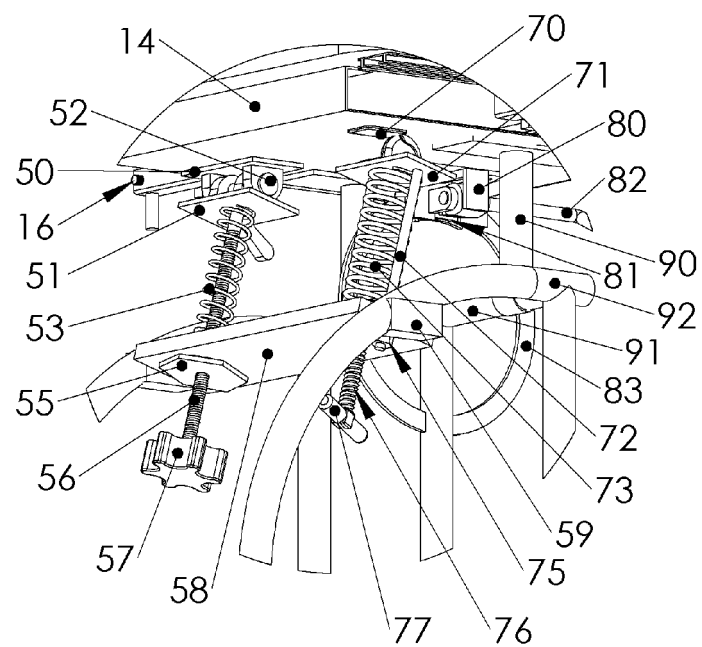


Fig. 11

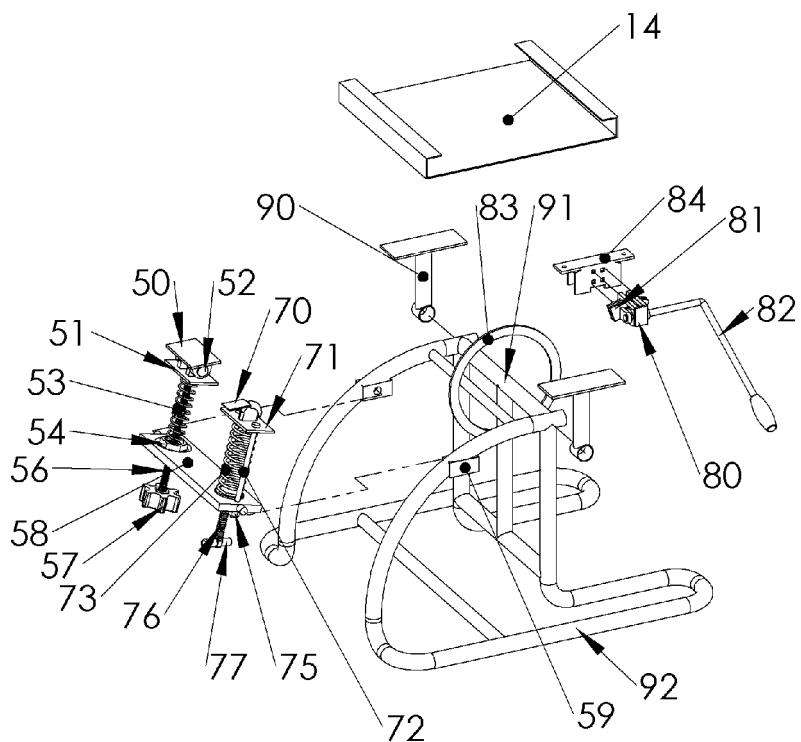


Fig. 12

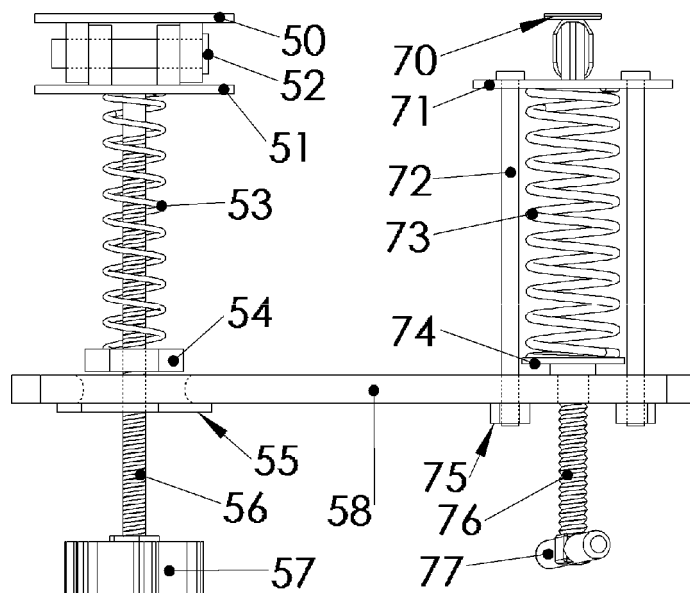


Fig. 13

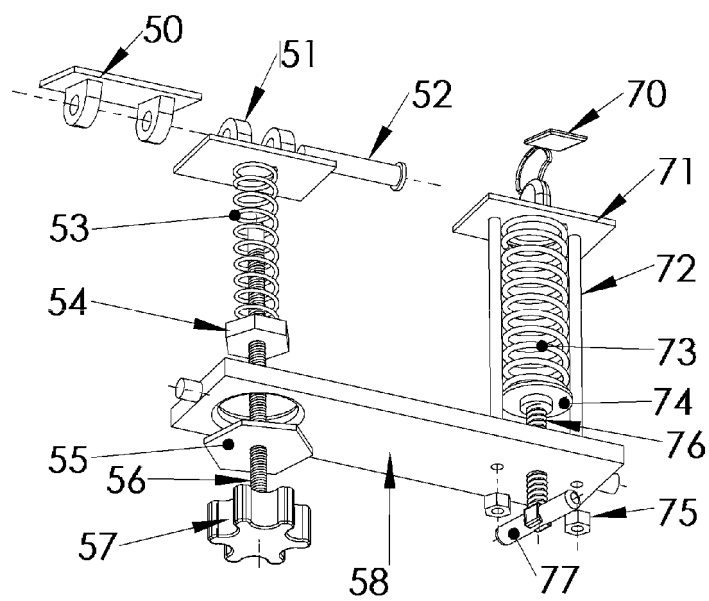


Fig. 14

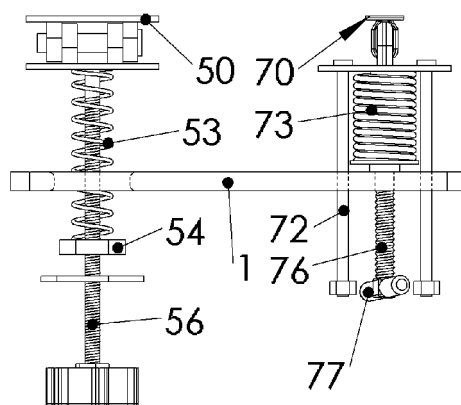


Fig. 15

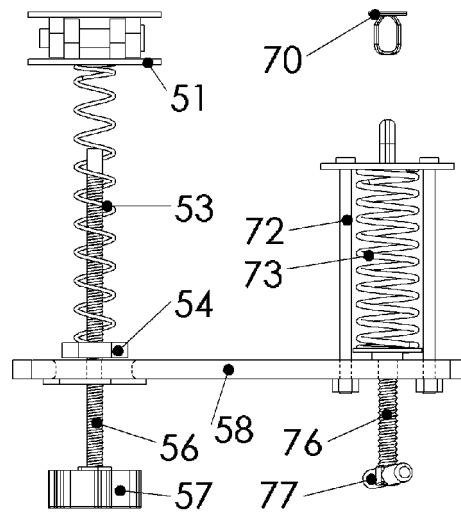


Fig. 16

