

APPARATUS AND ARMREST FOR ADJUSTING HEIGHT OF RESTING PLATE

TECHNICAL FIELD

[0001] Various embodiments relate to an apparatus and an armrest for adjusting a height of a rest portion, such as a resting plate.

BACKGROUND

[0002] The following discussion of the background is intended to facilitate an understanding of the present disclosure only. It should be appreciated that the discussion is not an acknowledgment or admission that any of the material referred to was published, known, or is part of the common general knowledge of the person skilled in the art in any jurisdiction as of the priority date of the disclosure.

[0003] Conventionally, an armrest is used to support a user's arm, wrist and/or hand while the user is sitting on a seat, such as a chair. Such armrest may provide enhanced comfort to the user by reducing a load down to the user's back and a strain on the user's shoulder and/or neck, when the user is seating on the seat. The conventional armrest may often be adjustable to accommodate users having different heights and body proportions. For example, a height of the armrest may be adjustable with respect to the user's input.

[0004] However, conventional armrests may have some problems. For example, some conventional armrests may offer a step-free height adjustment, but such height adjustment may be achieved by a use of a rotation of the armrest with respect to a pivot point. Therefore, when the armrest is rotated, the height of the armrest may be adjusted upward or downward, but such rotation may cause the armrest to move forward or backward unintentionally. This unintentional movement may cause discomfort to the user, as the user needs to do a second adjustment to correct the unintentional movement.

[0005] As another example, some other conventional armrests may make use of a sliding metal tube rail with a plurality of holes spaced apart in a straight line in a vertical direction. The height of the armrest may be adjusted, by attaching a corresponding latch to one of the plurality of holes. However, the armrest may cause play and looseness in a gap at a part that the latch is attached to the one of the plurality of holes, especially, for example, when the armrest is pulled or pushed. Also, the armrest may have a limitation in that the height of the armrest may be adjusted to the pre-set heights only.

[0006] In addition, the above-mentioned conventional armrests may not provide a measurement indication of a current height of the armrest. Moreover, there may be a dissimilar armrest height between a left armrest and a right armrest, for example, due to part size differences. Also, there may be a limitation of low precision in adjusting the height of the armrest.

[0007] Accordingly, there exists a need for an improved apparatus and an improved armrest, that seek to address at least one of the aforementioned problems.

SUMMARY

[0008] According to various embodiments, there is an apparatus for adjusting a height of a resting plate comprising: a hydraulic means configured to support the resting plate, and configured to move along an axis to adjust the height of the resting plate; and an activator connected to the hydraulic means, and configured to activate and control the hydraulic means to move along the axis to adjust the height of the resting plate, or deactivate the hydraulic means to stop at the adjusted height, based on first external force on the activator.

[0009] According to various embodiments, there is an apparatus for indicating a height of a resting plate supported by a first supporting means and a second supporting means comprising: a variable resistor comprising: a track connected to the first supporting means; and a slider connected to the second supporting means, and movably disposed on the track; and a display electrically connected to the variable resistor, wherein a position of the slider on the track is changed according to a movement of the first supporting means, the variable resistor is configured to detect a resistance depending on the changed position of the slider on the track, and measure the height of the resting plate based on the detection, and the display is configured to display the measured height of the resting plate.

[0010] According to various embodiments, there is an armrest comprising: a resting plate configured to rest an object thereon; and an apparatus for adjusting a height of the resting plate comprising: a hydraulic means configured to support the resting plate, and configured to move along an axis to adjust the height of the resting plate; and an activator connected to the hydraulic means, and configured to activate and control the hydraulic means to move along the axis to adjust the height of the resting plate, or deactivate the hydraulic means to stop at the adjusted height, based on first external force on the activator.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] In the drawings, like reference characters generally refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead generally being placed upon illustrating the principles of the invention. In the following description, various embodiments are described with reference to the following drawings, in which:

[0012] FIG. 1 shows a perspective view of an apparatus and an armrest according to various embodiments.

[0013] FIGS. 2A to 2E show various perspective views of an apparatus according to various embodiments.

[0014] FIG. 3 shows a perspective view of an apparatus and an armrest according to various embodiments.

[0015] FIG. 4 shows a perspective view of an apparatus and an armrest according to various embodiments.

[0016] FIG. 5 shows a perspective view of an apparatus according to various embodiments.

DESCRIPTION

[0017] The following detailed description refers to the accompanying drawings that show, by way of illustration, specific details and embodiments in which the disclosure may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the disclosure. Other embodiments may be utilized and structural, and logical changes may be made without departing from the scope of the disclosure. The various embodiments are not necessarily mutually exclusive, as some embodiments can be combined with one or more other embodiments to form new embodiments.

[0018] The disclosure illustratively described herein may suitably be practiced in the absence of any element or elements, limitation or limitations, not specifically disclosed herein. Thus, for example, the terms “comprising”, “including,” “containing”, etc. shall be read expansively and without limitation. The word "comprise" or variations such as "comprises" or "comprising" will accordingly be understood to imply the inclusion of a stated integer or groups of integers but not the exclusion of any other integer or group of integers. Additionally, the terms and expressions employed herein have been used as terms of description and not of limitation, and

there is no intention in the use of such terms and expressions of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the disclosure. Thus, it should be understood that although the present disclosure has been specifically described in exemplary embodiments and optional features, modification and variation of the disclosure embodied herein may be resorted to by those skilled in the art.

[0019] Features that are described in the context of an embodiment may correspondingly be applicable to the same or similar features in the other embodiments. Features that are described in the context of an embodiment may correspondingly be applicable to the other embodiments, even if not explicitly described in these other embodiments. Furthermore, additions and/or combinations and/or alternatives as described for a feature in the context of an embodiment may correspondingly be applicable to the same or similar feature in the other embodiments.

[0020] In the context of various embodiments, the articles “a”, “an” and “the” as used with regard to a feature or element include a reference to one or more of the features or elements. As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items.

[0021] While terms such as “first”, “second” etc., may be used to describe various elements, such elements are not limited to the above terms. The above terms are used only to distinguish one element from another, and do not define an order and/or significance of the elements. Without departing a scope of rights of the specification, a first element may be referred to as a second element, and similarly, the second element may be referred to as the first element.

[0022] It should be understood that the terms “on”, “over”, “top”, “bottom”, “down”, “side”, “back”, “left”, “right”, “front”, “lateral”, “side”, “up”, “down” etc., when used in the following description are used for convenience and to aid understanding of relative positions or directions, and not intended to limit the orientation of any device, structure or any part of any device or structure.

[0023] The term “coupled” (or “connected”) herein may be understood as mechanically coupled, for example attached or fixed, or just in contact without any fixation, and it will be understood that both direct coupling or indirect coupling (in other words: coupling without direct contact) may be provided.

[0024] In addition, the singular terms “a”, “an”, and “the” include plural references unless context clearly indicates otherwise. Similarly, the word “or” is intended to include “and” unless the context clearly indicates otherwise.

[0025] As described herein, the term “fluid” refers broadly to substances that are in the liquid state and/or gaseous, and further include substances that are able to flow. This may be or include, liquids such as liquids having a predetermined viscosity, for example, oil; or may include a gas, for example, air (including environmental air, ambient air, etc.).

[0026] As described herein, the term “hydraulic means” refers broadly to any hydraulic device that is capable of moving the resting plate using a hydraulic principle or mechanism. This may be or include, for example, a system having at least one fluid-based piston, such as a gas piston or a liquid piston. In some embodiments, there may be two pistons, which may be connected to one another via a fluid channel. The two pistons may be of the same size and be thereby configured to transmit power equally from one piston to another. The pistons may be of different sizes and therefore configured to transform distance to force, or vice versa. Alternatively or additionally, the hydraulic device include a hydraulic pump, which may be configured to displace, for example to transfer a fluid under pressure to one or more pistons, thereby causing the one or more pistons to translate along an axis. In this manner, the position of the resting plate may be controlled.

[0027] In order that the invention may be readily understood and put into practical effect, various embodiments will now be described by way of examples and not limitations, and with reference to the figures.

[0028] FIG. 1 shows a perspective view of an apparatus 100 and an armrest 200 according to various embodiments. FIGS. 2A to 2E show various perspective views of an apparatus for adjusting height of a resting plate according to various embodiments.

[0029] With reference to FIG. 1 and FIGS. 2A to 2E, the apparatus 100 for adjusting a height of a resting portion, e.g. resting plate 210 (also referred to as a “height of the armrest 200”) may be provided. In some embodiments, the apparatus 100 may be used with the resting plate 210 to rest an object on the resting plate 210. In some embodiments, the armrest 200 including the apparatus 100 for adjusting the height of the resting plate 210 may be provided. In some embodiments, the armrest 200 may further include the resting plate 210 supported by the apparatus 100. In some embodiments, the armrest 200 may further include, but is not limited to, a body or a housing (not shown) encasing at least one of the apparatus 100 and the resting

plate 210. In some embodiments, the object may include, but is not limited to, at least a part of a user's body and at least a part of an item. For example, the at least a part of the body may include, but is not limited to, an arm, a wrist, a hand, a leg and a foot. For example, the item may be any item, for example, a book, a cup, a tablet computer, or a laptop computer, that the user wishes to place on the resting plate 210.

[0030] In some embodiments, the resting plate 210 may be configured to rest the object thereon. In some embodiments, the resting plate 210 may be disposed on the apparatus 100, and the height of the resting plate 210 may be adjusted by the apparatus 100. In some embodiments, the resting plate 210 may comprise a resting top portion 210A. The resting top portion 210A may be a replaceable top having magnetic coupling means, i.e. magnetic PU (polyurethane) top to couple with a top resting plate 210C. In some embodiments, the resting top portion 210A may include a cushioned portion and the top resting plate 210C may be magnetically coupled to the cushioned portion. It is appreciable that the cushioned portion may be removably attached to the top resting plate 210C. In some embodiments, the top resting plate 210C may be attached to a bottom resting plate 210B of the apparatus 100. In some embodiments, the cushioned mat may be coated with anti-microbial materials or be formed from or of an anti-microbial fabric. In some embodiments, the top resting plate 210C may be formed from a relatively rigid material which may withstand the weight of the object, for example, a human arm, resting thereon and exerting pressure thereon.

[0031] In some embodiments, a furniture (not shown) may be provided. In some embodiments, the furniture may be a chair or a car seat. For example, the chair may include, but is not limited to, an office chair, a gaming chair, a dining chair, a bench, a wheelchair, a recliner, and a sofa. In some embodiments, the furniture may include the armrest 200. In some embodiments, the furniture may further include a second armrest (not shown) including a second resting plate (not shown) and a second apparatus (not shown) configured to support the second resting plate. In some embodiments, the second apparatus and the second resting plate may have the same shape and configuration as the apparatus 100 and the resting plate 210, respectively. In some embodiments, the armrest 200 may be referred to as a left armrest, and the second armrest may be referred to as a right armrest, and vice versa. In some embodiments, the furniture may further include, but is not limited to, a seat, a supporting component, and a backrest.

[0032] As shown in FIG. 1, the apparatus 100 may include a hydraulic means 110 and an activator 120. In some embodiments, the apparatus 100 as shown in FIG. 1 may provide a

digital measurement of the height of the resting plate 210. For example, the apparatus 100 as shown in FIG. 1 may be referred to as a “Vernier calliper concept”.

[0033] In some embodiments, the hydraulic means 110 may be disposed under the resting plate 210. For example, the hydraulic means 110 may be disposed under the bottom resting plate 210B of the apparatus 100. In some embodiments, the hydraulic means 110 may be directly or indirectly connected to the bottom resting plate 210B. For example, the hydraulic means 110 may be attached to the bottom resting plate 210B. In some embodiments, the hydraulic means 110 may be configured to support the resting plate 210. In some embodiments, the hydraulic means 110 may extend in a longitudinal direction. In some embodiments, the hydraulic means 110 may be configured to move along an axis, to adjust the height of the resting plate 210. In some embodiments, the axis may include an axis that is perpendicular (at a 90 degree angle) to a reference surface, for example, a floor. For example, the hydraulic means 110 may be configured to move upward or downward to adjust the height of the resting plate 210. In some other embodiments, the axis may include any axis between 0 and 90 degrees with respect to the reference surface. In some embodiments, the floor may include, but is not limited to, an indoor floor, an outdoor floor, a vehicle floor, a ground, and a surface of any article, for example, a table. In some embodiments, the floor may be any reference surface that the furniture (which incorporates the apparatus 100) rests on.

[0034] In some embodiments, the activator 120 may be disposed under the resting plate 210. For example, the activator 120 may be disposed adjacent to the bottom resting plate 210B. In some embodiments, the activator 120 may be directly or indirectly connected to the hydraulic means 110. For example, the activator 120 may be directly or indirectly connected to a piston (not shown) of the hydraulic means 110. The piston, which may be referred to as a fluid piston, may be a gas piston or may be a liquid piston containing a liquid, such as oil. For example, the activator 120 may be directly or indirectly connected to the top end of the hydraulic means 110, which may be adjacent to the bottom resting plate 210B. In some embodiments, the activator 120 may be disposed on the outer tube 150. In some embodiments, the outer tube 150 may include an opening window 121 (hereinafter, referred to as a “first opening window”), and the activator 120 may be connected to the gas or liquid piston of the hydraulic means 110 through the first opening window 121.

[0035] In some embodiments, the activator 120 may be a trigger mechanism of the apparatus 100. In some embodiments, the activator 120 may be configured to activate the hydraulic

means 110 to move from a current height, to adjust the height of the resting plate 210. In some embodiments, the activator 120 may be configured to be compressed (activated) in response to the user's input, for example, external force (hereinafter, referred to as a "first external force") on the activator 120. For example, when the activator 120 is compressed, the activator 120 may activate the hydraulic means 110 to move from the current height. In some embodiments, the activator 120 may be configured to deactivate (e.g. via a locking mechanism) the hydraulic means 110 to stop at the current height, based on the first external force on the activator 120. In some embodiments, the activator 120 may be released from the compression and return to an initial position, for example, when the user releases the compression. For example, when the activator 120 is released from the compression, the activator 120 may deactivate the hydraulic means 110 to stop the movement of the hydraulic means 110. In some embodiments, the activator 120 may include, but is not limited to, a trigger, a lever, and a handle. It may be appreciated that, in some embodiments, any other types of the activator 120 which may provide a necessary rotational angular range in response to the user input may be used.

[0036] In some embodiments, the activator 120 may be a control mechanism of the apparatus 100 and may comprise a lever that may actuate the activator 120 between a lock state and an unlock state. In some embodiments, in the unlock state, the activator 120 may be configured to allow the hydraulic means 110 to urge the resting plate 210 to move along the axis using a hydraulic mechanism, so as to adjust the height of the resting plate 210. In some embodiments, the activator 120 may be configured to control a direction and an amount of the movement of the hydraulic means 110, to adjust the height of the resting plate 210 to a desired height, based on the first external force on the activator 120. For example, when the activator 120 is actuated, the activator 120 may be configured to allow the movement of the resting plate 210 (or any of the constituent components 210B, 210C) to move along a first direction (for example, upward) along the axis such that the height of the resting plate 210 is increased. As another example, when the activator 120 is actuated to the unlock state, the activator 120 may be configured to allow a load to be exerted on the resting plate 210 to oppose the force of the hydraulic means, so as to move the resting plate 210 in a second direction which is opposite to the first direction (for example, downward) along the axis such that the height of the resting plate 210 is decreased. In summary, the activator 120 may toggle between an unlock state to allow the hydraulic mechanism to move the apparatus 100 along the first direction and the second direction, and a lock state to hold the apparatus 100 at a certain height.

[0037] In some embodiments, the apparatus 100 may further include a height adjuster 130.

[0038] In some embodiments, the height adjuster 130 may be disposed under the resting plate 210. In some embodiments, the height adjuster 130 may be directly or indirectly connected to the hydraulic means 110. For example, the height adjuster 130 may be connected to a fluid cylinder (not shown) of the hydraulic means 110 via an interconnecting part 222. For example, the height adjuster 130 may be connected to a bottom end of the hydraulic means 110 via the interconnecting part. In some embodiments, the height adjuster 130 may be connected to a connecting part 220 which is configured to connect the apparatus 100 to a body of the furniture, for example, the chair. In some embodiments, the height adjuster 130 may be connected to the connecting part 220 via the interconnecting part 222.

[0039] In some embodiments, the height adjuster 130 may be configured to displace the hydraulic means 110 along the axis to adjust the height of the resting plate 210, based on the user's input, for example, external force (hereinafter, referred to as "second external force") on the height adjuster 130. In some embodiments, the height adjuster 130 may be configured to control a direction and an amount of the movement of the hydraulic means 110, to adjust the height of the resting plate 210 to a desired height, based on the second external force on the height adjuster 130. In some embodiments, the height adjuster 130 may displace the apparatus 100 excluding the height adjuster 130, the bottom mounting plate 210B, and the inner tube 140 along the axis using a height adjustment mechanism which is different from the hydraulic mechanism. In some embodiments, the height adjuster 130 may allow higher precision on an adjustment of the height of the resting plate 210 (compared to the activator 120). In some embodiments, the height adjuster 130 may require specific thread dimensions to ensure the precise movement of the hydraulic means 110, while still preventing the armrest 200 from slipping.

[0040] In some embodiments, the height adjuster 130 may include, but is not limited to, a knob (for example, a fine tuning knob), a dial, a lever, and a handle. It may be appreciated that, in some embodiments, any other types of the height adjuster 130 which may provide a necessary rotational angular range in response to the user input may be used. In some embodiments, the knob may include, but is not limited to, an adjustable knob, a knob housing, and a lead screw 224. In some embodiments, the lead screw 224 may be welded with the interconnecting part 222, such that when the height adjuster 130 is rotated, the interconnecting part 222 and lead screw 224 may be displaced along a single axis. For example, the user may rotate the adjustable

knob housed by the knob housing, and the lead screw connected to the adjustable knob may allow the hydraulic means 110 to move along the axis, for example, upward or downward. In some embodiments, when the height adjuster 130, for example, the knob, is rotated to a third direction, the height adjuster 130 may be configured to displace the hydraulic means 110 to the first direction (for example, upward) along the axis such that the height of the resting plate 210 is increased. In some embodiments, when the height adjuster 130, for example, the knob, is rotated to a fourth direction which is opposite to the third direction, the height adjuster 130 may be configured to displace the hydraulic means 110 to the second direction (for example, downward) along the axis such that the height of the resting plate 210 is increased.

[0041] In some other embodiments, the activator 120 and the height adjuster 130 may not be linked, and the activator 120 may not control the height adjuster 130 but may control the activation of the hydraulic means 110. In some embodiments, the hydraulic means 110 may further include a lock (not shown) (hereinafter, referred to as a “first lock”) configured to lock the hydraulic means 110, for example, the gas or liquid piston, when the activator 120 deactivates the hydraulic means 110. For example, when the activator 120 deactivates the hydraulic means 110, the activator 120 may control the first lock to fix the hydraulic means 110, for example, the gas or liquid piston, and thus the hydraulic means 110 may not move, for example, regardless of whether the height adjuster 130, for example, the knob, is controlled by the second external force.

[0042] In some embodiments, the hydraulic means 110 may include the fluid cylinder. In various embodiments, the fluid cylinder may be filled with a viscous liquid, for example, oil, and therefore may be a liquid cylinder. In some embodiments, the fluid may be compressed, i.e. compressed fluid. In some embodiments, the fluid cylinder may be filled with compressed gas, and therefore may be a gas cylinder. In some embodiments, the hydraulic means 110 may further include the gas or liquid piston. In some embodiments, the gas or liquid piston may be configured to move along the axis, for example, upward or downward, in the fluid cylinder, based on the control of the activator 120. In some embodiments, the fluid cylinder may extend in the longitudinal direction. In some embodiments, the height adjuster 130 may be connected to the fluid cylinder through the interconnecting part. In some embodiments, a bottom end of the fluid cylinder may be disposed adjacent to the connecting part 220. For example, the bottom end of the fluid cylinder may be connected to the connecting part 220 through the interconnecting part. In some embodiments, the connecting part 220 may be sandwiched

between the height adjuster 130 and the interconnecting part. In some embodiments, the gas or liquid piston may extend in the longitudinal direction. In some embodiments, a top end of the gas or liquid piston may be disposed under the bottom surface of the resting plate 210. For example, the top end of the gas or liquid piston may be attached to the bottom resting plate 210B.

[0043] In some embodiments, the activator 120 may control the direction of the movement of the hydraulic means 110, for example, the gas or liquid piston. In some embodiments, where the hydraulic means 110 is activated, when the activator 120 is controlled by the user to increase the height of the resting plate 210, the activator 120 may allow the gas or liquid piston to move to the first direction along the axis (for example, upward) such that the gas or liquid is released to create the upward force. As the gas or liquid piston moves upward, the resting plate 210 may move upward, and thus the height of the resting plate 210 may be increased. In some embodiments, where the hydraulic means 110 is activated, such that the activator 120 is controlled by the user to decrease the height of the resting plate 210, the activator 120 may trigger the gas or liquid piston, thus opening one or more valves to allow free movement of the gas or liquid around the gas or liquid piston, such movement of gas or liquid enabling the move to the second direction along the axis (for example, downward). As the gas or liquid piston moves downward, the resting plate 210 may move downward, and thus the height of the resting plate 210 may be decreased. In some embodiments, in this manner, the height of the resting plate 210 may be adjusted within confines of gas or liquid spring strokes (not shown) of the hydraulic means 110. In some embodiments, the gas or liquid piston may require a fixed length to achieve low force required for the actuation. In some embodiments, a range of force of the gas or liquid piston may be between 1 and 40 N. In some embodiments, a range of an outer diameter dimension of the gas or liquid piston may be between 10 and 30 mm.

[0044] In some embodiments, the activator 120 may control the amount of the movement of the hydraulic means 110, for example, the gas or liquid piston. In some embodiments, the amount of the movement of the hydraulic means 110 may depend on time and/or strength of the first external force on the activator 120. For example, the amount of the gas released or trapped may depend on the time and/or the strength of the first external force on the activator 120. In another example, the amount of liquid displaced may depend on the speed of the first external force on the activator 120. For example, a higher speed may affect the amount of liquid displaced within the liquid piston enclosure.

[0045] In some embodiments, the apparatus 100 may further include, but is not limited to, an inner tube 140 and an outer tube 150. In some embodiments, the outer tube 150 may be configured to support the resting plate 210.

[0046] In some embodiments, the inner tube 140 may extend in the longitudinal direction. In some embodiments, the inner tube 140 may be disposed under the resting plate 210. In some embodiments, the inner tube 140 may be disposed adjacent to the hydraulic means 110. For example, a side surface of the inner tube 140 may be attached to a plate, for example, an aluminum plate, that may be attached to a side surface of the hydraulic means 110, for example, the fluid cylinder. In some embodiments, a bottom end of the inner tube 140 may be disposed adjacent to the connecting part 220. For example, the bottom end of the inner tube 140 may be attached to the connecting part 220 through the interconnecting part. In some embodiments, the inner tube 140 may not move along the axis, for example, upward or downward, regardless of whether the hydraulic means 110 moves along the axis, for example, upward or downward. It is appreciable that the plate attachable by the inner tube 140 may be form from various suitable metals or metallic alloys.

[0047] In some embodiments, the outer tube 150 may extend in the longitudinal direction. In some embodiments, the top end of the outer tube 150 may be disposed under the bottom surface of the resting plate 210. For example, the top end of the outer tube 150 may be attached to the bottom resting plate 210B. In some embodiments, the outer tube 150 may surround at least a part of the hydraulic means 110 and at least a part of the inner tube 140. In some embodiments, the outer tube 150 may surround at least a part of the side surface of the hydraulic means 110 and at least a part of the side surface of the inner tube 140. In some embodiments, the outer tube 150 may be configured to move along the axis, for example, upward or downward, according to the movement of the hydraulic means 110.

[0048] In some embodiments, the apparatus 100 may further include an indicator 170.

[0049] In some embodiments, the “Vernier calliper concept” as earlier mentioned may include the indicator 170 being configured to indicate the height, for example, a previous height, a current height and/or an adjusted height, of the resting plate 210. In some embodiments, the indicator 170 may further be configured to measure the height of the resting plate 210, to indicate the height of the resting plate 210. In some embodiments, the indicator 170 may indicate the measured height of the resting plate 210.

[0050] As shown in FIG. 1, in some embodiments, the indicator 170 may include, but is not limited to, a linear track 171, a sensor 172 (also referred to as a “sensor chip”), and a display 173.

[0051] In some embodiments, the linear track 171 may be connected directly or indirectly to the inner tube 140. In some embodiments, the linear track 171 may be attached to the inner tube 140. For example, a side surface of the linear track 171 may be attached to the side surface of the inner tube 140. In some embodiments, the linear track 170 may be formed along the inner tube 140.

[0052] In some embodiments, the sensor 172 may be disposed on the outer tube 150. In some embodiments, the sensor 172 may be disposed adjacent to a bottom end of the outer tube 150. In some embodiments, the sensor 172 may be disposed such that the sensor 172 may detect the linear track 171.

[0053] In some embodiments, the sensor 172 may be configured to detect the linear track 171. In some embodiments, the sensor 172 may include a capacitive linear encoder arrangement. In some embodiments, the sensor 172 may be configured to detect a position of the linear track 171 relative to the sensor 172. For example, when the height of the resting plate 210 is increased, the outer tube 150 may move along the axis, for example, upward while the inner tube 140 may not move. The sensor 172 disposed on the outer tube 150 may detect the changed position of the linear track 171 attached to the inner tube 140. In some embodiments, the sensor 172 may include, but is not limited to, an infrared (IR) sensor, a radio frequency identification (RFID), a near field communication (NFC), and an image sensor. In some embodiments, the linear track 171 may include at least one element such that the sensor 172 may detect the position of the linear track 171 which is changed with respect to the sensor 172. For example, the linear track 172 may include a plurality of RFID chips spaced apart in a vertical direction, and the sensor 172 may detect one of the plurality of RFID chips on the linear track 172. In some embodiments, the sensor 172 may measure the height of the resting plate 210, based on the detection of the sensor 172. For example, the sensor 172 may measure the height of the resting plate 210, based on the one of the plurality of RFID chips which is detected.

[0054] In some embodiments, the display 173 may be disposed on the outer tube 150. In some embodiments, the display 173 may be disposed adjacent to the top end of the outer tube 150. In some embodiments, the display 173 may be configured to display the height of the resting plate 210 which is measured by the sensor 172.

[0055] In some embodiments, the apparatus 100 may further include a zero function button 160. In some embodiments, the zero function button 160 may be disposed under the resting plate 210. For example, the zero function button 160 may be disposed adjacent to the bottom resting plate 210B. In some embodiments, the zero function button 160 may be directly or indirectly connected to the hydraulic means 110. For example, the zero function button 160 may be directly or indirectly connected to the gas or liquid piston of the hydraulic means 110. For example, the zero function button 160 may be directly or indirectly connected to a top end of the hydraulic means 110, which is adjacent to the bottom resting plate 210B. In some embodiments, the zero function button 160 may be disposed on the outer tube 150. In some embodiments, the outer tube 150 may include an opening window 122 (hereinafter, referred to as a “second opening window”), and the zero function button 160 may be accessible through the second opening window 122. For example, the user may access the zero function button 160 through the second opening window 122, to control, for example, turn on/off, the zero function button 160.

[0056] In some embodiments, the zero function button 160 may include a tactile button (not shown) and a main circuit board (not shown). In some other embodiments, the zero function button 160 may not include its main circuit board, and may use the main circuit board 174. In some embodiments, the zero function button 160 may be configured to calibrate the resting plate 210 to a same height as any reference point (for example, bottom of a table).

[0057] In some embodiments, the indicator 170 may further include a main circuit board 174. In some embodiments, the main circuit board 174 may act as a data centre for measurements of the height of the resting plate 210. In some embodiments, the main circuit board 174 may house a plurality of electric components. In some embodiments, the main circuit board 174 may be a printed circuit board (PCB) configured to connect the plurality of electric components one another. In some embodiments, the plurality of electric components may include, but is not limited to, a battery 175, a light source 176, and the sensor 172. In some embodiments, the plurality of electric components may further include a processor (not shown) configured to control at least one of the light source 176, the sensor 172, and the display 173. In some embodiments, the processor may be a microcontroller unit (MCU) 174A. The MCU 174A may be configured to detect a resistance value and then translates it to the value to be displayed on the display 173.

[0058] In some embodiments, the light source 176 may be disposed on the main circuit board 174. In some embodiments, the light source 176 may be directly or indirectly connected to the display 173. In some embodiments, the light source 176 may be a light-emitting diode (LED). In some embodiments, the light source 176 may be configured to emit light. In some embodiments, the light source 176 may be capable of producing a light colour. In some embodiments, the light source 176 may be configured to emit light, based on whether the display 173 is on or off. For example, the processor may control the light source 176 to emit light in a predetermined light colour when the display 173 is on, and not to emit light when the display 173 is off. In some embodiments, the light source 176 may be capable of selectively producing a plurality of light colours. As another example, the processor may control the light source 176 to emit light in a predetermined first light colour, for example, green colour, when the display 173 is on, and not to emit light in a predetermined second light colour, for example, yellow colour, when the display 173 is off. In some embodiments, the processor may control the light source 176 to emit light in a predetermined third light colour, for example, red colour, when the battery 175 does not have enough power.

[0059] In some embodiments, the battery 175 may power at least one of the light source 176, the sensor 172, and the display 173. In some embodiments, the battery 175 may be a chargeable battery or non-chargeable battery which is replaceable. For example, the battery 175 may be a coin battery, but is not limited thereto.

[0060] In some embodiments, the apparatus 100 as shown in FIGS. 2A to 2E may provide a digital measurement of the height of the resting plate 210. For example, the apparatus 100 as shown in FIGS. 2A to 2E may comprise a variable resistor. In some embodiments, the variable resistor may comprise a linear potentiometer, and the obtainment of digital measurement may be referred to as a “linear potentiometer concept”.

[0061] In some embodiments, although not shown, the apparatus 100 may include a hydraulic means 110, an activator 120, a height adjuster 130 as described with reference to FIG. 1. In some embodiments, the apparatus 100 may further include an indicator 170 as shown in FIGS. 2A to 2E. In some embodiments, although not shown, an armrest 200 which may include, but is not limited to, the apparatus 100 and a resting plate 210 as described with reference to FIG. 1 may be provided. In some embodiments, although not shown, a furniture, for example, a chair, which may include the armrest 200 may be provided.

[0062] In some embodiments, the apparatus 100 may further include an inner tube 140 and an outer tube 150 as described with reference to FIG. 1. In some embodiments, the apparatus 100 may further include a zero function button 160 as described with reference to FIG. 1.

[0063] As shown in FIGS. 2A to 2E, the indicator 170 may be configured to indicate the height, for example, a current height and an adjusted height, of the resting plate 210. In some embodiments, the indicator 170 may further be configured to measure the height of the resting plate 210, to indicate the height of the resting plate 210. In some embodiments, the indicator 170 may indicate the measured height of the resting plate 210.

[0064] As shown in FIGS. 2A to 2E, in some embodiments, the indicator 170 may include, but is not limited to, a linear potentiometer 177 and a display 173.

[0065] In some embodiments, the linear potentiometer 177 may be connected directly or indirectly to the outer tube 150. In some embodiments, the linear potentiometer 177 may be attached to the outer tube 150. For example, a side surface of the linear potentiometer 177 may be attached to a side surface of the outer tube 150. In some embodiments, the linear potentiometer 177 may be formed along the outer tube 150. In some embodiments, the linear potentiometer 177 may extend in a longitudinal direction. In some embodiments, the linear potentiometer 177 may be disposed under a bottom resting plate 210B of the apparatus 100. The linear potentiometer 177 may be controlled by a microcontroller.

[0066] In some embodiments, the linear potentiometer 177 may include a track 177a and a slider 177b. In some embodiments, the track 177a may extend in the longitudinal direction. In some embodiments, the track 177a may be in the form of an elongated recess, and provide a path for the slider 177b. In some embodiments, the track 177a may be connected directly or indirectly to the outer tube 150. In some embodiments, the track 177a may move along an axis, for example, upward or downward, according to the movement of the hydraulic means 110 and the outer tube 150.

[0067] In some embodiments, the slider 177b may be connected directly or indirectly to the inner tube 140. In some embodiments, the slider 177b may be attached to the inner tube 140. For example, a side surface of the slider 177b may be attached to a side surface of the inner tube 140. In some embodiments, the slider 177b may be movably disposed on the track 177a of the linear potentiometer 177. In some embodiments, a position of the slider 177b on the track 177a may be changed according to the movement of the outer tube 150, as the inner tube 140 may not move regardless of the movement of the hydraulic means 110 and the outer tube 150.

[0068] In some embodiments, the linear potentiometer 177 may be configured to detect the position of the slider 177b disposed on the track 177a of the linear potentiometer 177. For example, when the height of the resting plate 210 is increased, the outer tube 150 may move to a first direction (for example, upward) while the inner tube 140 may not move. The linear potentiometer 177 disposed on the outer tube 150 may detect the changed position of the slider 177b on the track 177a of the linear potentiometer 177. In some embodiments, the linear potentiometer 177 may detect a resistance, which may depend on the position of the slider 177b. In some embodiments, the linear potentiometer 177 may measure the height of the resting plate 210, based on the detected resistance.

[0069] In some embodiments, the display 173 may be disposed on the outer tube 150. In some embodiments, the display 173 may be disposed adjacent to a top end of the outer tube 150. In some embodiments, the display 173 may be configured to display the height of the resting plate 210 which is measured by the linear potentiometer 177.

[0070] In some embodiments, the indicator 170 may further include, but is not limited to, a main circuit board 174 housing a plurality of electric components, as described with reference to FIG. 1. In some embodiments, the plurality of electric components may include, but is not limited to, a battery 175 as described with reference to FIG. 1, a light source 176 as described with reference to FIG. 1, and the linear potentiometer 177. Although not shown, the plurality of electric components may further include a processor configured to control at least one of the light source 176 as described with reference to FIG. 1, the display 173, and the linear potentiometer 177.

[0071] In some other embodiments, an apparatus 100 for indicating the height of the resting plate 210 supported by a first supporting means (also referred to as the “outer tube”) 150 and a second supporting means (also referred to as the “inner tube”) 140 may be provided. The apparatus 100 may include the linear potentiometer 177 including a track 177a connected to the first supporting means 150, and the slider 177b connected to the second supporting means 140, and movably disposed on the track 177a. The apparatus 100 may further include the display 173 electrically connected to the linear potentiometer 177. The position of the slider 177b on the track 177a may be changed according to the movement of the first supporting means 150. The linear potentiometer 177 may be configured to detect a resistance depending on the changed position of the slider 177b on the track 177a, and measure the height of the

resting plate 210 based on the detection, and the display 173 may be configured to display the measured height of the resting plate 210.

[0072] FIG. 3 shows a perspective view of an apparatus 100 and an armrest 200 according to various embodiments. In some embodiments, the apparatus 100 as shown in FIG. 3 may provide a mechanical measurement of the height of the resting plate 210. For example, the apparatus 100 as shown in FIG. 3 may be referred to as a “rack and pinion concept”.

[0073] Although not shown, the apparatus 100 may include a hydraulic means 110, an activator 120, a height adjuster 130 as described with reference to FIG. 1. In some embodiments, the apparatus 100 may further include an indicator 170 as shown in FIG. 3. In some embodiments, the armrest 200 which may include, but is not limited to, the apparatus 100 and a resting plate 210 as described with reference to FIG. 1 may be provided. In some embodiments, although not shown, a furniture, for example, a chair, which may include the armrest 200 may be provided.

[0074] In some embodiments, the apparatus 100 may further include an inner tube 140 and an outer tube 150 as described with reference to FIG. 1. In some embodiments, the apparatus 100 may provide a zero function to calibrate the resting plate 210 to a same height as any reference point (for example, bottom of a table).

[0075] As shown in FIG. 3, the indicator 170 may be configured to indicate the height, for example, a current height and an adjusted height, of the resting plate 210. In some embodiments, the indicator 170 may include, but is not limited to, a linear rack 178 and a pinion gear 179.

[0076] In some embodiments, the linear rack 178 may be connected directly or indirectly to the inner tube 140. In some embodiments, the linear rack 178 may be attached to the inner tube 140. For example, a side surface of the linear rack 178 may be attached to a side surface of the inner tube 140. In some embodiments, the linear rack 178 may be formed along the inner tube 140. In some embodiments, the linear rack 178 may extend in a longitudinal direction. In some embodiments, the linear rack 178 may be disposed under a bottom resting plate of the apparatus 100. In some embodiments, the linear rack 178 may not move along an axis, for example, upward or downward, regardless of the movements of the hydraulic means 110 and the outer tube 150.

[0077] In some embodiments, the pinion gear 179 may be connected directly or indirectly to the outer tube 150. In some embodiments, the pinion gear 179 may be attached to the outer

tube 150. For example, the pinion gear 179 may be attached to a side surface of the outer tube 150. In some embodiments, the pinion gear 179 may be disposed under the bottom resting plate. In some embodiments, the pinion gear 179 may rotate and move along the axis, for example, upward or downward, according to the movements of the hydraulic means 110 and the outer tube 150.

[0078] In some embodiments, the linear rack 178 may include a plurality of teeth 178a. For example, each of the plurality of teeth 178a may be spaced apart in a straight line in a vertical direction. In some embodiments, the pinion gear 179 may include a pinion gear body 179a and an indicating element 179b attached to the pinion gear body 179a. In some embodiments, the pinion gear body 179a may be attached to the outer tube 150. In some embodiments, when the hydraulic means 110 and the outer tube 150 move, the pinion gear body 179a may be configured to rotate and move along the linear rack 178. In some embodiments, the pinion gear body 179a may be configured to rotate and move along the linear rack 178, along with the indicating element 179b, as the pinion gear body 179a may be attached to the indicating element 179b. In some embodiments, while the hydraulic means 110 and the outer tube 150 move, the pinion gear body 179a may move and rotate along the plurality of teeth 178a. When the hydraulic means 110 and the outer tube 150 stop moving, the pinion gear body 179a may engage with one of the plurality of teeth 178a. In some embodiments, the indicating element 179b may show a relative position change between the indicating element 179b and the plurality of teeth 178a, according to the movements of the hydraulic means 110 and the outer tube 150. For example, the indicating element 179b may show which tooth among the plurality of teeth 178a is engaged with the pinion gear body 179a. The tooth engaged with the pinion gear body 179a may be regarded as an indication of the height of the resting plate 210.

[0079] FIG. 4 shows a perspective view of an apparatus 100 and an armrest 200 according to various embodiments. In some embodiments, the apparatus 100 as shown in FIG. 4 may provide a mechanical measurement of the height of the resting plate 210. For example, the apparatus 100 as shown in FIG. 4 may be referred to as a “measurement tape concept”.

[0080] Although not shown, the apparatus 100 may include a hydraulic means 110, an activator 120, a height adjuster 130 as described with reference to FIG. 1. In some embodiments, the apparatus 100 may further include an indicator 170 as shown in FIG. 4. In some embodiments, the armrest 200 which may include, but is not limited to, the apparatus 100 and a resting plate 210 as described with reference to FIG. 1 may be provided. In some embodiments, although

not shown, a furniture, for example, a chair, which may include the armrest 200 may be provided.

[0081] In some embodiments, the apparatus 100 may further include an inner tube 140 and an outer tube 150 as described with reference to FIG. 1. In some embodiments, the apparatus 100 may provide a zero function to calibrate the resting plate 210 to a same height as any reference point (for example, bottom of a table).

[0082] As shown in FIG. 4, the indicator 170 may be configured to indicate the height, for example, a current height and an adjusted height, of the resting plate 210. In some embodiments, the indicator 170 may include, but is not limited to, an opening window 181, a first gear 182a, a second gear 182b, a belt 183, and a measurement tape 184.

[0083] In some embodiments, the opening window 181 may be formed on the outer tube 150. For example, the opening window 181 may be formed on an upper part of the outer tube 150.

[0084] In some embodiments, the first gear 182a and the second gear 182b may be disposed between the outer tube 150 and the inner tube 140. In some embodiments, the first gear 182a and the second gear 182b may be attached to the outer tube 150. In some embodiments, the belt 183 may be attached to the inner tube 140. In some embodiments, the belt 183 may be looped on the first gear 182a and the second gear 182b and looped on the first gear and the second gear, and may be configured to move according to rotations of the first gear 182a and the second gear 182b by the movement of the hydraulic means 110 and the outer tube 150. In some embodiments, the measurement tape 184 may be attached to the belt 183, and thus the measurement tape 183 attached to the belt 183 may be attached to the inner tube 140 and may be configured to move along the movement of the belt 183. In some embodiments, the measurement tape 184 and the belt 183 may be formed from or of a flexible material, for example, a fabric.

[0085] In some embodiments, a plurality of dimension indicators (not shown) may be indicated on the measurement tape 184. For example, each of the plurality of dimension indicators may be spaced apart in a straight line in a vertical direction. In some embodiments, a part of the measurement tape 184 may be visible through the opening window 181. For example, at least one dimension indicator among the plurality of dimension indicators may be visible through the opening window 181. In some embodiments, the opening window 181 may be configured to show the at least one dimension indicator among the plurality of dimension indicators

indicated on the measurement tape 184, as the height, for example, the adjusted height, of the resting plate.

[0086] In some embodiments, the measurement tape 184 attached to the belt 183 may move according to the movements of the hydraulic means 110 and the outer tube 150. For example, when the hydraulic means 110 and the outer tube 150 move, the first gear 182a and the second gear 182b may rotate, and the measurement tape 184 attached to the belt 183 may move. As the measurement tape 184 attached to the belt 183 moves, the at least one dimension indicator visible through the opening window 181 may change. In this regard, the at least one dimension indicator visible through the opening window 181 may be regarded as an indication of the height of the resting plate 210.

[0087] FIG. 5 shows a perspective view of an apparatus 100 according to various embodiments. In some embodiments, the apparatus 100 as shown in FIG. 5 may provide a mechanical measurement of the height of the resting plate 210. For example, the apparatus 100 as shown in FIG. 5 may be referred to as a “physical linear indicator concept”.

[0088] Although not shown, the apparatus 100 may include a hydraulic means 110, an activator 120, a height adjuster 130 as described with reference to FIG. 1. In some embodiments, the apparatus 100 may further include an indicator 170 as shown in FIG. 5. In some embodiments, although not shown, an armrest 200 which may include, but is not limited to, the apparatus 100 and a resting plate 210 as described with reference to FIG. 1 may be provided. In some embodiments, although not shown, a furniture, for example, a chair, which may include the armrest 200 may be provided.

[0089] In some embodiments, the apparatus 100 may further include an inner tube 140 and an outer tube 150 as described with reference to FIG. 1.

[0090] As shown in FIG. 5, the indicator 170 may be configured to indicate the height, for example, a current height and an adjusted height, of the resting plate 210. In some embodiments, the indicator 170 may include, but is not limited to, an opening window 181, a fixed indicator 185 and a plurality of dimension indicators 186.

[0091] In some embodiments, the opening window 181 may be formed on the outer tube 150. For example, the opening window 181 may extend in a longitudinal direction. In some embodiments, the opening window 181 may be formed along the outer tube 150.

[0092] In some embodiments, the fixed indicator 185 may be indicated on the outer tube 150. In some embodiments, the fixed indicator 185 may be indicated by printing, stamping,

engraving, attached sticker, and/or indentation. In some embodiments, the fixed indicator 185 may be positioned on the outer tube 150, adjacent to the opening window 181.

[0093] In some embodiments, the plurality of dimension indicators 186 may be indicated on the inner tube 140. In some embodiments, the plurality of dimension indicators 186 may be indicated by printing, stamping, engraving, embossing, attached sticker, and/or indentation. In some embodiments, each of the plurality of dimension indicators 186 may be spaced apart in a straight line in a vertical direction. In some embodiments, the plurality of dimension indicators 186 may be visible through the opening window 181.

[0094] In some embodiments, the fixed indicator 185 may be positioned on the outer tube 150 adjacent to the plurality of dimension indicators 186, such that the fixed indicator 150 may point one of the plurality of dimension indicators 186 or a gap between two of the plurality of dimension indicators 186 (hereinafter, referred to as a “corresponding dimension indicator”), at any adjusted height of the resting plate 210. For example, the fixed indicator 185 may be aligned with the corresponding dimension indicator.

[0095] In some embodiments, the opening window 181 may be configured to show a relative position change between the fixed indicator 185 and the plurality of dimension indicators 186 according to the movements of the hydraulic means 110 and the outer tube 150, as the height, for example, the adjusted height, of the resting plate 210.

[0096] In some embodiments, the fixed indicator 185 may move according to the movements of the hydraulic means 110 and the outer tube 150. For example, when the hydraulic means 110 and the outer tube 150 move, the fixed indicator 185 moves. As the fixed indicator 185 moves, the corresponding dimension indicator may change. In this regard, the changed corresponding dimension indicator may be regarded as an indication of the height of the resting plate 210.

[0097] As described above, the apparatus 100 according to various embodiments may offer a step-free height adjustment, by using a vertical motion to adjust the height of the resting plate 210, instead of a rotational motion. Also, the apparatus 100 according to various embodiments may allow the resting plate 210 to move between a lower height position and a higher height position without steps, by using the hydraulic means 110 to adjust the height of the resting plate 210.

[0098] In addition, the apparatus 100 according to various embodiments may provide high precision in an adjustment of the height of the resting plate 210, for example, by using the

height adjuster 130. Moreover, the apparatus 100 according to various embodiments may provide high precision in measurement of the height of the resting plate 210, for example, by using a battery-powered electronic high precision height reader (for example, the indicator 170 as described with reference to FIGS. 1 and 2) or using mechanical elements (for example, the indicator 170 as described with reference to FIGS. 3 to 5), and thus the function of the hydraulic means 110 may be enhanced.

[0099] Moreover, the apparatus 100 according to various embodiments may provide the indication of the height of the resting plate 210. Therefore, the user may discern the height of one armrest, for example, a left armrest, of the chair, and precisely adjust both armrests, for example, left and right armrests, to a desired and/or similar height.

[00100] While the disclosure has been particularly shown and described with reference to specific embodiments, it should be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the disclosure as defined by the appended claims. The scope of the disclosure is thus indicated by the appended claims and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced.

CLAIMS

What is claimed is:

1. An apparatus for adjusting a height of a resting plate comprising:
a hydraulic means configured to support the resting plate, and configured to move along an axis to adjust the height of the resting plate; and
an activator connected to the hydraulic means, and configured to activate and control the hydraulic means to move along the axis to adjust the height of the resting plate, or deactivate the hydraulic means to stop at the adjusted height, based on first external force on the activator.
2. The apparatus according to claim 1, further comprising a height adjuster connected to the hydraulic means, and configured to displace the hydraulic means along the axis to adjust the height of the resting plate, based on second external force on the height adjuster.
3. The apparatus according to claim 2, further comprising an indicator configured to indicate the adjusted height of the resting plate.
4. The apparatus according to claim 3, wherein the hydraulic means comprises:
a fluid cylinder filled with compressed fluid; and
a piston configured to move along the axis in the fluid cylinder, based on the control of the activator.
5. The apparatus according to claim 4, wherein the height adjuster comprises a knob connected to the fluid cylinder through an interconnecting part, and configured to displace the hydraulic means along the axis to adjust the height of the resting plate based on the second external force on the knob.
6. The apparatus according to claim 5, wherein when the hydraulic means is activated by the activator, the activator is configured to control the piston to move to a first direction, or allow a load exerted on the resting plate to oppose the movement of the piston in a second direction, the second direction opposite the first direction.

7. The apparatus according to claim 6, wherein the hydraulic means further comprises a lock, and
when the hydraulic means is deactivated by the activator, the lock is configured to fix the piston not to move.
8. The apparatus according to claim 3, further comprising:
an inner tube disposed under the resting plate, and disposed adjacent to the hydraulic means; and
an outer tube surrounding at least a part of the hydraulic means and at least a part of the inner tube, configured to support the resting plate, and configured to move according to the movement of the hydraulic means.
9. The apparatus according to claim 8, wherein the indicator is further configured to measure the adjusted height of the resting plate, to indicate the adjusted height of the resting plate.
10. The apparatus according to claim 9, wherein the indicator comprises:
a linear track connected to the inner tube;
a sensor connected to the outer tube; and
a display configured to display the adjusted height of the resting plate,
wherein the sensor is configured to detect a position of the linear track relative to the sensor, and measure the adjusted height of the resting plate based on the detection.
11. The apparatus according to claim 10, further comprising a zero function button disposed on the outer tube, and configured to calibrate the resting plate to a reference point.
12. The apparatus according to claim 10, wherein the indicator further comprises a main circuit board housing at least one of a battery, a light source, and the sensor.
13. The apparatus according to claim 12, wherein the light source is configured to emit light based on whether the display is on or off.

14. The apparatus according to claim 9, wherein the indicator comprises:
a linear potentiometer comprising:
a track connected to the outer tube; and
a slider connected to the inner tube, and movably disposed on the track; and
a display configured to display the adjusted height of the resting plate,
wherein a position of the slider on the track is changed according to the movement of the outer tube, and
the linear potentiometer is configured to detect a resistance depending on the changed position of the slider on the track, and measure the adjusted height of the resting plate based on the detection.
15. The apparatus according to claim 8, wherein the indicator comprises:
a linear rack connected to the inner tube, and comprising a plurality of teeth; and
a pinion gear comprising a pinion gear body connected to the outer tube and an indicating element connected to the pinion gear body,
wherein the pinion gear body, along with the indicating element, is configured to move along the linear rack according to the movement of the outer tube and engage with one of the plurality of teeth, and
the indicating element is configured to show a relative position change between the indicating element and the plurality of teeth according to the movements of the outer tube and the pinion gear body, as the adjusted height of the resting plate.
16. The apparatus according to claim 8, wherein the indicator comprises:
an opening window on the outer tube;
a first gear and a second gear connected to the outer tube;
a belt connected to the inner tube, looped on the first gear and the second gear, and configured to move according to rotations of the first gear and the second gear by the movement of the outer tube; and
a measurement tape attached to the belt,
wherein a plurality of dimension indicators are indicated on the measurement tape, and

the opening window is configured to show at least one dimension indicator among the plurality of dimension indicators indicated on the measurement tape, as the adjusted height of the resting plate.

17. The apparatus according to claim 8, wherein the indicator comprises:

an opening window on the outer tube,

wherein a fixed indicator is indicated on the outer tube,

a plurality of dimension indicators are indicated on the inner tube and visible through the opening window, and

the opening window is configured to show a relative position change between the fixed indicator and the plurality of dimension indicators according to the movement of the outer tube, as the adjusted height of the resting plate.

18. An apparatus for indicating a height of a resting plate supported by a first supporting means and a second supporting means comprising:

a variable resistor comprising:

a track connected to the first supporting means; and

a slider connected to the second supporting means, and movably disposed on the track; and

a display electrically connected to the variable resistor,

wherein a position of the slider on the track is changed according to a movement of the first supporting means,

the variable resistor is configured to detect a resistance depending on the changed position of the slider on the track, and measure the height of the resting plate based on the detection, and

the display is configured to display the measured height of the resting plate.

19. An armrest comprising:

a resting plate configured to rest an object thereon; and

an apparatus for adjusting a height of the resting plate comprising:

a hydraulic means configured to support the resting plate, and configured to move along an axis to adjust the height of the resting plate; and

an activator connected to the hydraulic means, and configured to activate and control the hydraulic means to move along the axis to adjust the height of the resting plate, or deactivate the hydraulic means to stop at the adjusted height, based on first external force on the activator.

20. The armrest according to claim 19, wherein the apparatus further comprises a height adjuster connected to the hydraulic means, and configured to displace the hydraulic means along the axis to adjust the height of the resting plate, based on second external force on the height adjuster.