AN ASSEMBLY SYSTEM FOR ATTACHING AN ACCESSORY TO A FURNITURE ITEM

TECHNICAL FIELD

[0001] The present disclosure relates to an accessory assembly system suitable for attaching one or more accessories, such as, but not limited to, the footrest assembly, to a furniture item.

BACKGROUND

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

[0003] There currently does not exist an assembly system for attaching an accessory to a furniture item, wherein an accessory, such as a footrest recliner system, can be freely attached or detached from a furniture item, such as a chair. There also does not exist an assembly method of a modular accessory assembly system for chairs wherein an accessory can be hooked on and secured with relative ease.

[0004] Accordingly, there exists a need for an improved footrest assembly for attachment to a chair, that seeks to address at least one of the aforementioned issues.

SUMMARY

[0005] According to an aspect of the disclosure, there is provided a footrest assembly for attachment to a chair, the footrest assembly comprising a mounting frame configured to be attached to a seat portion of the chair, the mounting frame comprising a pair of brackets; a recliner frame comprising a first portion configured to be slidably received by the pair of brackets, and a second portion configured to support (for example, attached to) a footrest, the first portion pivotably connected to the second portion to define a recliner angle therebetween; and an actuator assembly configured to allow adjustment of the recliner angle between the first portion and the second portion, the actuator assembly comprises a gas spring configured to

urge the second portion to an extended position, the extended position corresponding to a maximum allowable recliner angle.

[0006] In some embodiments, the pair of brackets, the first portion and the second portion form a six-bar mechanical linkage, the six-bar mechanical linkage arranged to move from a retracted state to the extended position upon actuation of the gas spring.

[0007] In some embodiments, the second portion comprises a linkage system, the linkage system having a main linkage, the main linkage configured to provide structural support to the linkage system. In some embodiments, the main linkage may comprise two limb portions joined by a cross member to form a H-shaped structure. The two limb portions may be casings for housing one or more other linkages of the linkage system.

[0008] In some embodiments, the second portion comprises a fastener for attaching the footrest to the main linkage when the six-bar mechanical linkage is in the retracted state. The fastener may comprise at least one magnet.

[0009] In some embodiments, the second portion comprises a support plate shaped and dimensioned to receive the footrest.

[0010] In some embodiments, the second portion comprises an end portion shaped and dimensioned to receive the footrest.

[0011] In some embodiments, the footrest comprises a base formed from or of a medium-density fiberboard (MDF), a cushion comprising memory foam, and a clip for attachment to an end portion.

[0012] In some embodiments, the clip is formed from or of a thermoplastic compound and glass fiber.

[0013] In some embodiments, the clip comprises polyamide and at least 10% of the glass fiber.

[0014] In some embodiments, each of the pair of brackets comprises a base portion and a pair of ribs extending from longitudinal opposing sides of the base portion, wherein the free end of at least one of the pair of ribs is inclined towards the free end of the other rib.

[0015] In some embodiments, each of the pair of ribs comprises at least one slot shaped and dimensioned to receive at least one fastener.

[0016] In some embodiments, the actuator assembly comprises a compression spring coupled to a piston of the gas spring. The compression spring may be sleeved on a piston rod of the gas spring, and one end of the compression spring may be directly or indirectly positioned in contact with the piston of the gas spring. When the gas spring is being compressed, the piston of the gas spring may compress the compression spring, thereby storing energy in the compression spring. Upon the actuation of the gas spring, the compression spring may extend, thus providing a reaction force on the piston which reinforces the force produced by the gas spring to overcome static friction and allow the gas spring to smoothly extend even after a period of inactivity.

[0017] According to another aspect of the disclosure, there is provided a chair comprising a seat portion and a footrest assembly installed to the seat portion, the footrest assembly comprising a mounting frame configured to be attached to the seat portion of the chair, the mounting frame comprising a pair of brackets; a recliner frame comprising a first portion configured to be slidably received by the pair of brackets, and a second portion configured to support a footrest, the first portion pivotably connected to the second portion to define a recliner angle; and an actuator assembly configured to allow adjustment of the recliner angle between the first portion and the second portion, the actuator assembly comprises a gas spring configured to urge the second portion to an extended position, the extended position corresponding to a maximum allowable recliner angle.

[0018] According to another aspect of the disclosure, there is provided a method of manufacturing a footrest assembly for attachment to a chair, the method comprising a step of providing a mounting frame, the mounting frame configured to be attached to a seat portion of

the chair, the mounting frame comprising a pair of brackets; a step of providing a recliner frame, the recliner frame comprising a first portion configured to be slidably received by the pair of brackets, and a second portion configured to support a footrest, the first portion pivotably connected to the second portion to define a recliner angle therebetween; and a step of providing an actuator assembly, the actuator assembly configured to allow adjustment of the recliner angle between the first portion and the second portion, the actuator assembly comprises a gas spring configured to urge the second portion to an extended position, the extended position corresponding to a maximum allowable recliner angle.

[0019] According to another aspect of the present disclosure there is provided a hook assembly system for attaching an accessory to a portion of a furniture item, comprising:

[0020] a mounting frame attachable to the portion of the furniture item; an accessory configured to be attached to the mounting frame; and a hook assembly, wherein the hook assembly comprises: at least one frame bracket, the at least one frame bracket includes a base portion and a pair of hooks extending from the base portion, the pair of hooks configured to be attached to the mounting frame, the base portion attachable to the accessory; wherein the pair of mounting bars is spaced apart in a range of 190 millimeters to 200 millimeters.

[0021] According to another aspect of the disclosure, there is provided a hook assembly system for attaching an accessory to a portion of a furniture item, comprising: a mounting frame attachable to the portion of the furniture item or forming part of the furniture item; an accessory configured to be attached to the mounting frame; and a hook assembly, wherein the hook assembly comprises: at least one frame bracket, the at least one frame bracket includes a base portion and a pair of hooks extending from the base portion, the pair of hooks configured to be attached to the mounting frame, the base portion attachable to the accessory; and a locking mechanism pivotably connected to the base portion, the locking mechanism comprising a stopper configured to prevent movement of the pair of hooks along at least one direction when the locking mechanism is in a locked position.

[0022] In some embodiments, the frame bracket comprises a slot and the stopper comprises a tab, the slot shaped and dimensioned to receive the tab, in the locked position.

[0023] In some embodiments, the locking mechanism comprises a catch, the catch configured to engage another end of the base portion.

[0024] In some embodiments, the mounting frame comprises a pair of mounting bars.

[0025] In some embodiments, each of the mounting bars comprises at least one resilient member, the at least one resilient member arranged to contact the pair of hooks.

[0026] In some embodiments, the at least one resilient member comprises at least one rubber or polymer-based clip, such as at least one silicone clip, the plurality of silicone clips arranged to contact the pair of hooks.

[0027] In some embodiments, the portion of the furniture item is a seat portion of the furniture item, and wherein the mounting frame is configured to be attached to a base of the seat portion of the furniture item; and the accessory is a footrest recliner.

[0028] In some embodiments, the portion of the furniture item is a seat portion of the furniture item, and wherein the pair of mounting bars is configured to be attached to a base or a side of the seat portion of the furniture item; and the accessory is a cup holder and hanger assembly.

[0029] According to another aspect of the present disclosure, there is provided a method of manufacturing an assembly system for a furniture item, comprising: providing a mounting frame attachable to the portion of a furniture item; providing an accessory, the accessory configured to be attached to the mounting frame; and providing a hook assembly, wherein the hook assembly comprises: at least one frame bracket including a base portion and a pair of hooks extending from the base portion, the pair of hooks configured to be attached to the mounting frame, the base portion attachable to the accessory; and a locking mechanism pivotably connected to the base portion, the locking mechanism comprising a stopper configured to prevent movement of the pair of hooks along at least one direction when the locking mechanism is in a locked position.

[0030] According to another aspect of the present disclosure, there is provided a furniture item comprising a seat portion and an accessory installed to the seat portion, comprising a mounting frame attachable to the seat portion of the furniture item or forming part of the seat portion of the furniture item; an accessory configured to be received by the pair of mounting bars; and a hook assembly, wherein the hook assembly comprises: at least one frame bracket including a base portion and a pair of hooks extending from the base portion, the pair of hooks configured to be attached to the mounting frame, the base portion attachable to the accessory; and a locking mechanism pivotably connected to the base portion, the locking mechanism comprising a stopper configured to prevent movement of the pair of hooks along at least one direction when the locking mechanism is in a locked position.

[0031] In some embodiments, the accessory is a footrest assembly, and the footrest assembly comprises a recliner frame comprising a first portion configured to be slidably received by the pair of brackets, and a second portion configured to support a footrest, the first portion pivotably connected to the second portion to define a recliner angle; and an actuator assembly configured to allow adjustment of the recliner angle between the first portion and the second portion.

[0032] In some embodiments, the actuator assembly comprises a gas spring configured to urge the second portion to an extended position, the extended position corresponding to a maximum allowable recliner angle.

[0033] In some embodiments, the pair of brackets, the first portion and the second portion form a six-bar mechanical linkage, the six-bar mechanical linkage arranged to move from a retracted position to the extended position upon actuation of the gas spring, and wherein the second portion comprises means for attaching the footrest directly or indirectly to a main linkage of a linkage system of the second portion when the six-bar mechanical linkage is in the retracted state.

[0034] In some embodiments, the second portion comprises means for attaching the footrest to a main linkage of a linkage system of the second portion when the six-bar mechanical linkage is in the retracted state.

[0035] In some embodiments, the second portion comprises an end portion shaped and dimensioned to receive the footrest.

[0036] In some embodiments, the footrest comprises a base formed from or of a medium-density fiberboard (MDF), a cushion comprising memory foam, and a clip for attachment to the end portion.

[0037] In some embodiments, the pair of mounting bars is spaced apart in with a range of 190 millimeters to 200 millimeters.

[0038] In some embodiments, each of the pair of mounting bars has a width in a range of 27.5 millimeters to 32.5 millimeters.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039] The disclosure will be better understood with reference to the detailed description when considered in conjunction with the non-limiting examples and the accompanying drawings, in which:

[0040] FIG. 1 is a perspective view of a footrest assembly, according to an embodiment.

[0041] FIG. 2 is a perspective view of an embodiment of a mounting frame of the footrest assembly.

[0042] FIG. 3 is a perspective view of an embodiment of a pair of brackets to be fastened to a seat portion of a chair by a plurality of screws.

[0043] FIG. 4 is a bottom view of an embodiment of the chair with the pair of brackets mounted and fastened to the seat portion of the chair by the plurality of screws.

[0044] FIG. 5 is a perspective view of an embodiment of a frame of a first portion of the footrest assembly which is configured to mount an actuator.

[0045] FIG. 6A is a perspective view of an embodiment of a main linkage of a linkage system of a second portion of the footrest assembly.

[0046] FIG. 6B is a perspective view of an embodiment of a long linkage of the linkage system of the second portion.

[0047] FIG. 6C is a perspective view of an embodiment of a medium linkage of the linkage system of the second portion.

[0048] FIG. 6D is a perspective view of an embodiment of a short linkage of the linkage system of the second portion.

[0049] FIG. 6E is a perspective view of an embodiment of a linkage cover of the linkage system of the second portion.

[0050] FIG. 7A illustrates the exposure of linkages and pinch points when the linkage cover is removed from the linkage system.

[0051] FIG. 7B illustrates the linkages and the pinch points are covered when the linkage cover is attached to the linkage system.

[0052] FIG. 8A illustrates an embodiment of a support plate of the second portion.

[0053] FIG. 8B illustrates an embodiment of an end portion of the second portion.

[0054] FIG. 9 is a perspective view of an embodiment of a footrest.

[0055] FIG. 10 is a perspective view of an embodiment of one of the pair of brackets with a C-shaped bend.

[0056] FIG. 11 is a perspective view of an embodiment of a recliner frame to be fastened to the mounting frame by the plurality of screws.

[0057] FIG. 12 is a perspective view of an embodiment of a portion of the recliner frame fastened to one of the pair of brackets.

[0058] FIG. 13A is an exploded view of an embodiment of a hook assembly of the one of the pair of brackets.

[0059] FIG. 13B is a perspective view of an embodiment of the hook assembly in a locked state.

[0060] FIG. 14A is a side view of an embodiment of the hook assembly in an unlocked state.

[0061] FIG. 14B is a side view of an embodiment of the hook assembly in the locked state.

[0062] FIG. 15A is a perspective view of an embodiment of a gas spring of an actuator assembly of the footrest assembly.

[0063] FIG. 15B is a perspective view of an embodiment of a lever shaft of the actuator assembly.

[0064] FIG. 15C is a perspective view of an embodiment of a cable of the actuator assembly.

[0065] FIG. 15D is a perspective view of an embodiment of a locking mechanism of the actuator assembly.

[0066] FIG. 15E is a perspective view of an embodiment of a lever of the actuator assembly.

[0067] FIG. 16 is a side view of an embodiment of the footrest assembly with a compression spring coupled to a piston of the gas spring.

[0068] FIG. 17 is a side view of an embodiment of a six-bar mechanical linkage.

[0069] FIG. 18 is a perspective view of an embodiment of the second portion with a magnet attached to the support plate.

[0070] FIG. 19 is a side view of an embodiment of the second portion with the magnet attaching the footrest to a cross member of the main linkage via the support plate.

[0071] FIG. 20 is a side view of an embodiment of a pusher mechanism of the actuator assembly.

[0072] FIG. 21 is a side view of another embodiment of the actuator assembly with the pusher mechanism and the one of the pair of brackets with the hook assembly.

[0073] FIG. 22 is a side view of an embodiment of the chair with a seat portion and the footrest assembly configured to be slidably received by the mounting frame attached to the seat portion.

[0074] FIG. 23 is a perspective view of an embodiment of the chair with the seat portion and the footrest assembly.

[0075] FIG. 24 is another perspective view of the chair with the seat portion and the footrest assembly of FIG. 23.

[0076] FIG. 25 is a side view of an embodiment of the chair with the seat portion and the footrest assembly in an extended position attached to the seat portion.

[0077] FIG. 26 is a side view of another embodiment of the chair with the seat portion and the footrest assembly in an extended position attached to the seat portion.

[0078] FIG. 27 is a side view of an embodiment of the chair with the seat portion and the footrest assembly in a retracted position attached to the seat portion.

[0079] FIG. 28 is a bottom view of an embodiment of the chair with the seat portion and the footrest assembly in a retracted position attached to the seat portion.

[0080] FIG. 29 is a side view of another embodiment of the chair with the seat portion and the footrest assembly in a retracted position attached to the seat portion.

[0081] FIG. 30 is a flowchart illustrating a method of manufacturing a footrest assembly for attachment to a chair, in accordance with a third aspect of the disclosure.

[0082] FIG. 31A to FIG. 31F are various perspective views of some embodiments of a hook assembly system based on the hook assembly of FIGs. 13A, 13B, 14A, and 14B, for attaching an accessory to a portion of a furniture item. FIG. 31G is an embodiment of a mounting frame comprising a pair of mounting bars, the pair of mounting bars is spaced apart with a distance, wherein the distance is calculated from a first surface of the first mounting bar, to a corresponding first surface of the second mounting bar.

DETAILED DESCRIPTION

[0083] The following detailed description refers to the accompanying drawings that show, by way of illustration, specific details and embodiments in which the disclosure may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the disclosure. Other embodiments may be utilized and structural, and logical changes may be made without departing from the scope of the disclosure. The various embodiments are not necessarily mutually exclusive, as some embodiments can be combined with one or more other embodiments to form new embodiments.

[0084] The disclosure illustratively described herein may suitably be practiced in the absence of any element or elements, limitation or limitations, not specifically disclosed herein. Thus, for example, the terms “comprising”, “including,” containing”, etc. shall be read expansively and without limitation. The word "comprise" or variations such as "comprises" or "comprising" will accordingly be understood to imply the inclusion of a stated integer or groups of integers but not the exclusion of any other integer or group of integers. Additionally, the terms and expressions employed herein have been used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the disclosure. Thus, it should be understood that although the present disclosure has been specifically described in exemplary embodiments and optional features, modification and variation of the disclosure embodied herein may be resorted to by those skilled in the art.

[0085] Features that are described in the context of an embodiment may correspondingly be applicable to the same or similar features in the other embodiments. Features that are described in the context of an embodiment may correspondingly be applicable to the other embodiments, even if not explicitly described in these other embodiments. Furthermore, additions and/or combinations and/or alternatives as described for a feature in the context of an embodiment may correspondingly be applicable to the same or similar feature in the other embodiments.

[0086] In the context of various embodiments, the articles “a”, “an” and “the” as used with regard to a feature or element include a reference to one or more of the features or elements.

As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items.

[0087] While terms such as “first”, “second” etc., may be used to describe various elements, such elements are not limited to the above terms. The above terms are used only to distinguish one element from another, and do not define an order and/or significance of the elements unless explicitly stated. Without departing a scope of rights of the specification, a first element may be referred to as a second element, and similarly, the second element may be referred to as the first element.

[0088] It should be understood that the terms “on”, “over”, “top”, “bottom”, “down”, “side”, “back”, “left”, “right”, “front”, “lateral”, “side”, “up”, “down” etc., when used in the following description are used for convenience and to aid understanding of relative positions or directions, and not intended to limit the orientation of any device, structure or any part of any device or structure.

[0089] The term “coupled” (or “connected”) herein may be understood as mechanically coupled, for example attached or fixed, or just in contact without any fixation, and it will be understood that both direct coupling or indirect coupling (in other words: coupling without direct contact) may be provided.

[0090] In order that the disclosure may be readily understood and put into practical effect, various embodiments will now be described by way of examples and not limitations, and with reference to the figures.

[0091] Throughout the description, the term “footrest assembly” refers broadly to a plurality of components of a footrest unit. In some embodiments, the footrest assembly may be assembled by a user.

[0092] FIG. 1 shows a schematic drawing, in perspective view, of a footrest assembly 100, according to an embodiment. The footrest assembly 100 includes a mounting frame 102 configured to be removably attached to a furniture/furniture item. In some embodiments, the

furniture may be a chair, and the footrest assembly 100 may be attachable to a seat portion of a chair. The mounting frame 102 comprises a pair of brackets 104. FIG. 2 shows a perspective view of the mounting frame 102, according to an embodiment. Each of the pair of brackets 104 comprises a base portion 202 and a pair of ribs 204 extending from longitudinal opposing sides of the base portion 202. A free end of at least one of the pair of ribs 204 is inclined towards a free end of the other (opposing side) rib. Additionally, at least one of the pair of ribs 204 comprises at least one slot 206 shaped and dimensioned to receive at least a fastener. As an example, the fastener may include a screw, a piece of wire and/or a bolt. In some embodiments, the fastener may include magnetic fasteners.

[0093] The pair of brackets 104 can be fastened to a surface, such as a bottom surface of a seat portion 302 of a chair 304 by, for example, a plurality of screws 306 as shown in FIG. 3. FIG. 4 depicts a bottom view of the chair 304 with the pair of brackets 104 mounted and fastened to the seat portion 302 of the chair 304 by the plurality of screws 306. The pair of brackets 104 may be mounted on top of an existing chair mechanism, such as a tilt mechanism. There may be variations in the size of the slot 208 to account for variances in mounting points across different chairs or chair product lines.

[0094] Referring back to FIG. 1, the footrest assembly 100 includes a recliner frame 106, the recliner frame 106 comprising a first portion 108 and a second portion 112. The first portion 108 may be configured to be slidably received by the pair of brackets 104. The first portion 108 comprises a frame 110 that may be configured to interface with pair of brackets 104 to attach the recliner frame 106 in position, allowing proper usage together with the chair. In the embodiment shown in FIG. 5, the frame 110 may comprise a mounting portion 504, the mounting portion 504 be configured for an actuator (such as a gas spring) to be mounted thereon. The frame 110 also has at least one mounting point 502 for a linkage of the second portion 112 to be mounted thereto. The second portion 112 may be attached to the mounting point 502 by one or more fastener(s), such as the fastener(s) as described in other embodiments.

[0095] The first portion 108 may be pivotably connected to the second portion 112 to define a recliner angle therebetween. In some embodiments, the second portion 112 comprises a mechanical linkage system 114 which allows for attachment to the first portion 108. The

linkage system 114 includes a main linkage 602. Referring to FIG. 6A, the main linkage 602 has a cross member 603 that provides structural support to the overall system. In some embodiments, the main linkage may comprise two limb portions 601 and a cross member 603 arranged in a H-shaped structure. Each of the two limb portions 601 may be configured to house one or more other linkages of the linkage system 114. The limb portions 601 may be attached to a portion of the footrest 116. In some embodiments, each limb portion 601 houses a set of linkages, the set of linkages configured to move the footrest 116 between the retracted position and the extended position. Each set of linkages housed within each limb portion 601 may be akin to an arm, and in some embodiments, the two limb portions 601 may be attached to opposing ends of the footrest 116 for proper support of the footrest 116 when a force is applied on the footrest 116. The cross-member 603 joining the two limb portions 601 may be used to ensure that the linkages are synchronized in movement between the retracted position and the extended position, so as to avoid uneven extension of the two limb portions 601.

[0096] In operation, when the one or more other linkages of linkage system 114 is urged to move from a first position (which may correspond to the retracted position) to a second position (which may correspond to the extended position), the movement causes the main linkage as well as any other linkages of the linkage system 114 encased within the main linkage 602 to move in tandem by virtue of the at least one cross member 603. The at least one cross member 603 may further introduce additional points of contact between various linkages of the linkage system 114 so as to distribute load and pressure from the footrest and/or a user's legs to the linkage system. The linkage system 114 also includes at least a first linkage (long linkage) 604, a second linkage (medium linkage) 606 or a third linkage (short linkage) 608, embodiments of which are shown in FIGs. 6B to 6D.

[0097] The linkage system 114 may further comprise a linkage cover 610 as shown in FIG. 6E. The linkage cover 610 fits over an exposed moving part of the linkage system 114 to cover at least one pinch point around the system, such as a gap that could potentially trap or pinch a human body part. FIG. 7A illustrates the exposure of linkages and pinch points when the linkage cover 610 is removed from the linkage system 114, and FIG. 7B shows that the linkages and pinch points are covered when the linkage cover 610 is attached to the same system. Aside from minimizing or eliminating pinch points, the linkage cover 610 minimizes or prevents dust

and/or debris from entering the linkage system 114 which helps to improve the lifespan and performance of the system. The linkage cover 610 may be shaped and dimensioned for easy installation and removal, e.g. via a snap-fit configuration, and may be made of or from polypropylene (PP) to resist or withstand the wear and tear of regular use.

[0098] The second portion 112 may be configured to support a footrest 116. The second portion 112 may comprise a support plate shaped and dimensioned to receive the footrest 116. FIG. 8A illustrates an embodiment of the support plate 802. In another embodiment as shown in FIG. 8B, the second portion 112 may comprise an end portion 804 shaped and dimensioned to receive the footrest 116.

[0099] FIG. 9 shows a perspective view of an embodiment of the footrest 116. The footrest 116 includes a base 902 formed from or of a medium-density fiberboard (MDF), a cushion 904 comprising memory foam, and a clip 906. The clip 906 provides a hook-on and clipping function for attachment to the end portion 804. The clip 906 may be formed from or of a thermoplastic compound and glass fiber. The thermoplastic compound may include a polyamide, such as polyamide 6. When the thermoplastic compound is reinforced with glass fibers, the resulting compound is stiffer and stronger compared to the thermoplastic compound. Glass fiber reinforcement also reduces the coefficient of thermal expansion, which makes the resulting compound more dimensionally stable over a wide range of temperatures. In particular, a compound comprising a polyamide and at least 10% of glass fiber has higher strength and stiffness over the polyamide, making the compound more durable and resistant to wear and tear. When in use, the clip will be subjected to both stress and strain. The stable dimensions of the polyamide and glass fiber compound allows the clip to hooked on to the end portion precisely and minimizes wobble when weight is applied to the cushion 904. With better durability and resistance to wear and tear, the hook can be subjected to load and still be able to withstand the load without breaking.

[00100] The recliner frame 106 may be configured to slidably receive the pair of brackets 104. Similarly, the pair of brackets 104 may be configured to slidably receive the recliner frame 106. FIG. 10 shows a perspective view of one of the pair of brackets 104 which has a C-shaped

bend 1002 to receive the recliner frame 106. In some embodiments, each of the pair of brackets 104 comprises a C-shaped bend 1002.

[00101] FIG. 11 shows a perspective view of the recliner frame 106 that is being attached to the mounting frame 102 by fastening one or more slots 206 on the side of each of the pair of brackets 104. The slot 206 may be elongated to account for variances in mounting points across the different chairs, therefore providing a wider range of compatibility. The slot 206 offers adjustability by allowing the recliner frame 106 to shift in and out depending on the user's needs and preferences. Having elongated slot 206 on the pair of brackets 104 also allow for easy installation and removal of components. This could save time and effort during installation or maintenance tasks, reducing downtime and increasing productivity. Furthermore, the elongated shape of the slot 206 distributes the load over a wider area, reducing stress concentrations and preventing the pair of brackets 104 from becoming damaged and/or deformed. The improvements to durability and strength could extend the lifespan of the pair of brackets 104 and reduce the need for repairs or replacements. FIG. 12 shows a perspective view of a part of the recliner frame 106 fastened to one of the pair of brackets 104.

[00102] In some embodiments, there may include a hook assembly to secure the mounting frame 102 and/or the first portion 108 to the mounting frame 102, and in turn to the seat portion 302. FIG. 13A shows an exploded view of a hook assembly 1300 for securing the mounting frame 102 to the seat portion 302. The hook assembly 1300 may include a frame bracket 1302, and a locking mechanism. The locking mechanism may include a stopper 1304 and a back plate 1306. In some embodiments, the frame bracket 1302 may comprise the at least one of the pair of brackets 104 or a portion thereof. A portion of the frame bracket 1302 may be shaped and dimensioned as a pair of hooks 1310, the hooks 1310 allowing the hook assembly 1300 to be attached to at least one part of the seat portion 302, or the hook assembly 1300 may facilitate the attachment of the recliner frame to the mounting frame 104. In some embodiments, the frame bracket 1302, the stopper 1304 and/or the back plate 1306 may be attached together by one or more fastener(s), such as the fastener(s) described in other embodiments.

[00103] In some embodiments, the stopper 1304 may include a tab 1322 configured to fit into a slot 1312 of the frame bracket 1302, the slot 1312 shaped and dimensioned to receive

the tab 1322 or part thereof. In some embodiments, the tab 1322 may be integrally formed with the stopper 1304, as can be seen in FIG. 13A. The profile of the slot 1312 may correspond to a shape of the tab 1322 to allow the tab 1322 to fit into the slot 1312. When the tab 1322 is fitted into the slot 1312 as shown in FIG. 13B, the slot 1312 may function define a frame to constraint the tab 1322 from moving in one or more directions. In some embodiments, the frame bracket 1302 may include one or more rods configured to support the stopper 1304. In some embodiments, one or more fasteners attaching the frame bracket 1302 to the stopper 1304 and/or the back plate 1306 may also be used to support the stopper 1304. The stopper 1304 may include a catch 1320, the catch 1320 in the form of a protrusion angled from one end of the stopper 1304 towards the tab 1322, so as to operably engage the one or more rods and/or the one or more fasteners. In some embodiments, the stopper 1304 may rotatable about an axis of a first rod of the one or more rods and/or a first fastener of the one or more fasteners so as to bring the catch 1320 towards (see arrow labelled “A” in FIG. 14A) a second rod of the one or more rods and/or a second fastener of the one or more fasteners. The user may then urge the catch 1320 against the second rod and/or the second fastener for the catch 1320 to engage the second rod and/or the second fastener.

[00104] FIG. 13B shows an embodiment of the hook assembly 1300 in a locked state where the catch 1320 is engaged to a fastener 1340 (which may be in the form of a screw). An engagement of the catch 1320 to the fastener 1340 allows the user to secure the stopper 1304 to the frame bracket 1302 using the fastener 1340. In this configuration, the tab 1322 may be fitted into the slot 1312. Therefore, the engagement of the catch 1320 to the fastener 1340 may lock the frame bracket 1302 in position with the stopper 1304. When the mounting frame 102 is attached to the seat portion 302, the engagement of the catch 1320 to the fastener 1340 helps to secure the mounting frame 102 to the seat portion 302 and prevent the mounting frame 102 from unintentional/inadvertent dislodgement from the seat portion 302. That is, the user would have to apply an additional force to intentionally disengage the stopper 1304 from the fastener 1340 in order to remove the mounting frame 102 from the seat portion 302.

[00105] FIG. 14A shows a side view of an embodiment of the hook assembly 1300 in an unlocked state where the catch 1320 is disengaged from the one or more rods and/or the one or more fasteners. FIG. 14B shows a side view of an embodiment of the hook assembly 1300 in

the locked state where the catch 1320 is engaged to the one or more rods and/or the one or more fasteners. In this embodiment, the tab 1322 is fitted into the slot 1312.

[00106] The footrest assembly 100 further includes an actuator assembly 118. The actuator assembly 118 may be configured to allow adjustment of the recliner angle between the first portion 108 and the second portion 112. In some embodiments, the actuator assembly 118 is mounted on the frame 110 of the first portion 108. According to FIGs. 15A to 15E, the actuator assembly 118 may include a gas spring 1502, a lever shaft 1504, a cable 1506, a locking mechanism 1508 and a lever 1510.

[00107] The gas spring 1502 may be configured or biased to urge the second portion 112 to an extended position, the extended position corresponding to a maximum allowable recliner angle. The gas spring 1502 may be triggered by the user through the application of a force on a lever 1510, which may be transmitted through the lever shaft 1504 and the cable 1506 to the gas spring 1502. In some embodiments, the cable 1506 may include a ball-shaped attachment on each end. The stroke of the gas spring 1502 allows the range of motion of the footrest 116 to be adjusted to any position between fully extended and fully retracted. Advantageously, the gas spring 1502 may provide a smooth extending and retracting movement. The motion of the footrest 116 can be stopped at precise positions, thereby allowing the user to control the recliner angle between the first portion 108 and the second portion 112. The user may then activate the locking mechanism 1508 to lock the piston position of the gas spring 1502 in place.

[00108] Although the components of the gas spring 1502 may be lubricated, “stiction” or “breakaway friction”, which is static friction that needs to be overcome to enable relative motion of stationary objects in contact, may become prominent after a period of inactivity. In some embodiments, the lubrication may be by way of one or more lubricating films attached or applied between two or more surfaces of the gas spring 1502 in a manner such as to reduce friction between the two or more surfaces. Stiction, for example, may occur due to pressure within the gas spring 1502 which could cause lubrication to migrate away from a seal of the gas spring 1502 and into the minute cracks and crevices within a rod of the gas spring 1502. This leads to additional force being required to free the seal from the cracks and crevices which may be present as a momentary force “spike” when the gas spring 1502 is compressed after a

period of inactivity. As such, the gas spring 1502 may require additional force to activate, i.e. to extend or to retract the gas spring 1502, when operated for the first time after a period of inactivity which could cause inconvenience to the user. In some embodiments, stiction may be minimized by using lubricants, low friction seals, highly finished rods and/or adding a spring to a piston of the gas spring 1502.

[00109] In the embodiment shown in FIG. 16, the actuator assembly 118 may comprise a compression spring 1602 coupled to a piston 1604 of the gas spring 1502. The compression spring 1602 may be sleeved on a piston rod 1606 of the gas spring 1502, and one end of the compression spring 1602 may be directly or indirectly placed in contact with the piston 1604 of the gas spring 1502. The compression spring 1602 may be configured or biased to urge the gas spring 1502 to an extended position. As the footrest 116 is being adjusted from an extended position to a retracted position, the gas spring 1502 is being compressed and causes the piston 1604 to compress the compression spring 1602 against one end of the gas spring 1502, thereby storing energy in the compression spring 1602. When the gas spring is left unused for a period of inactivity, the problem of stiction as described in the preceding paragraph may become prominent. The user, when operating the gas spring for the first time after the period of inactivity, may actuate the gas spring 1502 to extend the gas spring 1502. This provides the compression spring 1602 room to extend, thus providing a reaction force on the piston 1604 which reinforces the force produced by the gas spring 1502 that urges the footrest 116 to the extended position so as to overcome stiction and allow the gas spring 1502 to smoothly extend even after a period of inactivity.

[00110] The pair of brackets 104, the first portion 108 and the second portion 112 together may form a six-bar mechanical linkage. The six-bar mechanical linkage may comprise six rigid bars connected by six hinge joints. The six-bar mechanical linkage may be located at the base of the chair 304 and connected the to the frame of the chair 304. FIG. 17 shows an embodiment of a six-bar mechanical linkage which comprises two first linkages (long linkages) 604, two second linkages (medium linkages) 606 and two third linkages (short linkages) 608. One of the two third linkages 608 may be fastened to the support plate 802 and the two second linkages 606. The two second linkages 606 may each be fastened to separate pieces of the two first linkages 604. The two first linkages 604 may each be fastened to the other third linkage 608

which in turn could be fastened to the frame 110 via the mounting point 502. A fastener to fastened these linkages may, for example, be the fastener as described in other embodiments.

[00111] The six-bar mechanical linkage may be arranged to move from a retracted position or state to an extended position or state upon actuation of the gas spring 1502. The second portion 112 may rotate around a fixed point, causing the footrest 116 to extend and adjusting the recliner angle between the first portion 108 and the second portion 112. The six-bar mechanical linkage may be specifically designed to avoid collision between the footrest 116 and a fixed area of the chair 304 or a component of the chair 304, such as a chair tilt mechanism, a wheelbase, and/or a chair hydraulic mechanism. This ensures that the footrest 116 can move freely without interfering with the other functions of the chair 304. By optimizing the placement of the linkages and pivots, the six-bar mechanical linkage maximizes the available space and yet retain the maximum possible extension for the footrest 116.

[00112] In some embodiments, the second portion 112 may comprise means for attaching the footrest 116 directly or indirectly to a linkage, such as the main linkage 602, of the linkage system 114 of the second portion 112 when the six-bar mechanical linkage is in the retracted state. In some embodiments, the means for attaching may comprise at least one magnet. The magnet may comprise a permanent magnet such as a neodymium magnet. The strength of the magnet may correspond to the weight of the footrest 116. In some embodiments, the strength of the magnet may be of various neodymium magnet grades, such as N42, N45, N48, N52 and N55. In other embodiments, the means for attaching may comprise a plurality of magnets, and the total strength of the magnets may correspond to the weight of the footrest 116. In some embodiments, the movement of the footrest 116 between the retracted state and the extended state may comprise an arc formed by the configuration of the footrest 116 being pivotable about the frame 110 at the mounting point 502. At the retracted state of the footrest 116, the magnetic force produced by the magnet further urges the footrest 116 to an enhanced retracted position. In other words, the minimum retracted position of the retractable recliner may be enhanced by the magnet such that the footrest 116 may be held in place and minimize any adverse effects on the ergonomics of the user when the recliner is tugged away under the chair 304.

[00113] In some embodiments, the means for attaching may include clip-on attachments and/or hook-on attachments.

[00114] FIG. 18 illustrates an embodiment of a magnet 1802 attached to the support plate 802 with the footrest 116 attached thereto when the six-bar mechanical linkage is in the extended state/position. The magnet 1802 may have a surface contoured for alignment with a surface of a linkage of the linkage system 114. The surface of a linkage of the linkage system 114 may be formed from or of ferromagnetic materials and/or composites, such as steel. The magnet 1802 may sit in a frame 1804 and may be allowed to pivot about an axis for ease of alignment. The frame 1804 may be made of plastic. As the six-bar mechanical linkage moves from the extended state/position to the retracted state/position upon actuation of the gas spring 1502, the distance between the magnet 1802 and a linkage of the linkage system 114 would decrease, thereby increasing the magnetic force on the linkage system 114 until a point where the magnet 1802 provides enough attractive force to attach the support plate 802 and the footrest 116 to the linkage system 114. This achieves a “tuck in” effect on the footrest 116 and keep it away from the user’s legs.

[00115] In another embodiment as shown in FIG. 19, the six-bar mechanical linkage is in the retracted state with the magnet 1802 operably attracted to the cross member 603 of the main linkage 602. The footrest 116 may be indirectly attached to the main linkage 602 of the linkage system 114 of the second portion 112 via the support plate 802 when the six-bar mechanical linkage is in the retracted state. The cross member 603 provides a surface to attract the magnet 1802 so as to maintain the footrest 116 at a desired position away from the user’s legs.

[00116] In the embodiment shown in FIG. 20, instead of using at least one magnet as means for attaching the footrest 116 to a linkage, the actuator assembly 118 may comprise a pusher mechanism 2000 to achieve the same function as well as to overcome the problem of stiction as described in earlier paragraphs. The pusher mechanism 2000 may include a latch 2002, a hook 2004, a biasing element 2006, a carriage 2008 and/or a flipper 2010. In some embodiments, the latch 2002 may be attached to the linkage cover 610 and/or the main linkage 602. The latch 2002 may be configured to engage the hook 2004. A profile of the latch 2002 may correspond to a profile of the hook 2004 to allow the latch 2002 and the hook 2004 to

interlock with each other. For example, the profile of the latch 2002 may be configured to catch a receiving portion, such as an undercut, of the hook 2004. The interlocking of the latch 2002 and the hook 2004 may hold the six-bar mechanical linkage and the footrest attached thereto in the enhanced retracted position. Referring back to FIG. 20, the latch 2002 is shown to be engaging the hook 2004 so as to maintain the six-bar mechanical linkage in the enhanced retracted position.

[00117] In some embodiments, the hook 2004 may be coupled to an end of the gas spring 1502. In some embodiments, the hook 2004 may include one or more tracks that guides a movement of the carriage 2008. The movement of the carriage 2008 may be initiated by releasing the flipper 2010 which may be in contact with the carriage 2008. The carriage 2008 may be coupled to the biasing element 2006 such that the movement of the carriage 2008 would bring the biasing element 2006 to be in contact with the hook 2004 so as to provide a force on the hook 2004 to disengage/release the hook 2004 from the latch 2002. The force on the hook 2004 in turn provides a force on the piston 1604 which reinforces the force produced by the gas spring 1502 that urges the footrest 116 to the extended state position so as to overcome stiction and allow the gas spring 1502 to smoothly extend even after a period of inactivity.

[00118] In operation, when the user triggers the lever 1510, for example by rotating the lever 1510, the force on the lever 1510 may be transmitted through the lever shaft 1504 and the cable 1506 to the gas spring 1502. Consequently, the force on the lever 1510 may also be transmitted through the cable 1506 to the flipper 2010. The flipper 2010 may include a cylindrical pin inserted at one end such that a rotation of the lever shaft 1504 translates to a rotation of the flipper 2010. The rotation of the flipper 2010 may be determined by a profile of a slot that the flipper 2010 is confined in. As the flipper 2010 rotates, the flipper 2010 may release the carriage 2008 from a fixed position such that the biasing element 2006 may contact the hook 2004. The user is able to engage the gas spring 1502 and the carriage 2008 simultaneously by triggering the lever 1510.

[00119] In some embodiments, the latch 2002 may be configured or biased to urge the latch 2002 to engage the hook 2004. In some embodiments, the torsion spring force on the latch 2002 may be greater than the torsion spring force on the biasing element 2006 such that the latch

2002 forces the biasing element 2006 to rotate upwards to allow the latch 2002 to catch an undercut of the hook 2004. FIG. 21 shows a side view of another embodiment of the actuator assembly 118 with the pusher mechanism 2000. In this embodiment, the actuator assembly 118 is attached to the recliner frame which is mounted to the one of the pair of brackets 104 having the hook assembly 1300.

[00120] FIGs. 22 to 29 show various embodiments of a chair 2202 which includes a seat portion 2204 and a footrest assembly 2206. In particular, FIGs. 25 and 26 depict the chair 2202 with the seat portion 2204 attached to the footrest assembly 2206 in an extended position, while FIGs. 27 to 29 depict the chair 2202 with the seat portion 2204 attached to the footrest assembly 2206 in a retracted position. The footrest assembly 2206 may refer to the footrest assembly 100 described with reference to FIGs. 1 to 21 and repeated descriptions will be omitted.

[00121] FIG. 30 shows a flowchart illustrating a method 3000 of manufacturing a footrest assembly for attachment to a chair. At step 3002, the method 3000 provides a mounting frame, the mounting frame configured to be attached to a seat portion of the chair, the mounting frame comprising a pair of brackets. At step 3004, the method 3000 provides a recliner frame, the recliner frame comprising a first portion configured to be slidably received by the pair of brackets, and a second portion configured to support a footrest, the first portion pivotably connected to the second portion to define a recliner angle therebetween. In addition, at step 3006, the method 3000 provides an actuator assembly, the actuator assembly configured to allow adjustment of the recliner angle between the first portion and the second portion, the actuator assembly comprises a gas spring configured to urge the second portion to an extended position, the extended position corresponding to a maximum allowable recliner angle. The method 3000 of manufacturing the footrest assembly may refer to the footrest assembly 100 described with reference to FIGs. 1 to 21 and repeated descriptions will be omitted.

[00122] FIG. 31A to 31F shows various embodiments of the hook assembly system 3100, in various views, for attaching an accessory 3190 to a portion of a furniture item, such as a seat of a chair. The hook assembly system 3100 may comprise the mounting frame 102 (see previous embodiments), the mounting frame 102 may comprise a pair of mounting bars 3102 attachable to the portion of the chair, for example, a base portion of the chair. An accessory

3190 may be configured to be attached to the pair of mounting bars 3102, and/or a hook assembly. The hook assembly may be the hook assembly 1300 as shown in FIG. 13A, 13B, 14A, 14B, and may generally comprise at least one frame bracket 1302, including a base portion, and a pair of hooks 1310 extending from the base portion, the pair of hooks 1310 configured to be attached to each of the pair of mounting bars 3102, the frame bracket 1302 attachable to the accessory 3190, and, the locking mechanism pivotably connected to the frame bracket 1302 at one portion thereof, the locking mechanism comprising a stopper 1304 configured to prevent movement of the pair of hooks 1310 along at least one direction when the locking mechanism is in a locked position.

[00123] In some embodiments, the frame bracket 1302 comprises the slot 1312 and the stopper comprises a tab 1322, the slot 1312 shaped and dimensioned to receive the tab 1322, in the locked position. The locking mechanism may further comprise the catch 1320, the catch 1320 configured to engage a protrusion/fastener protruding from the base portion 3144.

[00124] FIG. 31A shows a perspective view of a furniture item comprising the seat portion 3104, and the accessory 3190 in the form of recliner footrest. The hook assembly 1300 may be attached to a frame of the recliner footrest, such as the frame 110. The base portion of the chair may comprise a base frame 3106.

[00125] FIG. 31B and FIG. 31C show the perspective view of an assembled furniture item in the form of a chair, comprising the seat portion 3104, and the hook assembly system 3100 used to connect the recliner footrest to the seat portion 3104.

[00126] FIG. 31D shows another possible embodiment wherein the hook assembly 1300 is first attached to the pair of mounting bars 3102, instead of to the frame 110. In this embodiment, the hook assembly 1300 may be attached to frame 110, after which the frame 110 may then be received by the frame bracket 1302.

[00127] In some embodiments, each of the mounting bar 3102 comprises at least one resilient member 3170, the at least one resilient member 3170 arranged to contact the pair of hooks 1310. The resilient member 3170 may form a protective cover to avoid direct contact of the

mounting bars 3102 and the frame 110. The at least one resilient member 3170 may comprise at least one at least one rubber or polymer-based clip, the at least one rubber or polymer-based clip arranged to contact the pair of hooks.

[00128] FIG. 31E shows some embodiments in various perspective views, wherein the portion of the furniture item is a seat portion of the furniture item, and wherein the mounting frame is configured to be attached to a base of the seat portion of the furniture item; and the accessory is a cup holder 3120 and hanger 3130 assembly. It is appreciable that the hook assembly system 3100 can be used for attaching/mounting any accessory that can be attached to the front, underneath or behind a furniture item, such as a chair.

[00129] FIG. 31F shows a table of various possible dimensions associated with the hook assembly, in millimeters, and the various considerations for the dimensions, for attaching a footrest recliner system to a chair. Six parameters associated with the hook assembly were identified, namely, a hooking surface distance parameter, a hook height parameter, a hook to plastic lock stopping surface parameter, a bracket slots length parameter, a plastic lock pivot position to locking surface distance parameter, and the at least one rubber or polymer-based clip dimensions. Each parameter is elaborated as follows.

[00130] The hooking surface distance, which is dimensioned according to the mounting frame, relates to the distance between the two hooks, and may be referred to as a hooking surface which is in contact with the mounting frame as attachment contact/point. In some embodiments, the hooking surface distance may be in a range from 190 mm to 200 mm.

[00131] The hook height parameter is an optimum height parameter obtained via testing. The optimum height parameter corresponds to a height parameter that allows prevents the locking mechanism from dislodging from the mounting frame and without being too loose which may cause noise and user experience (UX) issues. In some embodiments, the hook height may be in a range from 15mm to 22mm.

[00132] The hook to plastic lock stopping surface parameter is defined as a plastic lock to hook distance to allow for the locking mechanism to lock without dislodging. This may be a

distance measurement of the bracket slot length, plastic lock pivot position to locking surface distance, rubber clip dimensions. In some embodiments, the plastic lock to hook distance may be defined as the distance between the edge of the hook 1310 to an edge of the slot 1312 nearest to the hook 1310. In some embodiments, the hook to plastic lock stopping surface parameter may be in a range of 31mm to 36mm.

[00133] The bracket slots length parameter is a length parameter associated with the slot(s) 206, for the control of extension range for different sized chairs. Slots 206 may be positioned to accommodate out of factory setting for different chair sizes. In some embodiments, the slot size for a small sized chair may be 10mm, the slot size for a regular-sized chair or XL-sized chair may be 15mm.

[00134] The plastic lock pivot position to locking surface distance parameter may be defined as a holding position of the catch 1320 to the pivot point of the locking mechanism. This parameter relates to a holding position of the hook to the catch 1320 to facilitate optimum engagement of the catch 1320 to the fastener/protrusion 1340. A shorter distance or longer distance may compromise the locking ability. In some embodiments, the plastic lock pivot position to locking surface distance parameter may be in the range of 94.8mm to 101.8mm.

[00135] The resilient member dimensions parameter may be the dimension of the resilient member 3170, such as the four at least one rubber or polymer-based clip as depicted in the drawings. In some embodiments, the length of each resilient member may be in a range of 31.9 mm to 36.9 mm. In some embodiments, the width of each resilient member may be in a range of 36 mm to 43 mm. In some embodiments, the height of each resilient member may be in a range of 14.9 mm to 22.9 mm.

[00136] In some embodiments, the pair of mounting bars comprising a first mounting bar and a second mounting bar is spaced apart in with a range of 190 millimeters (mm) to 200 mm. The corresponding distance between the hooking surface may be 190 mm to 200 mm, and wherein the distance may be calculated from a first surface 3102A of the first mounting bar to a corresponding first surface 3102A of the second mounting bar as shown in FIG. 31G. The aforementioned dimensions have been obtained via various testing and measurements to

optimize the spacing apart of the pair of mounting bars, as well as to provide an adequate contact force of the hooks on the mounting pair, such that even when a locking mechanism is not present or when the locking mechanism is not working, there may be enough contact force of the pair of hooks on the corresponding pair of mounting bars to hold the accessory to the furniture item, thereby enhancing safety.

[00137] In some embodiments, each of the pair of mounting bars has a width in a range of 27.5 millimeters to 32.5 millimeters.

[00138] According to some embodiments, there is a method of manufacturing an assembly system for a furniture item, comprising: providing a mounting frame attachable to the portion of a furniture item; providing an accessory, the accessory configured to be attached to the mounting frame; and providing a hook assembly, wherein the hook assembly comprises: at least one frame bracket including a base portion and a pair of hooks extending from the base portion, the pair of hooks configured to be attached to the mounting frame, the base portion attachable to the accessory; and a locking mechanism pivotably connected to the base portion, the locking mechanism comprising a stopper configured to prevent movement of the pair of hooks along at least one direction when the locking mechanism is in a locked position.

[00139] According to some embodiments, there is a furniture item comprising a seat portion and an accessory installed to the seat portion, comprising a mounting frame attachable to the seat portion of the furniture item; an accessory configured to be received by the pair of mounting bars; and a hook assembly, wherein the hook assembly comprises: at least one frame bracket including a base portion and a pair of hooks extending from the base portion, the pair of hooks configured to be attached to the mounting frame, the base portion attachable to the accessory; and a locking mechanism pivotably connected to the base portion, the locking mechanism comprising a stopper configured to prevent movement of the pair of hooks along at least one direction when the locking mechanism is in a locked position.

[00140] It is contemplated that the described footrest assembly 100 is described in the context for attachment to chairs, the footrest assembly 100 may be attached to various types of furniture, including stools and sofas.

[00141] It is further contemplated that the various embodiments of an assembly system comprising a hook assembly system provides for a plurality of hooks or hook brackets that are attachable to a furniture item via mounting frame/bars, and provides a safe mechanical joint that may provide for adequate contact force to attach the accessory to the mounting bars, this may be further enhanced with a locking mechanism. The use of resilient members, such as the at least one rubber or polymer-based clip attached to the mounting frame/bars provides a protective layer between the mounting frame/bars and the hooks, and further minimizes "slipping" by providing frictional force between the mounting bars and the hooks. The hook assembly system (in the situation where the locking mechanism is present) may also be attached with relative ease to a furniture item using a three-step action, i.e. switch the locks on the hooks to an 'unlocked' mode, slide the hook assembly system to contact the resilient members (e.g. at least one rubber or polymer-based clip), and engage the locking mechanism (where present) to lock the hook assembly in place.

[00142] While the disclosure has been particularly shown and described with reference to specific embodiments, it should be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the scope of the disclosure as defined by the appended claims. The scope of the disclosure is thus indicated by the appended claims and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced.

CLAIMS

1. A hook assembly system for attaching an accessory to a portion of a furniture item, comprising:

a mounting frame attachable to the portion of the furniture item or forming part of the furniture item, the mounting frame comprises a pair of mounting bars, the pair of mounting bars comprising a first mounting bar and a second mounting bar;

an accessory configured to be attached to the mounting frame; and

a hook assembly, wherein the hook assembly comprises:

at least one frame bracket, the at least one frame bracket includes a base portion and a pair of hooks extending from the base portion, the pair of hooks configured to be attached to the mounting frame, the base portion attachable to the accessory;

wherein the pair of mounting bars is spaced apart with a distance in a range of 190 millimeters to 200 millimeters, and wherein the distance is calculated from a first surface of the first mounting bar, to a corresponding first surface of the second mounting bar.

2. A hook assembly system for attaching an accessory to a portion of a furniture item, comprising:

a mounting frame attachable to the portion of the furniture item or forming part of the furniture item;

an accessory configured to be attached to the mounting frame; and

a hook assembly, wherein the hook assembly comprises:

at least one frame bracket, the at least one frame bracket includes a base portion and a pair of hooks extending from the base portion, the pair of hooks configured to be attached to the mounting frame, the base portion attachable to the accessory; and

a locking mechanism pivotably connected to the base portion, the locking mechanism comprising a stopper configured to prevent movement of the pair of hooks along at least one direction when the locking mechanism is in a locked position.

3. The hook assembly system of claim 2, wherein the frame bracket comprises a slot and the stopper comprises a tab, the slot shaped and dimensioned to receive the tab, in the locked position.

4. The hook assembly system of claim 3, wherein the locking mechanism comprises a catch, the catch configured to engage a protrusion/fastener of the base portion.

5. The hook assembly system of claim 2, wherein the mounting frame comprises a pair of mounting bars.

6. The hook assembly system of claim 5, wherein each of the mounting bars comprises at least one resilient member, the at least one resilient member arranged to contact the pair of hooks.

7. The hook assembly system of claim 6, wherein the at least one resilient member comprises at least one rubber or polymer-based clip, the plurality of rubber or polymer-based clip arranged to contact the pair of hooks.

8. The hook assembly system of claim 2, wherein the portion of the furniture item is a seat portion of the furniture item, and wherein the mounting frame is configured to be attached to a base of the seat portion of the furniture item; and the accessory is a footrest recliner.

9. The hook assembly system of claim 5, wherein the portion of the furniture item is a seat portion of the furniture item, and wherein the pair of mounting bars is configured to be attached to a base or a side of the seat portion of the furniture item; and the accessory is a cup holder and hanger assembly.

10. A method of manufacturing an assembly system for a furniture item, comprising:

providing a mounting frame attachable to the portion of a furniture item;

providing an accessory, the accessory configured to be attached to the mounting frame; and

providing a hook assembly, wherein the hook assembly comprises:

at least one frame bracket including a base portion and a pair of hooks extending from the base portion, the pair of hooks configured to be attached to the mounting frame, the base portion attachable to the accessory; and

a locking mechanism pivotably connected to the base portion, the locking mechanism comprising a stopper configured to prevent movement of the pair of hooks along at least one direction when the locking mechanism is in a locked position.

11. A furniture item comprising a seat portion and an accessory installed to the seat portion, comprising

a mounting frame attachable to the seat portion of the furniture item or forming part of the seat portion of the furniture item;

an accessory configured to be received by the pair of mounting bars; and

a hook assembly, wherein the hook assembly comprises:

at least one frame bracket including a base portion and a pair of hooks extending from the base portion, the pair of hooks configured to be attached to the mounting frame, the base portion attachable to the accessory; and

a locking mechanism pivotably connected to the base portion, the locking mechanism comprising a stopper configured to prevent movement of the pair of hooks along at least one direction when the locking mechanism is in a locked position.

12. The furniture item of claim 11, wherein the accessory is a footrest assembly, and the footrest assembly comprises a recliner frame comprising a first portion configured to be slidably received by the pair of brackets, and a second portion configured to support a footrest, the first portion pivotably connected to the second portion to define a recliner angle; and an actuator assembly configured to allow adjustment of the recliner angle between the first portion and the second portion.

13. The furniture item of claim 12, wherein the actuator assembly comprises a gas spring configured to urge the second portion to an extended position, the extended position corresponding to a maximum allowable recliner angle.

14. The furniture item according to claim 11, wherein the pair of brackets, the first portion and the second portion form a six-bar mechanical linkage, the six-bar mechanical linkage arranged to move from a retracted position to the extended position upon actuation of the gas spring, and wherein the second portion comprises means for attaching the footrest directly or indirectly to a main linkage of a linkage system of the second portion when the six-bar mechanical linkage is in the retracted state.

15. The furniture item according to claim 11, wherein the second portion comprises means for attaching the footrest to a main linkage of a linkage system of the second portion when the six-bar mechanical linkage is in the retracted state.

16. The furniture item according to claim 15, wherein the second portion comprises an end portion shaped and dimensioned to receive the footrest.

17. The furniture item according to claim 14, wherein the footrest comprises a base formed from or of a medium-density fiberboard (MDF), a cushion comprising memory foam, and a clip for attachment to the end portion.

18. The furniture item of claim 11, wherein the mounting frame comprises a pair of mounting bars, each of the pair of mounting bars comprising a first mounting bar and a second mounting bar, the pair of mounting bars is spaced apart with a distance in a range of 190 millimeters to 200 millimeters, and wherein the distance is calculated from a first surface of the first mounting bar, to a corresponding first surface of the second mounting bar.

19. The furniture item of claim 11, wherein the mounting frame comprises a pair of mounting bars, wherein each of the pair of mounting bars has a width in a range of 27.5 millimeters to 32.5 millimeters.

20. A hook assembly system for attaching an accessory to a portion of a furniture item, comprising:

a mounting frame attachable to the portion of the furniture item or forming part of the furniture item;

an accessory configured to be attached to the mounting frame; and

a hook assembly, wherein the hook assembly comprises:

at least one frame bracket, the at least one frame bracket includes a base portion and a pair of hooks extending from the base portion, the pair of hooks configured to be attached to the mounting frame, the base portion attachable to the accessory; and

a sliding mechanism provided on the frame bracket, the sliding mechanism configured to slidably receive the accessory, and wherein the sliding mechanism is configured to engage a plurality of slots on the accessory.