

AN ADJUSTMENT LEVER FOR A FURNITURE ITEM

FIELD OF INVENTION

[1] The present invention generally relates to an adjustment lever for a furniture item, a method for manufacturing the adjustment lever and an adjustment assembly for a furniture item.

BACKGROUND

[2] Height adjustable chairs are commonly used in the office and homes. These chairs typically include a seat that swivels in relation to the base of the chair and the height of the seat can be adjusted. In a typical height adjustable chair, the height of the seat is adjusted so that users are sitting at a comfortable height in order to carry out their tasks, e.g. aligning the user's vision to be in line with the monitor when typing in front of a computer. The height adjustment mechanism of such chairs is usually a gas spring which allows the user to adjust the height of the chair using a lever located below the seat. The height of the chair is increased by pulling the lever up while the chair is lowered by the user's weight.

[3] The lever of the height adjustment mechanism generally includes two rods, one of which is a solid rod with protrusions on its outer surface and is installed to a seat shaft. The other hollow rod is installed over the solid rod at one end and includes a flat plate at the other end to allow the user to pull the lever up to increase or decrease the height of the seat. However, the typical lever design in chairs has the problem of aligning and assembling the rods. Particularly, existing designs require that the solid rod is initially installed at the seat shaft and it is difficult for the user to correctly align the hollow rod with the solid rod. In addition, a large force is required to mount the hollow rod to the solid rod and there is no feedback or indication on whether the two rods are fully and correctly assembled.

[4] Accordingly, a need exists to provide an adjustment lever that seeks to address some of the above problems.

SUMMARY

[5] According to a first aspect of the present invention, there is provided an adjustment lever for a furniture item, the lever comprising: a body having a first end and an opposing second end; a generally flat handle member extending from the first end; and a hollow cylindrical structure disposed at the second end and extending into the body, the hollow cylindrical structure comprising: a pair of tracks extending longitudinally into the hollow cylindrical structure; a pair of cam surfaces disposed adjacent an opening at the second end and arranged diagonally opposite each other, wherein each cam surface leads to a respective track; and a pair of locking members, each disposed along a respective track, wherein the hollow cylindrical structure is configured to receive an elongated rod of an adjustment assembly of the furniture item.

[6] In an embodiment, each of the cam surfaces may be configured to slidably receive a respective protrusion disposed on the elongated rod.

[7] In an embodiment, each of the pair of cam surfaces may comprise a high pitched helix surface.

[8] In an embodiment, each of the locking members may comprise a flexural member configured to engage a respective protrusion to secure the hollow cylindrical structure to the elongated rod.

[9] According to a second aspect of the present invention, there is provided a method for manufacturing an adjustable lever for a furniture item, the method comprising: forming a body structure having a first end, an opposing second end and a generally flat handle member extending from the first end; forming a hollow cylindrical structure at the second end such that the hollow cylindrical structure extends into the body, wherein forming the hollow cylindrical structure comprises: forming a pair of tracks extending longitudinally into the hollow cylindrical structure; forming a pair of cam surfaces adjacent an opening at the second end such that the cam surfaces are arranged diagonally opposite each other and each cam surface leads to a respective track; and forming a pair of locking members, each disposed along a respective track.

[10] In an embodiment, forming the pair of cam surfaces may comprise forming each cam surface as a high pitched helix surface.

[11] In an embodiment, forming the pair of locking members may comprise forming each locking member having a flexural member.

[12] According to a third aspect of the present invention, there is provided a kit of parts for assembling an adjustment assembly of a furniture item, the kit comprising: the adjustment lever as defined in the first aspect; and an elongated rod having a pair of protrusions, wherein the adjustment lever is configured to be mounted to the elongated rod such that the adjustment lever is rotationally and translationally secured to the elongated rod.

BRIEF DESCRIPTION OF THE DRAWINGS

[13] Embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

[14] Fig. 1A shows a perspective view of an adjustment lever for a furniture item according to an example embodiment.

[15] Fig. 1B shows a top view of the adjustment lever of Fig. 1A.

[16] Fig. 1C shows a cross-sectional view of the adjustment lever of Fig. 1A.

[17] Fig. 1D shows an end view of the adjustment lever of Fig. 1A.

[18] Figs. 2A to 2C show a perspective view of the installation of an adjustment assembly for a furniture item according to an example embodiment.

[19] Figs. 3A to 3C show an end view of the installation of an adjustment assembly corresponding to Figs. 2A to 2C.

[20] Fig. 4A shows a top view of the assembled adjustment assembly according to an example embodiment.

[21] Fig. 4B shows a cross-sectional view of the assembled adjustment assembly of Fig. 4A.

[22] Fig. 5 shows a flowchart illustrating a method for manufacturing an adjustable lever according to an example embodiment.

DETAILED DESCRIPTION

[23] The following detailed description is merely exemplary in nature and is not intended to limit the invention or the application and uses of the invention. Furthermore, there is no intention to be bound by any theory presented in the preceding background of the invention or the following detailed description. Herein, the adjustment lever for a furniture item, method of manufacturing the adjustment lever and an adjustment assembly for a furniture item are presented in accordance with present embodiments having the advantage of ease of installation through correct positioning and haptic feedback to the user while maintaining a low cost of manufacturing.

[24] Fig. 1A shows a perspective view of an adjustment lever 100 for a furniture item according to an example embodiment. The adjustment lever 100 comprises a body 102 having a first end 104 and an opposing second end 106. A generally flat handle member 108 extends from the first end 104. A hollow cylindrical structure 110 is disposed at the second end 106 and extends into the body 102. The hollow cylindrical structure 110 may include a pair of tracks 112 (only one track is shown in Fig. 1A) extending longitudinally into the hollow cylindrical structure 110. The hollow cylindrical structure 110 may also include a pair of cam surfaces 114 (only one cam surface is shown in Fig. 1A) disposed adjacent an opening at the second end 106. The hollow cylindrical structure 110 is configured to receive an elongated rod of an adjustment assembly of the furniture item which will be discussed in detail later with reference to Figs. 2A-2C. The pair of cam surfaces 114 may be arranged diagonally opposite each other (see Fig. 1D) and each cam surface 114 leads to a respective track 112. In one non-limiting example, each of the pair of cam surfaces 114 may include a high pitched helix surface having a pitch of approximately 12.5mm. It will be appreciated that the cam surfaces 114 may have a different profile, or the pitched helix may have a different pitch, in alternate embodiments.

[25] Fig. 1B shows a top view of the adjustment lever 100 of Fig. 1A while Fig. 1C shows a cross-sectional view of an adjustment lever 100 of Fig. 1A. As shown in Fig. 1C, the hollow cylindrical structure 110 may also include a pair of locking members 118a, 118b. Each of the locking members 118a, 118b is disposed along a respective track 112 and each of the pair of locking members 118a, 118b may include a flexural member. In an alternative embodiment, the hollow cylindrical structure 110 may include more than a pair of cam surfaces and more than a pair of locking members 118a, 118b. The body 102 may include one or more apertures 116 disposed on an outer surface such that each of the pair of locking members 118a, 118b can flex and even be assessed through a respective aperture 116. The aperture 116 may also provide visual aid to the user during installation of the adjustment assembly. Fig. 1D shows an end view

170 of the adjustment lever of Fig. 1A. In the embodiment shown in Fig. 1D, the pair of cam surfaces 114 are arranged diagonally opposite each other relative to the longitudinal axis of the hollow structure 110.

[26] Figs. 2A to 2C show a perspective view of the installation of an adjustment assembly 200 for a furniture item according to an example embodiment. In Fig. 2A, the adjustment assembly 200 includes the adjustment lever 100 as described previously and further includes an elongated rod 202 having a pair of protrusions 204a, 204b. In alternative embodiments, the elongated rod 202 can have more than a pair of protrusions. For example and as shown in Fig. 2A, the elongated rod 202 has two pairs of protrusions 204a, 204b, 204c, 204d. The elongated rod 202 may be a solid rigid rod made of metal to increase durability. The adjustment lever 100 is configured to slidably engage with the elongated rod 202 and be guided to a fully engaged position where the adjustment lever 100 is secured to the elongated rod 202. In Fig. 2A, the elongated rod 202 is mounted to a furniture item (not shown in the figure), for example a chair or a table, such that the elongated rod 202 does not rotate, and the adjustment lever 100 is brought toward the elongated rod 202.

[27] In Fig. 2B, the adjustment lever 100 is then installed by sliding over the elongated rod 202. The adjustment lever 100 can be initially at any orientation about its longitudinal rotation axis when installing over the elongated rod 202. The pair of cam surfaces 114 (not shown in the figure) slidably receives the pair of corresponding protrusions 204a, 204b disposed on the elongated rod 202. This can be achieved by having a high pitched helix surface for each cam surface 114.

[28] In Fig. 2C, the adjustment lever 100 rotates 206 about its longitudinal axis in order to receive the pair of corresponding protrusions 204a, 204b, thereby guiding the protrusions 204a, 204b into the cam surfaces 114 and into the tracks 112 without the need for visual and physical pre-alignment. The adjustment lever 100 may thus effortlessly guide the pair of corresponding protrusions 204a, 204b into the correct orientation. In example implementations, the guiding can be achieved even if the adjustment lever 100 is initially offset from its correct orientation by up to about 170°.

[29] After the adjustment lever 100 rotates to the correct orientation to receive the pair of corresponding protrusions 204a, 204b, the elongated rod 202 is guided longitudinally into the body 102 of the adjustment lever 100 by the pair of tracks 112 (not shown in the figure) that extend into the hollow cylindrical structure 110. The pair of locking members 118a, 118b (not shown in the figures), each having a flexural member, then engage the pair of corresponding

protrusions 204a, 204b to secure the elongated rod 202 to the adjustment lever 100. The locking members 118a, 118b may be arranged opposite each other in order to engage the pair of corresponding protrusions 204a, 204b. In an embodiment, the locking members 118a, 118b may be snap fittings which are designed to provide haptic feedback to the user when the elongated rod 202 is fully assembled into its final intended position in the adjustment lever 100. This may be possible by sliding the flexural members over the pair of corresponding protrusions 204a, 204b. The locking members 118a, 118b may also function to keep the adjustment assembly 200 securely installed. If the adjustment lever 100 is to be removed from the elongated rod 202, the aperture 116 of the adjustment lever 100 can allow the user to flex the flexural member to an open position such that the elongated rod 202 can be removed.

[30] Figs. 3A to 3C show an end view of the installation of an adjustment assembly corresponding to the Figs. 2A to 2C. Fig. 3A corresponds to Fig. 2A, where the adjustment lever 100 has yet to be installed onto the elongated rod 202 and is angularly offset from its correct orientation by about 90°. Fig. 3B corresponds to Fig. 2A, where the adjustment lever 100 is slidingly receives the rod 202 via the cam surfaces 114 and Fig. 3C corresponds to Fig. 2C, where the adjustment lever 100 rotates such that the protrusions 204a, 204b are engaged by the locking members 118a, 118b. As discussed above, the adjustment lever 100 can be guided to its correct orientation even if it is initially offset by up to 170°.

[31] Fig. 4A shows a top view of an assembled adjustment assembly 400 according to an example embodiment while Fig. 4B shows a cross-sectional view of the assembled adjustment assembly 400 of Fig. 4A. As shown in the figures, the adjustable lever 100 has been installed into the elongated rod 202. The aperture 116 on the adjustable lever 100 (as shown in Fig. 4A) may allow the user to view the locking member 118a and to confirm that the elongated rod 202 is correctly secured. The aperture 116 may also allow the user to remove the elongated rod 202 by flexing the locking means 118a to the open position. The locking means 118a may be automatically flexed to the open position when a predetermined force is applied to remove the elongated rod 202. In an embodiment and as shown in Fig. 4B, the locking member 118a is engaged in the recess between protrusions 204a and 204c while locking member 118b is engaged in the space between protrusions 204b and 204d. In the position shown in Fig. 4B, the protrusion 204c, 204d sit snugly in the respective tracks 112, thereby locking the adjustment lever 100 from any rotational movement.

[32] Fig. 5 shows a flowchart illustrating a method for manufacturing an adjustable lever according to an example embodiment. The method comprises, at step 502, forming a body

structure having a first end, an opposing second end and a generally flat handle member extending from the first end. At step 504, the method includes forming a hollow cylindrical structure at the second end such that the hollow cylindrical structure extends into the body. At step 506, the method for forming the hollow cylindrical structure includes forming a pair of tracks extending longitudinally into the hollow cylindrical structure. At step 508, the method for forming the hollow cylindrical structure includes forming a pair of cam surfaces adjacent an opening at the second end such that the cam surfaces are arranged diagonally opposite each other and each cam surface leads to a respective track. At step 510, the method for forming the hollow cylindrical structure includes forming a pair of locking members, each disposed along a respective track. The method for forming the pair of cam surfaces may include forming each cam surface as a high pitched helix surface. The method for forming the pair of locking members may include forming each locking member having a flexural member.

[33] As described, the example embodiments use an adjustment lever having a pair of cam surfaces to guide the elongated rod and may enable correct positioning. In this way, only a small force may be required to install the adjustment lever thereby facilitating easy installation of the adjustment assembly. The locking members of the adjustment lever may provide haptic feedback to the user during installation and keep the elongated rod securely attached to the adjustment lever. This may assist the user to know that the adjustment assembly has been correctly installed without having to visually look at the elongated rod or the adjustment lever. While exemplary embodiments have been presented in the foregoing detailed description of the invention, it should be appreciated that a vast number of variations exist.

[34] It should further be appreciated that the exemplary embodiments are only examples, and are not intended to limit the scope, applicability, operation, or configuration of the invention in any way. Rather, the foregoing detailed description will provide those skilled in the art with a convenient road map for implementing an exemplary embodiment of the invention, it being understood that various changes may be made in the function and arrangement of elements and method of manufacturing described in an exemplary embodiment without departing from the scope of the invention as set forth in the appended claims.

[35] It will be appreciated by a person skilled in the art that numerous variations and/or modifications may be made to the present invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects to be illustrative and not restrictive.

CLAIMS

1. An adjustment lever for a furniture item, the lever comprising:
 - a body having a first end and an opposing second end;
 - a generally flat handle member extending from the first end; and
 - a hollow cylindrical structure disposed at the second end and extending into the body,
 the hollow cylindrical structure comprising:
 - a pair of tracks extending longitudinally into the hollow cylindrical structure;
 - a pair of cam surfaces disposed adjacent an opening at the second end and arranged diagonally opposite each other, wherein each cam surface leads to a respective track; and
 - a pair of locking members, each disposed along a respective track,
 wherein the hollow cylindrical structure is configured to receive an elongated rod of an adjustment assembly of the furniture item.
2. The adjustment lever of claim 1, wherein each of the cam surfaces is configured to slidingly receive a respective protrusion disposed on the elongated rod.
3. The adjustment lever of claim 1 or 2, wherein each of the pair of cam surfaces comprises a high pitched helix surface.
4. The adjustment lever of claim 2, wherein each of the locking members comprises a flexural member configured to engage a respective protrusion to secure the hollow cylindrical structure to the elongated rod.
5. A method for manufacturing an adjustable lever for a furniture item, the method comprising:
 - forming a body structure having a first end, an opposing second end and a generally flat handle member extending from the first end;
 - forming a hollow cylindrical structure at the second end such that the hollow cylindrical structure extends into the body,
 wherein forming the hollow cylindrical structure comprises:
 - forming a pair of tracks extending longitudinally into the hollow cylindrical structure;

forming a pair of cam surfaces adjacent an opening at the second end such that the cam surfaces are arranged diagonally opposite each other and each cam surface leads to a respective track; and

forming a pair of locking members, each disposed along a respective track.

6. The method of as claimed in claim 5, wherein forming the pair of cam surfaces comprises forming each cam surface as a high pitched helix surface.

7. The method as claimed in claim 5 or 6, wherein forming the pair of locking members comprises forming each locking member having a flexural member.

8. A kit of parts for assembling an adjustment assembly of a furniture item, the kit comprising:

the adjustment lever as claimed in any one of claims 1 to 4; and

an elongated rod having a pair of protrusions,

wherein the adjustment lever is configured to be mounted to the elongated rod such that the adjustment lever is rotationally and translationally secured to the elongated rod.