

BACK-SUPPORT ASSEMBLY AND CHAIR WITH BACK-SUPPORT ASSEMBLY

Technical Field

[0001] Embodiments generally relate to a back-support assembly, and particularly to a back-support assembly for a chair.

Background

[0002] Conventional chairs often lack adequate lumbar support, which can lead to discomfort and posture-related issues for users. While some chairs may offer basic backrests, they often fail to provide effective support specifically targeted at the lumbar region of the spine. The lumbar region, located in the lower back, requires proper support to maintain a good spinal alignment and prevent strain or pain during prolonged sitting.

[0003] Many conventional chairs have generic backrest designs that do not cater to individual ergonomic needs. These backrests may lack adjustability, limiting a user's ability to customize the support to their unique preferences. As a result, users with specific lumbar support requirements may find themselves unable to achieve their desired comfort and optimal sitting posture.

[0004] Even when chairs with lumbar support options are available in the market, they may not fully meet the needs of every individual. Different users have different characteristics, such as curvature of their spines. Standard lumbar support systems may not offer the necessary flexibility or customization to accommodate these diverse needs.

[0005] Accordingly, there may be a need for an improved backrest assembly for a chair which solves at least the above-mentioned issues.

Summary

[0006] According to various embodiments, there may be provided a back-support assembly for a chair. The back-support assembly may include a back-support mounting frame for a backrest of the chair. The back-support assembly may include (e.g. further

include) a displaceable member that is displaceable relative to the back-support mounting frame along a primary movement axis. The back-support assembly may include (e.g. further include) a motion converter that operatively couples the displaceable member to the back-support mounting frame. The motion converter may be configured to convert an input motion applied to the motion converter relative to the back-support mounting frame into an output motion that displaces the displaceable member relative to the back-support mounting frame and along the primary movement axis. The primary movement axis may extend across the back-support mounting frame along a thickness direction of the back-support mounting frame. The back-support assembly may include (e.g. further include) a link arrangement for coupling one or more back-support members to the displaceable member, the link arrangement being operatively engaged with the displaceable member so as to be movable relative to the displaceable member along a secondary movement axis that is non-parallel to the primary movement axis.

[0007] According to various embodiments, there may be provided a chair. The chair may include a backrest and the back-support assembly mounted to the backrest.

Brief description of the drawings

[0008] 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.

FIG. 1A shows a schematic diagram of a back-support assembly for a backrest of a chair, according to various embodiments;

FIG. 1B shows a schematic diagram of the back-support assembly of FIG. 1A, with a displaceable member being displaced along a primary movement axis, according to various embodiments;

FIG. 2A shows a perspective view of a chair, with a back-support assembly and a head-support assembly, according to various embodiments;

FIG. 2B shows a close-up view of the back-support assembly of FIG. 2A, according to various embodiments;

FIG. 2C shows a frontal perspective isolated view of the back-support assembly of FIG. 2A, according to various embodiments;

FIG. 2D shows a rear perspective isolated view of the back-support assembly of FIG. 2C, according to various embodiments;

FIG. 2E shows a cross-sectional view of the back-support assembly of FIG. 2C, according to various embodiments;

FIG. 2F depicts an input-receiving member being rotated to displace a displaceable member, of the back-support assembly, along the primary movement axis, according to various embodiments;

FIG. 2G shows a close-up cross-sectional view of a knob, of the back-support assembly, according to various embodiments;

FIG. 2H shows an isolated side view of a threaded shaft with the knob, according to various embodiments;

FIG. 2I shows a front view of FIG. 2H, according to various embodiments;

FIG. 2J shows a partial cross-sectional view of the back-support assembly, according to various embodiment;

FIG. 2K to FIG. 2M shows a back-support member, of a pair of back-support members, pivoted to various positions, relative to a link arrangement, of the back-support assembly, according to various embodiments;

FIG. 2N shows a rear view of the back-support assembly, with the back-support mounting frame removed, according to various embodiments;

FIG. 2O shows a close-up view of a movable tab of the link arrangement within a guide of the displaceable member, of the back-support assembly, according to various embodiments;

FIG. 2P shows a pair of cantilever handle members of the back-support assembly attached to the link arrangement, with the pair of cantilever handle members at a bottommost position relative to the displaceable member, according to various embodiments;

FIG. 2Q and FIG. 2R are various cross-sectional views of the back-support assembly, with the pair of cantilever handle members at the bottommost position relative to the displaceable member, according to various embodiments;

FIG. 2S shows the pair of cantilever handle members attached to the link arrangement, with the pair of cantilever handle members at a topmost position relative to the displaceable member, according to various embodiments;

FIG. 2T and FIG. 2U are various cross-sectional views of the back-support assembly, with the pair of cantilever handle members at the topmost position relative to the displaceable member, according to various embodiments;

FIG. 2V shows a close-up frontal perspective view of a head-support assembly, of the chair of FIG. 2A, according to various embodiments; and

FIG. 2W shows a close-up rear perspective view of the head-support assembly, according to various embodiments;

FIG. 2X shows a head-support link member pivoted relative to a head-support mount, of the head-support assembly, according to various embodiments;

FIG. 2Y shows a connector pivoted relative to the head-support link member, of the head-support assembly, according to various embodiments; and

FIG. 2Z shows a head-support member, of the head-support assembly, moved along a displacement axis, according to various embodiments.

Detailed description

[0009] Embodiments described below in context of the apparatus are analogously valid for the respective methods, and vice versa. Furthermore, it will be understood that the embodiments described below may be combined, for example, a part of one embodiment may be combined with a part of another embodiment.

[0010] It should be understood that the terms “on”, “over”, “top”, “bottom”, “down”, “side”, “back”, “left”, “right”, “front”, “lateral”, “up” 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, or structure or any part of any device or structure. 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.

[00011] Various embodiments generally relate to a backrest articulation assembly (e.g. a back-support assembly) that may be mountable (e.g. releasably mountable) or integrated with a backrest portion (e.g. a frame) of a chair.

[00012] The backrest articulation assembly, according to the various embodiments, may include an articulation arrangement that allows a user to selectively adjust a height and depth of one or more lumbar supports (e.g. back-support members) relative to the backrest portion of the chair. The articulation arrangement of the backrest articulation assembly may include various interconnected and/or operatively engaged components within the back-support assembly.

[00013] Additionally, the backrest articulation assembly may include one or more user-operable control members, such as an input-receiving member, a handle arrangement, etc. These user-operable control members facilitate adjustments to the height and/or depth of the lumbar supports relative to the backrest portion of the chair.

[00014] Various embodiments may also generally relate to a head-rest articulation assembly (e.g. a head-support assembly) that may be mountable (e.g. releasably mountable) or integrated with the backrest portion (e.g. frame) of the chair.

[00015] The head-rest articulation assembly may include an articulation arrangement that enables a headrest to be movable relative to the backrest portion, about and/or along various linear and rotational (e.g., pivot) axes. This versatile range of motion enables users to find an optimal position for their headrest.

[00016] Moreover, various embodiments may encompass a chair system (e.g. a chair) equipped with the backrest articulation assembly and/or the head-rest articulation assembly. Each of these assemblies may function as a modular sub-unit of the chair system.

[00017] The following Examples pertain to various embodiments.

[00018] Example 1 is a back-support assembly for a chair. The back-support assembly may include a back-support mounting frame for a backrest of the chair. The back-support assembly may include (e.g. further include) a displaceable member that is displaceable relative to the back-support mounting frame along a primary movement axis. The back-support assembly may include (e.g. further include) a motion converter that operatively couples the displaceable member to the back-support mounting frame. The motion converter may be configured to convert an input motion applied to the motion converter relative to the back-support mounting frame into an output motion

that displaces the displaceable member relative to the back-support mounting frame and along the primary movement axis. The primary movement axis may extend across the back-support mounting frame along a thickness direction of the back-support mounting frame. The back-support assembly may include (e.g. further include) a link arrangement for coupling one or more back-support members to the displaceable member, the link arrangement being operatively engaged with the displaceable member so as to be movable relative to the displaceable member along a secondary movement axis that is non-parallel to the primary movement axis.

[00019] In Example 2, the subject matter of Example 1 may optionally include that the motion converter may include an input-receiving member, that is movable relative to the back-support mounting frame, for receiving the input motion. Further, the motion converter may include an output member in engagement with the input-receiving member, wherein the output member is further coupled to the displaceable member in a manner so as to impart the output motion to the displaceable member for displacing the displaceable member relative to the back-support mounting frame and along the primary movement axis.

[00020] In Example 3, the subject matter of Example 2 may optionally include that the input-receiving member may include a rotatable member that is rotatable to input a rotational input motion into the motion converter that is converted by the motion converter into a linear output motion for displacing the displaceable member relative to the back-support mounting frame and along the primary movement axis.

[00021] In Example 4, the subject matter of Example 3 may optionally include that wherein the input-receiving member of the motion converter includes a threaded shaft that is rotatable about a rotational axis extending across the threaded shaft, wherein the rotational axis is parallel with the primary movement axis. Further, the output member may include an internally threaded cylindrical body in operative threaded engagement with the threaded shaft such that a rotational input motion of the threaded shaft about the rotational axis may result in a threaded displacement of the internally threaded cylindrical body relative to the threaded shaft along the primary movement axis.

[00022] In Example 5, the subject matter of Example 4 may optionally include that wherein the threaded shaft includes a plurality of outer screw threads. Further, the plurality of outer screw threads may include a multi-start thread (or multi-start threads).

[00023] In Example 6, the subject matter of Example 4 or Example 5 may optionally include a knob coupled to the threaded shaft.

[00024] In Example 7, the subject matter of any one of Examples 1 to 6 may optionally include that the link arrangement may include a bar member operatively engaged with the displaceable member such that the bar member may be movable relative to the displaceable member along the secondary movement axis.

[00025] In Example 8, the subject matter of any one of Examples 1 to 7 may optionally include that the displaceable member may include a guide (e.g. guide arrangement). The guide may define a linear pathway on the displaceable member for moving the link arrangement along the linear pathway, wherein the linear pathway may be parallel with the secondary movement axis.

[00026] In Example 9, the subject matter of Example 8 may optionally include that the link arrangement may include a movable tab, and the displaceable member may include a tab-guide, wherein the tab-guide may include a pair of opposing longitudinal inner surfaces of the displaceable member which define the linear pathway for the movable tab to be movable therealong.

[00027] In Example 10, the subject matter of Example 9 may optionally include that the tab-guide may include a first engagement arrangement, and the movable tab may include a second engagement arrangement, wherein the first engagement arrangement and the second engagement arrangement are configured to inter-engage with each other for releasably holding the movable tab in place relative to the tab-guide.

[00028] In Example 11, the subject matter of Example 10 may optionally include that the first engagement arrangement may include a plurality of first engagement elements disposed along a longitudinal inner surface, of the pair of opposing longitudinal inner surfaces of the displaceable member, and the second engagement arrangement may include at least one second engagement element for inter-engaging with a respective first engagement-element of the plurality of first engagement elements.

[00029] In Example 12, the subject matter of Example 10 or Example 11 may optionally include that the first engagement arrangement and the second engagement arrangement may include inter-engageable protrusion and recess, or inter-engageable magnetic couplings, etc.

[00030] In Example 13, the subject matter of any one of Examples 9 to 12 may optionally include that the tab-guide may include an alignment rod that is parallel with

the linear pathway, and the movable tab may define a bore, wherein the alignment rod may be extending through the bore of the movable tab.

[00031] In Example 14, the subject matter of any one of Examples 1 to 13 may optionally include (e.g. further include) a handle arrangement coupled to the link arrangement for moving the link arrangement along the secondary movement axis.

[00032] In Example 15, the subject matter of Example 14 may optionally include that the handle arrangement may include a cantilever handle member secured, at a first end portion thereof, to the link arrangement, wherein an opposite second free end portion of the cantilever handle member may serve as a handle portion for moving the link arrangement.

[00033] In Example 16, the subject matter of Example 15 may optionally include that the link arrangement and the first end portion of the cantilever handle member may be at a first side of the back-support mounting frame, wherein an intermediate portion of the cantilever handle member may extend from the first end portion of the cantilever handle member, across a side of the back-support mounting frame in the thickness direction of the back-support mounting frame, to a second side of the back-support mounting frame opposite the first side of the back-support mounting frame, and wherein the second free end portion of the cantilever handle member may extend, from the intermediate portion of the cantilever handle member, in a direction away from the second side of the back-support mounting frame.

[00034] In Example 17, the subject matter of any one of Examples 1 to 16 may optionally include (e.g. further include) one or a pair of back-support member(s) coupled to the displaceable member via the link arrangement.

[00035] In Example 18, the subject matter of Example 17 may optionally include that the pair of back-support members may be arranged adjacent to each other along a sideways direction that is non-parallel to both the primary movement axis and the secondary movement axis.

[00036] Example 19 is a chair. The chair may include a backrest. The chair may further include the back-support assembly of any one of Examples 1 to 18, mounted to the backrest.

[00037] In Example 20, the subject matter of Example 19 may optionally include (e.g. further include) a head-support assembly. The head-support assembly may include a head-support mount releasably mounted to the backrest. The head-support assembly

may include (e.g. further include) a head-support link member pivotably coupled, at a first end portion of the head-support link member, to the head-support mount so as to be pivotable relative to the head-support mount about a primary pivot axis. The head-support assembly may include (e.g. further include) a connector pivotably coupled, at a first portion of the connector, to a second end portion of the head-support link member so as to be pivotable relative to the head-support link member about a secondary pivot axis that is parallel with the primary pivot axis. The primary pivot axis of the head-support assembly may be orthogonal to the primary movement axis of the back-support assembly.

[00038] In Example 21, the subject matter of Example 20 may optionally include (e.g. further include) a head-support member operatively coupled to a second portion of the connector such that the head-support member may be movable along a displacement axis that is orthogonal to the secondary pivot axis.

[00039] In Example 22, the subject matter of Example 21 may optionally include that the second portion of the connector may include a guide element which defines a guide path that is extending parallel with the displacement axis for guiding movement of the head-support member.

[00040] In Example 23, the subject matter of Example 22 may optionally include that the guide element may include or may be a tubular member with an inner guide-channel extending parallel with the displacement axis, and the head-support member may include a shaft that is slidably inserted into the guide-channel.

[00041] FIG. 1A shows a schematic diagram of a back-support assembly 1100 for a backrest 1005 of a chair 1000, according to various embodiments.

[00042] FIG. 1B shows a schematic diagram of the back-support assembly 1100 of FIG. 1A, with a displaceable member 1110 being displaced along a primary movement axis 1181, according to various embodiments.

[00043] According to various embodiments, there may be provided the back-support assembly 1100 for the chair 1000. The chair 1000 may be any type of chair, such as an adjustable chair (e.g. swivel chair, office chair, computer chair, task chair, car seat, etc.) or a non-adjustable chair (e.g. fixed chair or stationary chair).

[00044] The back-support assembly 1100 may be configured to support and/or articulate (e.g. displace or move) one or more back-support member(s) 1150 relative to the backrest 1005 of the chair 1000. The one or more back-support member(s) 1150

may include or may be, for example, one or more lumbar-support pads(s), cushion, foam, or a mesh support for a person's back.

[00045] With reference to FIG. 1A, the back-support assembly 1100 may include a back-support mounting frame 1101. The back-support mounting frame 1101 may be configured to be mountable to the backrest 1005 of the chair 1000 as an attachable or modular unit (e.g. via one or more fasteners, screw(s), bolt(s) and nuts(s), etc.), or may be integrated with the backrest 1005 of the chair 1000 (e.g. via a welding joint).

[00046] According to various embodiments, the back-support mounting frame 1101 may be shaped as a planar, or a plate (or plate-like), structure for accommodating one or more other components of the back-support assembly 1100. According to various embodiments, the back-support mounting frame 1101 may be substantially planar such that it may include a curvature. According to various other embodiments, the back-support mounting frame 1101 may be curved, while providing space for accommodating one or more other components of the back-support assembly 1100. The back-support mounting frame 1101 may also be shaped and/or sized (e.g. may be elongate) in a manner such that it extends across a width of the backrest 1005 of the chair 1000. In addition, the back-support mounting frame 1101 may include or may be made of a rigid or substantially rigid material, for example, a metal or metal alloy, fibre glass, carbon fibre, a rigid or substantially rigid polymer, etc.

[00047] According to various embodiments, the back-support assembly 1100 may include (e.g. further include) a displaceable member 1110 that may be arranged to be displaceable relative to the back-support mounting frame 1101. Specifically, the displaceable member 1110 may be arranged to be displaceable along a primary movement axis 1181. The primary movement axis 1181 may be a linear (e.g. substantially linear) axis that extends across the back-support mounting frame 1101, specifically, along its thickness direction. For example, when the back-support mounting frame 1101 is shaped as a plate, the primary movement axis 1181 may be extending perpendicularly to the planar surfaces of the plate. According to various embodiments, the primary movement axis 1181 may also be extending across a motion converter 1120 (described in detail later), specifically, across a front end and a rear end of the motion converter 1120. According to various embodiments, any displacement or motion of the displaceable member 1110 may be restricted to be along only the linear primary movement axis 1181. In other words, according to various embodiments, the

displaceable member 1110 may be non-rotatable about the primary movement axis 1181.

[00048] According to various embodiments, the displaceable member 1110 may be shaped to include at least a planar surface or a substantially planar surface for attaching or connecting or engaging one or more other components thereon. For example, the displaceable member 1110 may be shaped as a wide structure, such as a squarish or a circular plate. In addition, the displaceable member 1110 may include or may be made of a rigid (or substantially rigid) material, for example, a metal or metal alloy, fibre glass, carbon fibre, a rigid (or substantially rigid) polymer, etc.

[00049] According to various embodiments, the back-support assembly 1100 may include (e.g. further include) a link arrangement 1130. The link arrangement 1130 may be for coupling (e.g. removably coupling) one or more back-support member(s) 1150 (e.g. lumbar support pad(s)) to the displaceable member 1110 within the back-support assembly 1100.

[00050] As an example, the link arrangement 1130 may include a bar member (e.g. a single bar member). The bar member may be a substantially rigid or semi-rigid bar member. In other words, the bar member may be capable of flexing to a certain extent for providing comfort and accommodating a natural movement of a user's back while maintaining adequate support. A portion (e.g. an intermediate portion) of the bar member may be engaged or coupled to the displaceable member 1110, while other portion(s) (e.g. end portions) of the bar member may be couplable or attachable to one or more back-support member(s) 1150 (e.g. lumbar support pad(s)).

[00051] As another example, the link arrangement 1130 may include a pair of bar members (e.g. discrete or individual or separate bar members). A first end portion of each bar member may be engaged or coupled to the displaceable member 1110 while an opposite second end portion of each bar member may be couplable or attachable to a respective or individual back-support member 1150 (e.g. a respective lumbar support pad).

[00052] Accordingly, according to various embodiments, when the displaceable member 1110 moves along the primary movement axis 1181, as depicted in FIG. 1B, the link arrangement 1130 (i.e. that is engaged with the displaceable member 1110) may move in a same direction and in tandem with the displaceable member 1110. Consequently, any back-support member(s) 1150 attached to the link arrangement 1130

may also be displaced in a same direction and in tandem with the link arrangement 1130. Hence, according to various embodiments, with the back-support assembly 1100 mounted to the backrest 1005 of the chair 1000, the link arrangement 1130, along with any back-support member(s) 1150 attached to it, can be adjusted in a "forward-backward" (e.g. substantially horizontal) direction relative to the backrest 1005 of the chair 1000, thereby providing flexibility to shift support for a person's back (e.g. the back-support member(s) 1150) away from or toward a front surface of the backrest 1005.

[00053] According to various embodiments, the link arrangement 1130 may be configured (e.g. may additionally be configured) to be operatively engaged with the displaceable member 1110. Specifically, in such a configuration, the link arrangement 1130 may be movable relative to the displaceable member 1110 along a secondary movement axis (see, for example, reference 2182 in FIG. 2C) that is non-parallel to the primary movement axis 1181 (or reference 2181 in FIG. 2C). For instance, the displaceable member 1110 may include a guide (e.g. a rail or a slot) which defines a linear pathway that is parallel with the secondary movement axis, on or along the displaceable member 1110 (e.g. on or along a body of the displaceable member 1110), for moving the link arrangement 1130 along the linear pathway relative to the displaceable member 1110. According to various embodiments, the secondary movement axis may be perpendicular (e.g. substantially perpendicular) to the primary movement axis 1181. That is, while the primary movement axis 1181 may be along the "forward-backward" (e.g. substantially horizontal) direction relative to the backrest 1005 of the chair 1000, the secondary movement axis may be along an "up-down" (e.g. substantially vertical or upright) direction relative to the backrest 1005 of the chair 1000. Accordingly, the link arrangement 1130, along with any back-support member(s) 1150 attached to it, may, additionally, be adjusted in an "up-down" (e.g. substantially vertical or upright) direction relative to the backrest 1005 of the chair 1000, thereby allowing a height of support for a person's back (e.g. the back-support member(s) 1150) to be adjustable.

[00054] Thus, the back-support assembly 1100, according to the various embodiments, may allow adjustment of the link arrangement 1130, along with any back-support member(s) 1150 attached to it, along two different (e.g. independent) movement axes.

[00055] Moreover, adjustment of the link arrangement 1130 along one of the two movement axes (e.g. the secondary movement axis alone) may be independent of adjustment of the link arrangement 1130 along the other of the two movement axes (e.g. the primary movement axis 1181). As an example, a (vertical) height of the link arrangement 1130 (along with any back-support member(s) 1150 attached to it) may be adjustable separately or independently from adjustment of a (horizontal) depth or distance of the link arrangement 1130 (along with any back-support member(s) 1150 attached to it) from the backrest 1005 of the chair 1000. That is, the link arrangement 1130 (along with any back-support member(s) 1150 attached to it) may, selectively, be displaceable by a user along only one movement axis (i.e. either the primary movement axis 1181 or the secondary movement axis) at a given time. According to various other embodiments, the link arrangement 1130 may, selectively, be displaceable by the user along both the primary movement axis 1181 and the secondary movement axis simultaneously.

[00056] According to various embodiments, the displaceable member 1110 may include a first engagement arrangement, and the link arrangement 1130 may include a second engagement arrangement. The first engagement arrangement and the second engagement arrangement may be configured to inter-engage with each other, for releasably holding the link arrangement 1130 in place relative to the displaceable member 1110. For example, the first engagement arrangement and the second engagement arrangement may include inter-engageable protrusion(s) and recess(s) (e.g. shaped to inter-mate with each other), inter-engageable magnetic couplings (e.g. attracting magnetic members with opposite poles), snap-fit mechanism(s), detent mechanism(s) (e.g. spring-loaded ball and a detent hole for receiving the spring-loaded ball), or any other suitable inter-engageable and/or detachable mechanism(s).

[00057] According to various embodiments, the back-support assembly 1100 may include (e.g. further include) a motion converter 1120 that operatively couples the displaceable member 1110 to the back-support mounting frame 1101. The motion converter 1120 may be configured to convert an input motion applied to the motion converter 1120 relative to the back-support mounting frame 1101 into an output motion that displaces the displaceable member 1110 relative to the back-support mounting frame 1101 and along the primary movement axis 1181.

[00058] As an illustration, according to various embodiments, the motion converter 1120 may include an input-receiving member 1121. The input-receiving member 1121 may be movable relative to the back-support mounting frame 1101 and may be configured to receive the input motion.

[00059] For example, the input-receiving member 1121 may be or may include a rotatable member which may be rotatable to input or apply or impart a rotational input motion to or into the motion converter 1120. The rotatable member may be rotatable about a rotational axis that is parallel or coinciding or coaxial with the primary movement axis 1181. Additionally, the rotational axis may be extending across the rotatable member (e.g. across a center portion of the rotatable member), such that the rotatable member may “spin” (i.e. rotate) about its rotational axis. According to various other embodiments, the rotational axis may be non-parallel (e.g. substantially perpendicular) with the primary movement axis 1181.

[00060] As another example, the input-receiving member 1121 may be or may include a linearly-movable (e.g. a slidable) member (e.g. push button, push rod, linear actuator, etc.) which may input or apply or impart a linear input motion to the motion converter 1120. A linear axis of the linearly-movable member may be parallel or coinciding or coaxial with the primary movement axis 1181. According to various other embodiments, the linear axis of the linearly-movable member may be non-parallel (e.g. substantially perpendicular) with the primary movement axis 1181.

[00061] According to various embodiments, the motion converter 1120 may include (e.g. further include) an output member 1125 that is in engagement (e.g. operative engagement) with the input-receiving member 1121. Further, the output member 1125 of the motion converter 1120 may be coupled to or engaged with the displaceable member 1110 in a manner so as to impart or convey or transmit the output motion (i.e. of the motion converter 1120) to the displaceable member 1110 to displace the displaceable member 1110 relative to the back-support mounting frame 1101 and along the primary movement axis 1181. According to various embodiments, the output member 1125 may be, but is not limited to being, integral with the displaceable member 1110. Accordingly, an output motion (e.g. a linear output motion) of the output member 1125 of the motion converter 1120 that is parallel with and/or along the primary movement axis 1181 may cause a corresponding motion (e.g. a linear motion) or displacement of the displaceable member 1110 along the primary movement axis 1181.

As such, according to various embodiments, the output member 1125 of the motion converter 1120 may be restricted to a linear output motion that is parallel with and/or along the primary movement axis 1181, so as to align the displaceable member 1110 along the primary movement axis 1181.

[00062] According to various embodiments, the motion converter 1120 may include (e.g. further include) one or a combination of connecting gear(s), movable or pivotable joint(s), coupling(s), bearing(s), sliding mechanism(s), cam and follower, and/or linkage(s), threaded engagement(s), etc., connecting the input-receiving member 1121 and the output member 1125 in the operational manner.

[00063] According to various embodiments, the back-support assembly 1100 may include (e.g. further include) a handle arrangement 1140 that is coupled (e.g. immovably coupled or affixed or secured) to the link arrangement 1130 for moving the link arrangement 1130 along the secondary movement axis. Specifically, the handle arrangement 1140 may be coupled to the link arrangement 1130 in a manner such that they may move in tandem.

[00064] For example, the handle arrangement 1140 may include a cantilever handle member secured, at a first end portion thereof, to the link arrangement 1130, while an opposite second free end portion of the cantilever handle member may serve as a “handle portion” for a user to move the link arrangement 1130.

[00065] As another example, the handle arrangement 1140 may include a bracket arm member (e.g. “U”-shaped arm). End portions (i.e. of a pair of opposite end portions) of the bracket arm member may be secured to the link arrangement 1130, while an intermediate portion of the bracket arm member (i.e. between the pair of opposite end portions) may serve as a “handle portion” for moving the link arrangement 1130 along the secondary movement axis.

[00066] According to various embodiments, the displaceable member 1110 and the link arrangement 1130 may be at a first side (e.g. a front side) of the back-support mounting frame 1101. The input-receiving member 1121 (i.e. of the motion converter 1120) and the “handle portion” of the handle arrangement 1140, on the other hand, may be at a second side (e.g. a rear side) of the back-support mounting frame 1101 opposite the first side. As such, a user of the back-support assembly 1100 may be able to adjust a position of the displaceable member 1110, and in turn, a position of the link arrangement 1130 (along with any back-support member(s) 1150 attached to it), from

a same side (e.g. the rear side) of the back-support mounting frame 1101 using the input-receiving member 1121 and the “handle portion” of the handle arrangement 1140. According to various embodiments, the second side of the back-support mounting frame 1101 may be aligned with a rear side of the backrest 1005 of the chair 1000.

[00067] According to various embodiments, the back-support mounting frame 1101 may define a passageway 1103 for the handle arrangement 1140 to extend thereacross from the first side (e.g. front side) of the back-support mounting frame 1101 to the second side (e.g. rear side) of the back-support mounting frame 1101. In particular, the handle arrangement 1140 may extend from the first side of the back-support mounting frame 1101 (i.e. where it is attached to the link arrangement 1130), across the passageway 1103 defined by the back-support mounting frame 1101, to the second side of the back-support mounting frame 1101 where it serves as the “handle portion”.

[00068] For example, the passageway 1103 of the back-support mounting frame 1101 may include or may be a slot, a cavity, an opening, or through-hole on the back-support mounting frame 1101.

[00069] As another example, the back-support mounting frame 1101 may have a tapered shape or tapered cross-sectional profile. For instance, the back-support mounting frame 1101 may have a “Y” (or “Y”-like) shape or cross-sectional profile. According to various other embodiments, the back-support mounting frame 1101 may have a “T” shape or cross-sectional profile. In this manner, a side of the back-support mounting frame 1101, at a narrower segment of the back-support mounting frame 1101, may define the passageway 1103 for the handle arrangement 1140 to extend across (i.e. from the first side of the back-support mounting frame 1101 to the second side of the back-support mounting frame 1101).

[00070] According to various embodiments, the back-support assembly 1100 may include (e.g. optionally or further include) a pair of back-support members 1150 (e.g. a pair of lumbar-support pads) attached or coupled to the link arrangement 1130. That is, according to various embodiments, the pair of back-support members 1150 may be coupled to the displaceable member 1110 via the link arrangement 1130. According to various embodiments, each back-support member 1150, of the pair of back-support members 1150, may be a discrete or individual piece. Further, the pair of back-support members 1150 may be positioned adjacent or side-by-side or abreast to each other in a “sideway direction”. The “sideway direction” may be non-parallel (e.g. perpendicular

or substantially perpendicular) to both the primary movement axis 1181 and the secondary movement axis (e.g. perpendicular primary movement axis 1181 and secondary movement axis). More specifically, the pair of back-support members 1150 may be spaced apart from each other in the “sideway direction” for respectively supporting a left region and a right region of a person’s back (e.g. person’s left and right lumbar regions).

[00071] According to various other embodiments, the back-support assembly 1100 may include a single piece of back-support member 1150 (e.g. single piece of lumbar-support pad) attached or coupled to the link arrangement 1130 (e.g. in lieu of the pair of back-support members 1150 mentioned above). In particular, the single piece of back-support member 1150 may be elongate in a horizontal or the “sideway direction” for supporting both a left region and a right region of a person’s back (e.g. person’s left and right lumbar regions) concurrently.

[00072] According to various embodiments, each back-support member 1150, of the back-support assembly 1100, may be pivotable relative to the link arrangement 1130, about a pivot axis extending in the “sideway direction”. Thus, each back-support member 1150, of the back-support assembly 1100, may be tilted (or rocked) forward or backward relative to the backrest 1005 of the chair 1000. According to various embodiments, each back-support member 1150 (e.g. of the pair of back-support members 1150) may be individually or independently or separately pivotable with respect to the link arrangement 1130.

[00073] According to various embodiments, the chair 1000 (e.g. a chair system) may be provided.

[00074] The chair 1000 may include the backrest 1005.

[00075] According to various embodiments, the chair 1000 may include (e.g. further include) the back-support assembly 1100 mounted (e.g. releasably or integrally) to the backrest 1005 of the chair 1000.

[00076] According to various embodiments, the chair 1000 may include (e.g. further include) a head-support assembly 1200 for supporting and/or articulating (e.g. displacing or moving) one or more head-support member(s) 1230 (e.g. headrest, headrest pad, cushion, foam, mesh support for a person’s head, etc.) relative to a backrest 1005 of the chair 1000.

[00077] According to various embodiments, the head-support assembly 1200 may include a head-support mount 1201 configured to be mountable to the backrest 1005 of the chair 1000. Accordingly, the chair 1000 may include the head-support mount 1201 releasably mounted to the backrest 1005 of the chair 1000.

[00078] According to various embodiments, the head-support assembly 1200 may include (e.g. further include) a head-support link member 1210 pivotably coupled, at a first end portion of the head-support link member 1210, to the head-support mount 1201 so as to be pivotable relative to the head-support mount 1201 about a primary pivot axis. The primary pivot axis may be orthogonal or perpendicular (e.g. substantially perpendicular) to the primary movement axis 1181 of the displaceable member 1110. In addition, the primary pivot axis may be extending across an end portion of the head-support link member 1210.

[00079] According to various embodiments, the head-support assembly 1200 may include (e.g. further include) a connector 1220 that is pivotably coupled, at a first portion of the connector 1220, to a second end portion of the head-support link member 1210 so as to be pivotable relative to the head-support link member 1210 about a secondary pivot axis. According to various embodiments, the secondary pivot axis may be parallel (e.g. substantially parallel) with the primary pivot axis of the head-support link member 1210.

[00080] According to various embodiments, the head-support assembly 1200 may include (e.g. further include) the head-support member 1230 (e.g. a headrest). The head-support member 1230 may be operatively coupled to the connector 1220 such that the head-support member 1230 may be movable along a displacement axis (e.g. a linear displacement axis), that is orthogonal or perpendicular (e.g. substantially perpendicular) to the secondary pivot axis, for adjusting a height of the head-support member 1230 relative to the backrest 1005 (or a seat) of the chair 1000. That is, both the primary pivot axis and the secondary pivot axis may be horizontal axes (e.g. along the “sideway direction”) while the displacement axis of the head-support member 1230 may be a vertical (e.g. substantially vertical) or a substantially upright axis.

[00081] According to various embodiments, the connector 1220 may include a guide element which defines a guide path (e.g. a channel or rail) that is extending parallel with the displacement axis for guiding or restricting movement of the head-support member 1230 to be along the displacement axis.

[00082] FIG. 2A shows a perspective view of a chair 2000, with a back-support assembly 2100 and a head-support assembly 2200, according to various embodiments.

[00083] FIG. 2B shows a close-up view of the back-support assembly 2100, according to various embodiments.

[00084] According to various embodiments, there may be provided the back-support assembly 2100 for a backrest 2005 of the chair 2000.

[00085] The components of the back-support assembly 2100 that are like the corresponding components of the back-support assembly 1100 of FIG. 1A are similarly numbered. The description of these components made with respect to the back-support assembly 2100 may be applicable with respect to the back-support assembly 1100, and vice versa.

[00086] With reference to FIG. 2B, the back-support assembly 2100 may, similar to the back-support assembly 1100 of FIG. 1A, include a back-support mounting frame 2101, a displaceable member 2110, a motion converter 2120 (see FIG. 2D), and a link arrangement 2130.

[00087] As shown in FIG. 2B, the back-support mounting frame 2101 may be a “Y”-shaped (e.g. tapered-shaped) back-support mounting frame 2101 with a plurality of (e.g. three) arm portions 2102. The arm portions 2102 (e.g. free ends thereof) may be mounted or coupled to a frame of the chair 2000, for example, to the backrest 2005 of the chair 2000, via screws, bolts and nuts, etc. In this manner, the back-support mounting frame 2101 may be releasably mounted or releasably coupled to the backrest 2005 of the chair 2000.

[00088] The “Y”-shaped back-support mounting frame 2101 may further define one or more passageways 2103 for a handle arrangement 2140 (described in detail later with reference to FIG. 2P). Specifically, each side surface (e.g. an arced or curved side surface that is connecting neighbouring arm portions 2102) of the “Y”-shaped back-support mounting frame 2101 may, together with the backrest 2005 of the chair 2000, define a respective passageway 2103. As shown in FIG. 2B, the “Y”-shaped back-support mounting frame 2101 may define at least two passageways 2103 on opposite arced or curved side surfaces of the “Y”-shaped back-support mounting frame 2101.

[00089] Additionally, the back-support mounting frame 2101 may be configured (e.g. shaped) to be a substantially planar structure for accommodating one or more other components of the back-support assembly 2100.

[00090] FIG. 2C shows a frontal perspective isolated view of the back-support assembly 2100, according to various embodiments.

[00091] FIG. 2D shows a rear perspective isolated view of the back-support assembly 2100 of FIG. 2C, according to various embodiments.

[00092] FIG. 2E shows a cross-sectional view of the back-support assembly 2100 of FIG. 2C, according to various embodiments.

[00093] Referring to FIG. 2C, the displaceable member 2110 may be operatively coupled to the back-support mounting frame 2101 in a manner such that the displaceable member 2110 may be displaceable relative to the back-support mounting frame 2101 and along a primary movement axis 2181. The primary movement axis 2181 may be extending across the back-support mounting frame 2101, along a thickness direction of the back-support mounting frame 2101. Specifically, as shown, the primary movement axis 2181 may be perpendicular (e.g. substantially perpendicular) to a substantially planar front surface (and/or a substantially planar rear surface) of the substantially planar back-support mounting frame 2101. Additionally, according to various embodiments, the primary movement axis 2181 may be aligned to a middle of the backrest 2005 of the chair 2000 of FIG. 2A and FIG. 2B, with respect to a width of the backrest 2005. Accordingly, according to various embodiments, the displaceable member 2110 may also be aligned to the middle of the backrest 2005 of the chair 2000 of FIG. 2A and FIG. 2B, with respect to the width of the backrest 2005.

[00094] As an example, as shown in FIG. 2C, the displaceable member 2110 may have a plate-shaped body, with its planar surfaces being substantially aligned (e.g. substantially parallel) with the planar surfaces of the back-support mounting frame 2101.

[00095] With reference to FIG. 2D and FIG. 2E, according to various embodiments, the motion converter 2120, may be operatively coupling the displaceable member 2110 to the back-support mounting frame 2101, to enable the displacement of the displaceable member 2110 relative to the back-support mounting frame 2101 and along the primary movement axis 2181.

[00096] For example, with reference to FIG. 2D and FIG. 2E, the back-support mounting frame 2101 may include or define an opening at its central region (e.g. where its arm portions 2102 are converging) for accommodating a chassis 2120a of the motion converter 2120. Accordingly, the chassis 2120a of the motion converter 2120 may be

inserted into the opening of the back-support mounting frame 2101 and may be coupled to the back-support mounting frame 2101, for instance, via a snap-fit attachment or any other attachment mechanism, such as screw(s), bolt(s) and nut(s), rivet(s), and/or welding joint(s), etc. According to various embodiments, a portion of the motion converter 2120 (e.g. a movable output member 2125, as shown in FIG. 2E and FIG. 2F) may be engaged with the displaceable member 2110, thereby enabling the displaceable member 2110 to be displaceable relative to the back-support mounting frame 2101.

[00097] In particular, the motion converter 2120 may be configured to convert an input motion (e.g. a rotational input motion) applied to the motion converter 2120 relative to the back-support mounting frame 2101 into an output motion (e.g. a linear output motion) that displaces the displaceable member 2110 relative to the back-support mounting frame 2101 and along the primary movement axis 2181.

[00098] For example, according to various embodiments, with reference to FIG. 2E, the motion converter 2120 may include an input-receiving member 2121 as well as the output member 2125.

[00099] The input-receiving member 2121 of the motion converter 2120 may include or may be a rotatable member that is rotatable to input or impart a rotational input motion into the motion converter 2120. For example, as shown, the input-receiving member 2121 may include or may be a threaded shaft 2122. The threaded shaft 2122 may include a plurality of outer screw threads, along a cylindrical outer side surface thereof. The threaded shaft 2122 may be rotatable, relative to the back-support mounting frame 2101, about a rotational axis 2183 extending longitudinally across the threaded shaft 2122. According to various embodiments, the rotational axis 2183 of the threaded shaft 2122 may be coinciding or coaxial with the primary movement axis 2181 of the displaceable member 2110. Further, the threaded shaft 2122 may be coupled to or held by the chassis 2120a of the motion converter 2120 in a manner such that the threaded shaft 2122 is capable of only a rotatable motion about the rotational axis 2183, but is incapable or is inhibited or restricted from other types or forms of motion such as a linear motion (e.g. linearly along the primary movement axis 2181). In other words, the threaded shaft 2122 may be non-movable (e.g. linearly) along the rotational axis 2183. For example, with reference to FIG. 2E, by anchoring or fastening (e.g. using a bolt / screw 80) the threaded shaft 2122 to a rear end (e.g. a rear wall 2120c) of the chassis 2120a of the motion converter 2120, the threaded shaft 2122 may be inhibited

from linear motion towards or away from the rear end (e.g. the rear wall 2120c) of the chassis 2120a, while still being capable of rotational motion relative to the chassis 2120a. As a non-limiting example, shown in FIG. 2E, a rear portion of the threaded shaft 2122 that is at an inner rear surface of the rear wall 2120c of the chassis 2120a may be fastened (e.g. screwed) to an externally disposed knob 2123 (described in detail later with reference to FIG. 2F) that is at an outer rear surface of the rear wall 2120c of the chassis 2120a. According to various other embodiments (not shown), the rear portion of the threaded shaft 2122 may be fastened directly to the rear end (e.g. the rear wall 2120c) of the chassis 2120a.

[000100] The output member 2125 of the motion converter 2120 may be in engagement with the input-receiving member 2121 and may further be engaged with the displaceable member 2110 in a manner so as to be capable of imparting the output motion of the motion converter 2120 to the displaceable member 2110 for displacing the displaceable member 2110 along the primary movement axis 2181.

[000101] For example, as shown in FIG. 2E, the output member 2125 may include or may be a threaded cylindrical body 2126. The threaded cylindrical body 2126 may be hollow and may include a plurality of inner screw threads, along an inner surface thereof. Thus, the threaded cylindrical body 2126 may be an “internally threaded cylindrical body” 2126. According to various embodiments, the inner surface of the internally threaded cylindrical body 2126 may be cylindrical, while its outer surface is not limited to being cylindrical (in other words, may be cylindrical, or may be non-cylindrical e.g. octagonal).

[000102] The internally threaded cylindrical body 2126 (i.e. the output member 2125) may be fitted over the threaded shaft 2122 (i.e. the input-receiving member 2121), with their threaded portions directly engaging each other, such that the threaded shaft 2122 and the internally threaded cylindrical body 2126 may be in operative threaded engagement with each other. In this arrangement, the internally threaded cylindrical body 2126 and the threaded shaft 2122 may be coaxially aligned along the rotational axis 2183 of the threaded shaft 2122.

[000103] According to various embodiments, the internally threaded cylindrical body 2126 (i.e. the output member 2125) may be inhibited from a rotational motion or rotational movement about the rotational axis 2183. For example, according to various embodiments (not shown), an outer surface of the internally threaded cylindrical body

2126 may include an alignment arrangement that mates with a corresponding alignment arrangement on an inner surface of the chassis 2120a of the motion converter 2120. Such an alignment arrangement of the internally threaded cylindrical body 2126 and the corresponding alignment arrangement of the chassis 2120a of the motion converter 2120 may include, but is not limited to, inter-mating groove (e.g. elongate groove) and ridge, inter-mating recess (e.g. channel) and protrusion (e.g. pin), etc.

[000104] Additionally, according to various other embodiments (not shown), the internally threaded cylindrical body 2126 may include (e.g. optionally or further include) an alignment member at an outer surface of the internally threaded cylindrical body 2126 for preventing tilt or misalignment of the internally threaded cylindrical body 2126 away from the rotational axis 2183. As an example, according to various other embodiments (not shown), the alignment member may be a pin member which extends radially away from the outer surface of the internally threaded cylindrical body 2126 to (e.g. to abut) an inner surface of the chassis 2120a of the motion converter 2120. As another example, according to various other embodiments (not shown), the alignment member may be an annular fin, with a hole axis of the annular fin being coaxial with the rotational axis 2183 and/or the primary movement axis 2181. Hence, the alignment member may align the internally threaded cylindrical body 2126 along the rotational axis 2183 and/or the primary movement axis 2181, thereby preventing tilt or misalignment.

[000105] An end portion of the internally threaded cylindrical body 2126 (i.e. the output member 2125) that is directed or facing away from the threaded shaft 2122 (i.e. the input-receiving member 2121) may be engaged with the displaceable member 2110. For example, said end portion of the output member 2125 may be integral with a rear side (e.g. planar rear surface) of the displaceable member 2110. As an example, shown in FIG. 2E, the internally threaded cylindrical body 2126 may be extending perpendicularly to the planar rear surface of the displaceable member 2110. According to various embodiments, since the internally threaded cylindrical body 2126 (i.e. the output member 2125) may be inhibited from rotational motion (in other words, may be non-rotatable) about the rotational axis 2183, hence, the displaceable member 2110 (i.e. which is engaged to the internally threaded cylindrical body 2126) may, likewise, be inhibited from rotational motion (in other words, may be non-rotatable) about the rotational axis 2183. Thus, according to various embodiments, both the internally

threaded cylindrical body 2126 and the displaceable member 2110 may be arranged to be movable, or may be capable of, only linear motion along the primary movement axis 2181.

[000106] FIG. 2F depicts the input-receiving member 2121 being rotated to displace the displaceable member 2110 along the primary movement axis 2181, according to various embodiments.

[000107] According to various embodiments, as the threaded shaft 2122 (i.e. the input-receiving member 2121) is being rotated about the rotational axis 2183, the internally threaded cylindrical body 2126 (i.e. the output member 2125) may be threadedly displaced relative to the threaded shaft 2122 so as to move linearly (e.g. in a linear output motion) along the linear primary movement axis 2181, thereby displacing the displaceable member 2110 (i.e. which is engaged to the internally threaded cylindrical body 2126) along the linear primary movement axis 2181. In other words, the threaded shaft 2122 (i.e. the input-receiving member 2121), when rotated, may drive the internally threaded cylindrical body 2126 (i.e. the output member 2125) and, in turn, the engaged displaceable member 2110, in a linear “forward” or “backward” direction along the primary movement axis 2181. Specifically, a rotation of the threaded shaft 2122 (or “lead screw”) in a first rotational direction (i.e. about the rotational axis 2183) (e.g. clockwise direction) may cause (or drive) the internally threaded cylindrical body 2126 (along with the engaged displaceable member 2110) to be moved forward along the primary movement axis 2181 relative to the backrest 2005 of the chair 2000, while a second rotational direction (i.e. opposite the first rotational direction) (e.g. anti-clockwise direction) of the threaded shaft 2122 may cause (or drive) the internally threaded cylindrical body 2126 (along with the engaged displaceable member 2110) to be moved backward along the primary movement axis 2181 relative to the backrest 2005 of the chair 2000.

[000108] According to various embodiments, as shown, the internally threaded cylindrical body 2126 (i.e. the output member 2125) may include (e.g. optionally or further include) a stopper member 2127 (e.g. a stopper pin), protruding from an outer surface (e.g. outer side surface) of the internally threaded cylindrical body 2126, for limiting forward motion or displacement of the internally threaded cylindrical body 2126 along the primary movement axis 2181 (e.g. relative to the backrest 2005 of the chair 2000). Particularly, the stopper member 2127 may be configured to prevent the

internally threaded cylindrical body 2126 from disengaging (e.g. being detached or separated) from the threaded shaft 2122 (i.e. the input-receiving member 2121) or from slipping or falling out of the chassis 2120a of the motion converter 2120. To illustrate, referring to FIG. 2F, when the internally threaded cylindrical body 2126 includes the stopper member 2127, the internally threaded cylindrical body 2126 may be blocked or obstructed (or no longer displaceable) from moving in the linear forward direction once the stopper member 2127 reaches or comes into contact or is abutting a front wall 2120b of the chassis 2120a of the motion converter 2120. As shown, according to various embodiments, the stopper member 2127 may be disposed at a rear end portion of the internally threaded cylindrical body 2126.

[000109] According to various embodiments, the back-support assembly 2100 may include (e.g. optionally or further include) the knob 2123 for rotating the threaded shaft 2122. For example, the knob 2123 may be coupled to the threaded shaft 2122 in a manner such that a rotational of the knob 2123 causes a corresponding (e.g. equal) and simultaneous rotational motion of the threaded shaft 2122 about the rotational axis 2183, and in a same rotational direction as the knob 2123.

[000110] FIG. 2G shows a close-up cross-sectional view of the knob 2123, according to various embodiments.

[000111] According to various embodiments, the knob 2123 may be on the outer rear surface of the rear wall 2120c of the chassis 2120a and may be engaged (or fastened, e.g. using the bolt / screw 80) to the threaded shaft 2122 (i.e. that is housed within the chassis 2120a). According to various embodiments, the engagement between the knob 2123 and the threaded shaft 2122 may allow free rotation of the knob 2123 relative to the rear wall 2120c of the chassis 2120a. Specifically, a clearance between the knob 2123 and the threaded shaft 2122 may be wider than a width of the rear wall 2120c so that the rear wall 2120c does not impede rotational motion of the knob 2123.

[000112] According to various embodiments, the back-support assembly 2100 may include (e.g. optionally or further include) a biasing member 2124 acting against the knob 2123. Specifically, an end of the biasing member 2124 may be mounted to the chassis 2120a and another end of the biasing member 2124 may exert a biasing force on the knob 2123. As an example, shown in FIG. 2G, the biasing member 2124 may include or may be one or more spring loaded ball plungers configured to exert a biasing force on the knob 2123. This arrangement may ensure that the knob 2123 (and the

engaged threaded shaft 2122) will only rotate when an external force (e.g. applied by a user) surpasses the biasing force from the biasing member 2124.

[000113] FIG. 2H shows an isolated side view of the threaded shaft 2122 with the knob 2123, according to various embodiments.

[000114] FIG. 2I shows a front view of FIG. 2H, according to various embodiments.

[000115] According to various embodiments, the plurality of outer screw threads of the threaded shaft 2122 may include or may be a multi-start thread (or multi-start threads). The multi-start thread may include a plurality of intertwined threads (e.g. six threads 2122a to 2122f) running alongside (e.g. parallel) to one another. As an example, shown in FIG. 2H and FIG. 2I, the multi-start thread, of the threaded shaft 2122, may include six starts (e.g. six individual threads 2122a to 2122f). The multiple-start thread may provide increased contact surface engagement compared to a single thread structure. As a result, the multi-start thread may allow for a longer lead distance (i.e. forward or backward distance of the threadedly engaged output member 2125, as depicted in FIG. 2F) to be covered with a single rotation of the threaded shaft 2122. Moreover, by having multiple starts, the threaded shaft 2122 may drive or move the output member 2125 and the engaged displaceable member 2110 continuously (e.g. without breaks in their movement).

[000116] FIG. 2J shows a partial cross-sectional view of the back-support assembly 2100, according to various embodiment.

[000117] Referring to FIG. 2J, the link arrangement 2130 of the back-support assembly 2100 may include or may be a substantially rigid or semi-rigid bar member 2131 (e.g. single bar member), extending in a horizontal or “sideway direction”. The “sideway direction” may be non-parallel (e.g. perpendicular) to both the primary movement axis 2181 and a secondary movement axis 2182 (described in detail later with reference to FIG. 2N) (e.g. orthogonal primary movement axis 2181 and secondary movement axis 2182).

[000118] As shown in FIG. 2J, the bar member 2131 may be a substantially “U”-shaped or “bracket”-shaped bar member 2131, with an intermediate portion being substantially linear, and with a pair of end portions bending away from the intermediate portion. The pair of end portions of the bar member 2131 may be extending in a direction substantially parallel with the primary movement axis 2181 and away from the displaceable member 2110, while the intermediate portion of the bar member 2131

may be extending in a substantially orthogonal or perpendicular direction to the end portions (or to the primary movement axis 2181).

[000119] The back-support assembly 2100 may include (e.g. further include) the pair of back-support members 2150 (e.g. lumbar-support pads). A first back-support member 2150 thereof may be coupled to a first end portion (e.g. of the pair of end portions) of the “bracket”-shaped bar member 2131 of the link arrangement 2130, and a second back-support member 2150 may be coupled to a second end portion (e.g. of the pair of end portions) of the “bracket”-shaped bar member 2131. As shown, with the bar member 2131 of the link arrangement 2130 extending in the “sideway direction”, the pair of back-support members 2150 may be adjacent or side-by-side or abreast to each other along the “sideway direction”.

[000120] According to various embodiments, the intermediate portion of the bar member 2131 of the link arrangement 2130 may be engaged with the displaceable member 2110. In this manner, the link arrangement 2130 may couple the pair of back-support members 2150 to the displaceable member 2110.

[000121] FIG. 2K to FIG. 2M shows a back-support member 2150, of the pair of back-support members 2150, pivoted to various positions, relative to the link arrangement 2130, according to various embodiments.

[000122] According to various embodiments, each back-support member 2150 may be pivotably coupled (e.g. via a hinge) to the link arrangement 2130. Thus, the pair of back-support members 2150 may be pivotable relative to the link arrangement 2130 and about a pivot axis 2184 that extends in the “sideway direction”.

[000123] More particularly, with reference to FIG. 2K to FIG. 2M, according to various embodiments, each back-support member 2150, of the pair of back-support members 2150, may be individually or independently pivotable with respect to the link arrangement 2130 for accommodating the contour of an individual’s back.

[000124] FIG. 2N shows a rear view of the back-support assembly 2100, with the back-support mounting frame 2101 removed, according to various embodiments.

[000125] According to various embodiments, the link arrangement 2130 may be operatively engaged with the displaceable member 2110 so as to be movable relative to the displaceable member 2110 along a secondary movement axis 2182 that is non-parallel (e.g. perpendicular or substantially perpendicular) to the primary movement

axis 2181 (as shown in FIG. 2J). The secondary movement axis 2182 may be a vertical or substantially upright axis (e.g. relative to the chair 2000).

[000126] According to various embodiments, when the link arrangement 2130 is a single bar member 2131, the link arrangement 2130 may move as a single unit along the secondary movement axis 2182.

[000127] According to various other embodiments, when the link arrangement 2130 includes a pair of bar members (e.g. independent and discrete bar members) (not shown), each of the pair of bar members may be independently and/or separately movable in a direction parallel with the secondary movement axis 2182.

[000128] Additionally, according to various embodiments, the displaceable member 2110 may include a first engagement arrangement 2115, and the link arrangement 2130 may include a second engagement arrangement 2135. The first engagement arrangement 2115 and the second engagement arrangement 2135 may be configured to inter-engage with each other for releasably holding the link arrangement 2130 in place relative to the displaceable member 2110 (e.g. at any one of a plurality of positions along the displaceable member 2110).

[000129] According to various embodiments, the first engagement arrangement 2115 may include a plurality of first engagement elements. The second engagement arrangement 2135 may include at least one second engagement element for inter-engaging with a respective first engagement-element of the plurality of first engagement elements.

[000130] FIG. 2O shows a close-up view of a movable tab 2132 of the link arrangement 2130, slidably received within a guide 2113 of the displaceable member 2110, according to various embodiments.

[000131] With reference to FIG. 2O, according to various embodiments, the link arrangement 2130 may include at least one (e.g. one, or a pair of, or more) movable tab 2132 (e.g. a slider). As an example, the at least one movable tab 2132 may be at (e.g. secured or coupled or affixed to) the intermediate portion of the link arrangement 2130 (e.g. bar member 2131). For ease of illustration, various embodiments herein may be illustrated or described with reference to the link arrangement 2130 having a pair of movable tabs 2132. Nevertheless, embodiments illustrated or described herein as such are not limited thereto. Thus, for example, various embodiments may include a link

arrangement 2130 having only one movable tab 2132, or three or more movable tabs 2132.

[000132] According to various embodiments, each movable tab 2132 may include a main portion 2132a and a deformable portion 2132b. The main portion 2132a may be at a side (e.g. lateral side) of the movable tab 2132 and the deformable portion 2132b may be at another side (e.g. opposite lateral side) of the movable tab 2132, adjacent to the main portion 2132a. According to various embodiments, the main portion 2132a may be integral with the deformable portion 2132b. The deformable portion 2132b may be configured to be resiliently deformable, in other words, may be capable of deformation (e.g. compressed) upon a force (e.g. an external force) being exerted thereon and, thereafter, returning to its original shape or form when the force is released or no longer exerted thereon. For example, according to various embodiments, each movable tab 2132 (e.g. at least the deformable portion 2132b thereof) may include or may be made of a resilient (or resiliently deformable) material, such as a resilient plastic or polymer, an elastomer, a resilient metal or metallic alloy, spring steel, memory alloy, etc. As a further example, according to various embodiments, the deformable portion 2132b of the movable tab 2132 may be configured (e.g. shaped) in a manner so as to enable or be capable of resilient deformation. For instance, according to various embodiments, the deformable portion 2132b be formed or shaped as a resilient or spring-like structure (e.g. a helical shape, corrugated pattern, etc.), which provides the deformable portion 2132b with a resilient deformable property. According to various other embodiments, the deformable portion 2132b may include a rigid material, and cut-outs or slots may be introduced in the deformable portion 2132b to enhance its flexibility as well as resilient deformable property.

[000133] As shown in FIG. 2O, according to various embodiments, the deformable portion 2132b of each movable tab 2132 may include a corrugated pattern (i.e. resilient structure). The deformable portion 2132b may be a continuous piece of material (e.g. homogeneous material) that is shaped into the corrugated pattern. According to various embodiments, the corrugated pattern may include at least one protrusion 2135a. The at least one protrusion 2135a may be the at least one second engagement element of the second engagement arrangement 2135. The corrugated pattern may include (e.g. further include) at least two troughs (e.g. recessed portions) adjacent and/or sandwiching a respective protrusion 2135a. According to various embodiments, each protrusion 2135a

(or an apex, peak, peak top, crest, etc., of each protrusion 2135a) may be further away from the main portion 2132a than each through 2135b (or a bottom point / valley bottom of each trough). As show in FIG. 2O, the corrugated pattern of the deformable portion 2132b of the movable tab 2132 may include three protrusions 2135a and a pair of throughs 2135b interposed among the three protrusions 2135a. At least one protrusion 2135a (e.g. a middle or center protrusion 2135a) of the deformable portion 2132b of the movable tab 2132 may be taller (e.g. protrude further away from the main portion 2132a) than the remaining protrusions 2135a. The bottom points of the pair of throughs 2135b may be, but is not limited to being, at a same distance from the main portion 2132a as each other. Each protrusion 2135a of the deformable portion 2132b of the movable tab 2132 may be resiliently deformable inwards (i.e. towards the main portion 2132a) (e.g. when an inward force is applied thereto). With reference to FIG. 2O, an apex (or peak or peak top) of each protrusion 2135a may be, but is not limited to being, a curved or rounded portion. According to various other embodiments (not shown), an apex of each protrusion 2135a may be a pointed edge (e.g. an edge of a wedge-shaped protrusion). Likewise, with reference to FIG. 2O, a bottom point (or valley bottom) of each trough may be, but is not limited to being, a curved or rounded portion.

[000134] According to various embodiments, the displaceable member 2110 may include a guide 2113 which defines a linear pathway that is parallel with the secondary movement axis 2182, as shown in FIG. 2N, on the displaceable member 2110 (e.g. along a body of the displaceable member 2110), for moving the link arrangement 2130 (e.g. the movable tabs 2132 of the link arrangement 2130) along the linear pathway relative to the displaceable member 2110.

[000135] Referring to FIG. 2N, the guide 2113 of the displaceable member 2110 may include a pair of tab-guides 2115 for guiding or aligning the movable tabs 2132 of the link arrangement 2130 to be movable in a direction along (e.g. along only) the secondary movement axis 2182. For ease of illustration, various embodiments herein may be illustrated or described with reference to the guide 2113 having a pair of tab-guides 2115 for a pair of movable tabs 2132. Nevertheless, embodiments illustrated or described herein as such are not limited thereto. Thus, for example, various embodiments may include a guide 2113 having only one tab-guide 2115 for a single movable tab 2132, or three or more tab-guides 2115 for three or more movable tabs 2132.

[000136] According to various embodiments, each tab-guide 2115 may include a pair of opposing longitudinal inner surfaces 2111 of the displaceable member 2110 (e.g. of the body of the displaceable member 2110). The pair of opposing longitudinal inner surfaces 2111 may define a linear pathway for a respective movable tab 2132 to be movable (e.g. slidable) therealong. As shown, the linear pathway may be parallel with the secondary movement axis 2182.

[000137] With reference to FIG. 2N and FIG. 2O, the pair of opposing longitudinal inner surfaces 2111 of each tab-guide 2115 may be a pair of opposing longitudinal inner surfaces 2111 of an elongate channel (e.g. slot) along the body of the displaceable member 2110. Further, the pair of opposing longitudinal inner surfaces 2111 may be extending parallel (e.g. substantially parallel) with the secondary movement axis 2182. An average width of the linear pathway (or average distance between the pair of opposing longitudinal inner surfaces 2111) may correspond to (e.g. may be substantially the same as) an average width of a corresponding movable tab 2132. Hence, the movable tab 2132, when slidably seated or fitted between the pair of opposing longitudinal inner surfaces 2111 of the displaceable member 2110, may be inhibited from rotating or sideways tilt and may only be capable of a linear sliding motion along the linear pathway defined by the pair of opposing longitudinal inner surfaces 2111 of the displaceable member 2110. According to various embodiments, the body of the displaceable member 2110 may be made of a rigid material which may be resistant to deformation (e.g. as the movable tab 2132 moves along the linear pathway of the displaceable member 2110).

[000138] Further, with reference to FIG. 2N and FIG. 2O, each tab-guide 2115 may include a plurality of grooves 2115a along a first longitudinal inner surface 2111a of the pair of opposing longitudinal inner surfaces 2111 of the displaceable member 2110. The plurality of grooves 2115a may be the plurality of first engagement elements of the first engagement arrangement 2115 that is configured to inter-engage with the second engagement arrangement 2135 (e.g. the at least one protrusion 2135a of the movable tab 2132 of the link arrangement 2130) for releasably holding the link arrangement 2130 in place relative to the displaceable member 2110. Accordingly, the plurality of grooves 2115a may be shaped to correspond to (e.g. mate with) a shape of a corresponding protrusion 2135a (e.g. tallest protrusion 2135a) of the deformable portion 2132b of the movable tab 2132. Further, the plurality of grooves 2115a may be

spaced uniformly apart from each other. According to various other embodiments (not shown), the plurality of grooves 2115a may be spaced at non-uniform intervals. Accordingly, the movable tab 2132 may be movable along the secondary movement axis 2182 to a position corresponding to any one of the plurality of grooves 2115a.

[000139] According to various embodiments, an opposite second longitudinal inner surface 2111b of the pair of opposing longitudinal inner surfaces 2111 may be, but is not limited to being, a linear surface (e.g. corresponding to, or for engagement with a corresponding linear surface of the main portion 2132a of the movable tab 2132). Specifically, according to various embodiments, the second longitudinal inner surface 2111b may be configured (e.g. shaped) as a track on which the main portion 2132a of the movable tab 2132 may straddle.

[000140] As shown in FIG. 2N, according to various embodiments, the back-support assembly 2100 may include two tab-guides 2115 and two corresponding movable tabs 2132. A first set of a first tab-guide 2115 and first movable tab 2132 may be symmetrically arranged to a second set of second tab-guide 2115 and second movable tab 2132, about a line of symmetry 2188 (which may be parallel and/or coaxial with the secondary movement axis 2182 and/or extending central of the body of the displaceable member 2110). As a non-limiting example, shown in FIG. 2N, the first longitudinal inner surfaces 2111a of the two tab-guides 2115 (i.e. having the plurality of grooves 2115a) may be closer to the line of symmetry 2188 than the linear longitudinal inner surfaces 2111b thereof.

[000141] According to various embodiments, with reference to FIG. 2N and FIG. 2O, each tab-guide 2115 may include (e.g. further include) at least one alignment rod 2119. The alignment rod 2119 may be parallel with the secondary movement axis 2182. Correspondingly, each movable tab 2132 may include or may define a bore 2139 (e.g. through-hole) for a respective alignment rod 2119 to extend across. With the alignment rod 2119 extending across the bore 2139 of the movable tab 2132, the alignment rod 2119 may restrict the movable tab 2132 to be movable along only the secondary movement axis 2182.

[000142] FIG. 2P shows a pair of cantilever handle members 2141 attached to the link arrangement 2130, with the pair of cantilever handle members 2141 at a bottommost position relative to the displaceable member 2110, according to various embodiments.

[000143] FIG. 2Q and FIG. 2R are various cross-sectional views of the back-support assembly 2100, with the pair of cantilever handle members 2141 at the bottommost position relative to the displaceable member 2110, according to various embodiments.

[000144] FIG. 2S shows the pair of cantilever handle members 2141 attached to the link arrangement 2130, with the pair of cantilever handle members 2141 at a topmost position relative to the displaceable member 2110, according to various embodiments.

[000145] FIG. 2T and FIG. 2U are various cross-sectional views of the back-support assembly 2100, with the pair of cantilever handle members 2141 at the topmost position relative to the displaceable member 2110, according to various embodiments.

[000146] According to various embodiments, the back-support assembly 2100 may include a handle arrangement 2140 coupled or secured to the link arrangement 2130 for moving the link arrangement 2130 along the secondary movement axis 2182. With reference to FIG. 2P, the handle arrangement 2140 may include the pair of cantilever handle members 2141 (e.g. cantilever arm members) attached (or coupled or secured) to the link arrangement 2130. A first end portion of each cantilever handle member 2141 may be attached to the link arrangement 2130, and an opposite second end portion (e.g. free end portion) of the cantilever handle member 2141 may serve as a “handle portion” for moving the link arrangement 2130. Hence, when the link arrangement 2130 is at the bottommost position relative to the displaceable member 2110, as shown in FIG. 2P, the second end portion (e.g. free end portion) of any one or both of the pair of cantilever handle members 2141 may be pushed upward to move the link arrangement 2130 to an upper position relative to the displaceable member 2110 (e.g. to the topmost position), as shown in FIG. 2S.

[000147] Referring back to FIG. 2D, according to various embodiments, the second end portion (e.g. free end portion) of the pair of cantilever handle members 2141 may be extending rearwards of the back-support mounting frame 2101. In particular, as shown, the link arrangement 2130 and a first end portion of each of the pair of cantilever handle members 2141 secured or attached thereto may be at a front side (e.g. a first side) of the back-support mounting frame 2101. An intermediate portion of the cantilever handle member 2141 may extend from the first end portion of the cantilever handle member 2141, across a side of the back-support mounting frame 2101 (i.e. across the passageway 2103 defined by the back-support mounting frame 2101) in a direction along the thickness of the back-support mounting frame 2101, to a rear side

(e.g. an opposite second side) of the back-support mounting frame 2101. The second end portion of the cantilever handle member 2141 may be extending from the intermediate portion of the cantilever handle member 2141 in a direction away from the rear side of the back-support mounting frame 2101.

[000148] As shown in FIG. 2D and FIG. 2E, according to various embodiments, the first end portion of the cantilever handle member 2141 may be oriented in a first direction (e.g. a substantially vertical direction). The intermediate portion of the cantilever handle member 2141 may be oriented in a second direction (e.g. a substantially horizontal direction) different from (e.g. substantially perpendicular to) the first direction. The second end portion of the cantilever handle member 2141 may be oriented in a third direction (e.g. another substantially horizontal direction) different from both (e.g. substantially perpendicular to both) the first direction and the second direction.

[000149] According to various embodiments, each cantilever handle member 2141 may have a uniform (e.g. substantially uniform) cross-sectional profile. For example, as shown, each cantilever handle member 2141 may have a rectangular cross-sectional shape. According to various other embodiments (not shown), each cantilever handle member 2141 may have a circle or circular cross-sectional profile.

[000150] Referring to FIG. 2S, according to various embodiments, the second end portions (e.g. free end portions) of the pair of cantilever handle members 2141 may be movable alongside the displaceable member 2110. Thus, the displaceable member 2110 may be between the second end portions (e.g. free end portions) of the pair of cantilever handle members 2141 (e.g. at various positions of the handle members 2141 relative to the displaceable member 2110).

[000151] FIG. 2V shows a close-up frontal perspective view of a head-support assembly 2200, of the chair 2000, according to various embodiments.

[000152] FIG. 2W shows a rear close-up perspective view of the head-support assembly 2200, according to various embodiments.

[000153] According to various embodiments, there may be provided the head-support assembly 2200 for the backrest 2005 of the chair 2000.

[000154] The components of the head-support assembly 2200 that are like the corresponding components of the head-support assembly 1200 of FIG. 1A and FIG. 1B are similarly numbered. The description of these components made with respect to the

head-support assembly 2200 may be applicable with respect to the head-support assembly 1200, and vice versa.

[000155] With reference to FIG. 2V, the head-support assembly 2200 may, similar to the head-support assembly 1200 of FIG. 1A and FIG. 1B, include a head-support mount 2201, a head-support link member 2210, and a connector 2220.

[000156] Referring to FIG. 2W, the head-support mount 2201 may be releasably mounted to the backrest 2005. For example, as shown, the head-support mount 2201 may include a clamp for releasably clamping to an upper portion of the backrest 2005 of the chair 2000.

[000157] The head-support link member 2210 may be pivotably coupled (e.g. via a hinge), at a first end portion of the head-support link member 2210, to the head-support mount 2201 so as to be pivotable relative to the head-support mount 2201 about a primary pivot axis 2291. According to various embodiments, the primary pivot axis 2291 may be orthogonal or perpendicular to the primary movement axis 2181 of the back-support assembly 2100 (i.e. when they are both mounted to the chair 2000). As shown, the head-support link member 2210 may be an elongate structure, such as an arm member. According to various embodiments, the head-support link member 2210 may include or may be made of a rigid material, or a semi-rigid material which may be capable of flexing to a certain extent.

[000158] The connector 2220 may be pivotably coupled (e.g. via a hinge), at a first portion of the connector 2220, to an opposite second end portion of the head-support link member 2210 so as to be pivotable relative to the head-support link member 2210 about a secondary pivot axis 2292. The secondary pivot axis 2292 may be parallel (e.g. substantially parallel) with the primary pivot axis 2291.

[000159] According to various embodiments, the head-support assembly 2200 may include (e.g. optionally or further include) a head-support member 2230 (e.g. a headrest) that is coupled to a second portion of the connector 2220.

[000160] FIG. 2X shows the head-support link member 2210 pivoted relative to the head-support mount 2201, according to various embodiments.

[000161] FIG. 2Y shows the connector 2220 pivoted relative to the head-support link member 2210, according to various embodiments.

[000162] Accordingly, pivoting the head-support link member 2210, relative to the head-support mount 2201, as shown in FIG. 2X, about the primary movement axis 2181

may move (e.g. “orbit”) the connector 2220 and the head-support member 2230 about the primary pivot axis 2291. On the other hand, with reference to FIG. 2Y, pivoting the connector 2220, relative to the head-support link member 2210, about the secondary pivot axis 2292 may rotate the head-support member 2230 (e.g. headrest) about the secondary movement axis 2182. Hence, according to various embodiments, a position of the head-support member 2230 about the secondary pivot axis 2292 may be adjusted separately from a position of the head-support member 2230 about the primary pivot axis 2291. Accordingly, a user of the chair 2000 may adjust a tilt angle of a head-support member 2230 (e.g. headrest), to cater to the user’s head, by rotating the headrest about the secondary movement axis 2182, as shown in FIG. 2Y. Moreover, as shown in FIG. 2X, the user may easily move the entire headrest rearwards (i.e. away) from the user’s head by pivoting the head-support link member 2210 rearwards about the primary pivot axis 2291 (e.g. when the user of the chair 2000 does not wish to use the headrest).

[000163] Additionally, referring back to FIG. 2V and FIG. 2W, according to various embodiments, the head-support member 2230 (e.g. headrest) and the second portion of the connector 2220 may be coupled in an operative manner such that the head-support member 2230 may be movable (e.g. slidable linearly) along a displacement axis 2293 (e.g. a linear displacement axis 2293). According to various embodiments, the displacement axis 2293 may be perpendicular to the secondary pivot axis 2292.

[000164] FIG. 2Z shows the head-support member 2230 moved along the displacement axis 2293, according to various embodiments.

[000165] Accordingly, as shown in FIG. 2Z, a user of the chair 2000 may adjust a height of the head-support member 2230 by moving the head-support member 2230 along the displacement axis 2293.

[000166] According to various embodiments, the second portion of the connector 2220 may include a guide element which defines a guide path that is extending parallel with the displacement axis 2293 for guiding movement of the head-support member 2230. For example, as shown, the second portion of the connector 2220 may include a tubular member 2221 with an inner guide-channel (e.g. cylindrical bore or through-hole) extending parallel with the displacement axis 2293. The head-support member 2230 may include a shaft 2231 that is extending across (or slidably inserted) into the inner-guide channel of the tubular member 2221 of the connector 2220. As a non-limiting example, as shown in FIG. 2V, head-support assembly 2200 may include two

tubular members 2221 (e.g. of two connectors 2220) and two shafts 2231 (e.g. of a single head-support member 2230).

[000167] According to various embodiments, the tubular member 2221 and the shaft 2231 may further include an inter-engagement arrangement for releasably holding the shaft 2231 (i.e. of the headrest member) in place relative to the tubular member 2221 (i.e. of the connector 2220). For example, the shaft 2231 may be fitted into the tubular member 2221 via a friction-fit joint, and/or the shaft 2231 may include a plurality of serrations corresponding to a plurality of positions where the shaft 2231 may be held in place relative to the tubular-member. As other non-limiting examples, the inter-engagement arrangement may include a detent mechanism, or a magnetic coupling, etc.

[000168] Referring back to FIG. 2A, according to various embodiments, the chair 2000 may be provided.

[000169] The chair 2000 may include the backrest 2005.

[000170] According to various embodiment, the chair 2000 may include (e.g. further include) the back-support assembly 2100 mounted (e.g. releasably mounted) or affixed to the backrest 2005.

[000171] According to various embodiment, the chair 2000 may include (e.g. further include) the head-support assembly 2200 mounted (e.g. releasably mounted) to the backrest 2005 of the chair 2000.

[000172] Various embodiments thus generally described a backrest assembly for a chair, that offers adjustability to accommodate individual ergonomic requirements.

[000173] Furthermore, various embodiment described a head-rest assembly for the chair, which can be conveniently mounted and adjusted to provide flexible headrest support to individual users.

[000174] Additionally, various embodiments described a chair that may be equipped with the backrest assembly and/or the head-rest assembly.

[000175] While the invention has been particularly shown and described with reference to specific embodiments, it should be understood by those skilled in the art that various changes, modification, variation in form and detail may be made therein without departing from the scope of the invention as defined by the appended claims. The scope of the invention 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

1. A back-support assembly for a chair comprising:
 - a back-support mounting frame for a backrest of the chair;
 - a displaceable member that is displaceable relative to the back-support mounting frame along a primary movement axis;
 - a motion converter that operatively couples the displaceable member to the back-support mounting frame;
 - wherein the motion converter is configured to convert an input motion applied to the motion converter relative to the back-support mounting frame into an output motion that displaces the displaceable member relative to the back-support mounting frame and along the primary movement axis;
 - wherein the primary movement axis extends across the back-support mounting frame along a thickness direction of the back-support mounting frame; and
 - a link arrangement for coupling one or more back-support members to the displaceable member, the link arrangement being operatively engaged with the displaceable member so as to be movable relative to the displaceable member along a secondary movement axis that is non-parallel to the primary movement axis.
2. The back-support assembly of claim 1,
 - wherein the motion converter comprises:
 - an input-receiving member, that is movable relative to the back-support mounting frame, for receiving the input motion, and
 - an output member in engagement with the input-receiving member,
 - wherein the output member is further coupled to the displaceable member in a manner so as to impart the output motion to the displaceable member for displacing the displaceable member relative to the back-support mounting frame and along the primary movement axis.
3. The back-support assembly of claim 2,
 - wherein the input-receiving member comprises a rotatable member that is rotatable to input a rotational input motion into the motion converter that is converted by the motion converter into a linear output motion for displacing the displaceable

member relative to the back-support mounting frame and along the primary movement axis.

4. The back-support assembly of claim 3,
wherein the input-receiving member of the motion converter comprises a threaded shaft that is rotatable about a rotational axis extending across the threaded shaft;
wherein the rotational axis is parallel with the primary movement axis; and
wherein the output member comprises an internally threaded cylindrical body in operative threaded engagement with the threaded shaft such that a rotational input motion of the threaded shaft about the rotational axis results in a threaded displacement of the internally threaded cylindrical body relative to the threaded shaft along the primary movement axis.
5. The back-support assembly of claim 4,
wherein the threaded shaft comprises a plurality of outer screw threads; and
wherein the plurality of outer screw threads comprises a multi-start thread.
6. The back-support assembly of claim 1,
wherein the link arrangement comprises a bar member operatively engaged with the displaceable member so that the bar member is movable relative to the displaceable member along the secondary movement axis.
7. The back-support assembly of claim 1,
wherein the displaceable member comprises a guide;
wherein the guide defines a linear pathway on the displaceable member for moving the link arrangement along the linear pathway; and
wherein the linear pathway is parallel with the secondary movement axis.
8. The back-support assembly of claim 7,
wherein the link arrangement comprises a movable tab;
wherein the displaceable member comprises a tab-guide; and

wherein the tab-guide comprises a pair of opposing longitudinal inner surfaces of the displaceable member which define the linear pathway for the movable tab to be movable therealong.

9. The back-support assembly of claim 8,
wherein the tab-guide comprises a first engagement arrangement;
wherein the movable tab comprises a second engagement arrangement; and
wherein the first engagement arrangement and the second engagement arrangement are configured to inter-engage with each other for releasably holding the movable tab in place relative to the tab-guide.
10. The back-support assembly of claim of claim 8,
wherein the tab-guide comprises an alignment rod that is parallel with the linear pathway;
wherein the movable tab defines a bore; and
wherein the alignment rod is extending through the bore of the movable tab.
11. The back-support assembly of claim 1, further comprising:
a handle arrangement coupled to the link arrangement for moving the link arrangement along the secondary movement axis.
12. The back-support assembly of claim 11,
wherein the handle arrangement comprises:
a cantilever handle member secured, at a first end portion thereof, to the link arrangement;
wherein an opposite second free end portion of the cantilever handle member serves as a handle portion for moving the link arrangement.
13. The back-support assembly of claim 12,
wherein the link arrangement and the first end portion of the cantilever handle member are at a first side of the back-support mounting frame;
wherein an intermediate portion of the cantilever handle member extends from the first end portion of the cantilever handle member, across a side of the back-

support mounting frame in the thickness direction of the back-support mounting frame, to a second side of the back-support mounting frame opposite the first side of the back-support mounting frame; and

wherein the second free end portion of the cantilever handle member extends, from the intermediate portion of the cantilever handle member, in a direction away from the second side of the back-support mounting frame.

14. The back-support assembly of claim 1, further comprising:

a pair of back-support members coupled to the displaceable member via the link arrangement.

15. The back-support assembly of claim 14,

wherein the pair of back-support members are arranged adjacent to each other along a sideways direction that is non-parallel to both the primary movement axis and the secondary movement axis.

16. A chair comprising:

a backrest; and

the back-support assembly of claim 1 mounted to the backrest.

17. The chair of claim 16, further comprising:

a head-support assembly comprising:

a head-support mount releasably mounted to the backrest,

a head-support link member pivotably coupled, at a first end portion of the head-support link member, to the head-support mount so as to be pivotable relative to the head-support mount about a primary pivot axis, and

a connector pivotably coupled, at a first portion of the connector, to a second end portion of the head-support link member so as to be pivotable relative to the head-support link member about a secondary pivot axis that is parallel with the primary pivot axis;

wherein the primary pivot axis is orthogonal to the primary movement axis.

18. The chair of claim 17, further comprising:
a head-support member operatively coupled to a second portion of the connector such that the head-support member is movable along a displacement axis that is orthogonal to the secondary pivot axis.
19. The chair of claim 18,
wherein the second portion of the connector may comprise a guide element which defines a guide path that is extending parallel with the displacement axis for guiding movement of the head-support member.
20. The chair of claim 19,
wherein the guide element comprises a tubular member with an inner guide-channel extending parallel with the displacement axis; and
wherein the head-support member comprises a shaft that is slidably inserted into the guide-channel.