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(54) **CHAIR HAVING REMOVABLE BACK OR SEAT CUSHION ASSEMBLIES AND METHODS RELATED THERETO**

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- (57) **ABSTRACT**

(76) Inventors: **Nicholas M. Christianson**, Fairway, KS (US); **Mark B. Emge**, Lawrence, KS (US); **Shawn R. Harvill**, Kansas City, KS (US)

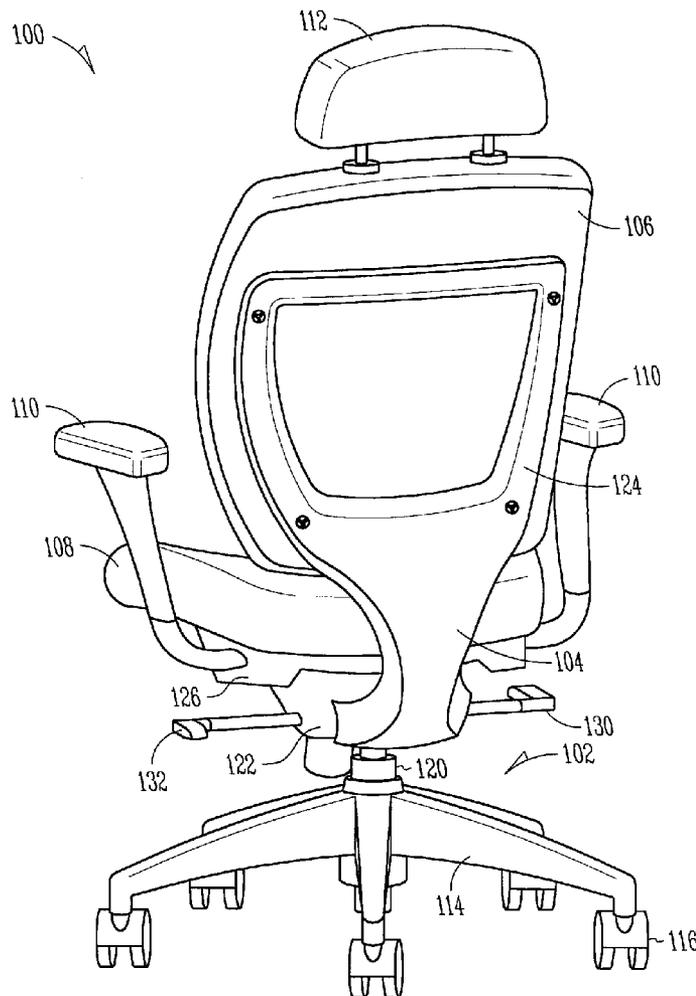
Correspondence Address:
SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

A chair comprising a chair base, a chair frame mounted to the chair base, a back cushion assembly, and a seat cushion assembly, along with related methods, is described. The chair frame includes an upper and lower frame portion. One or both of the back cushion assembly or the seat cushion assembly can be releasably coupled to the upper frame portion or the lower frame portion, respectively. Such releasable coupling can be achieved via one or more quick-release connectors brought into coupling engagement or disengagement via a rotational, sliding, or push-button movement. In varying examples, the back and seat cushion assemblies each comprise at least one support member and a foam cushion attached thereto. A downward-oriented surface of the seat cushion support member can comprise an integrated tool housing to store a connector actuator tool when not in use.

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- (60) Provisional application No. 60/804,363, filed on Jun. 9, 2006.



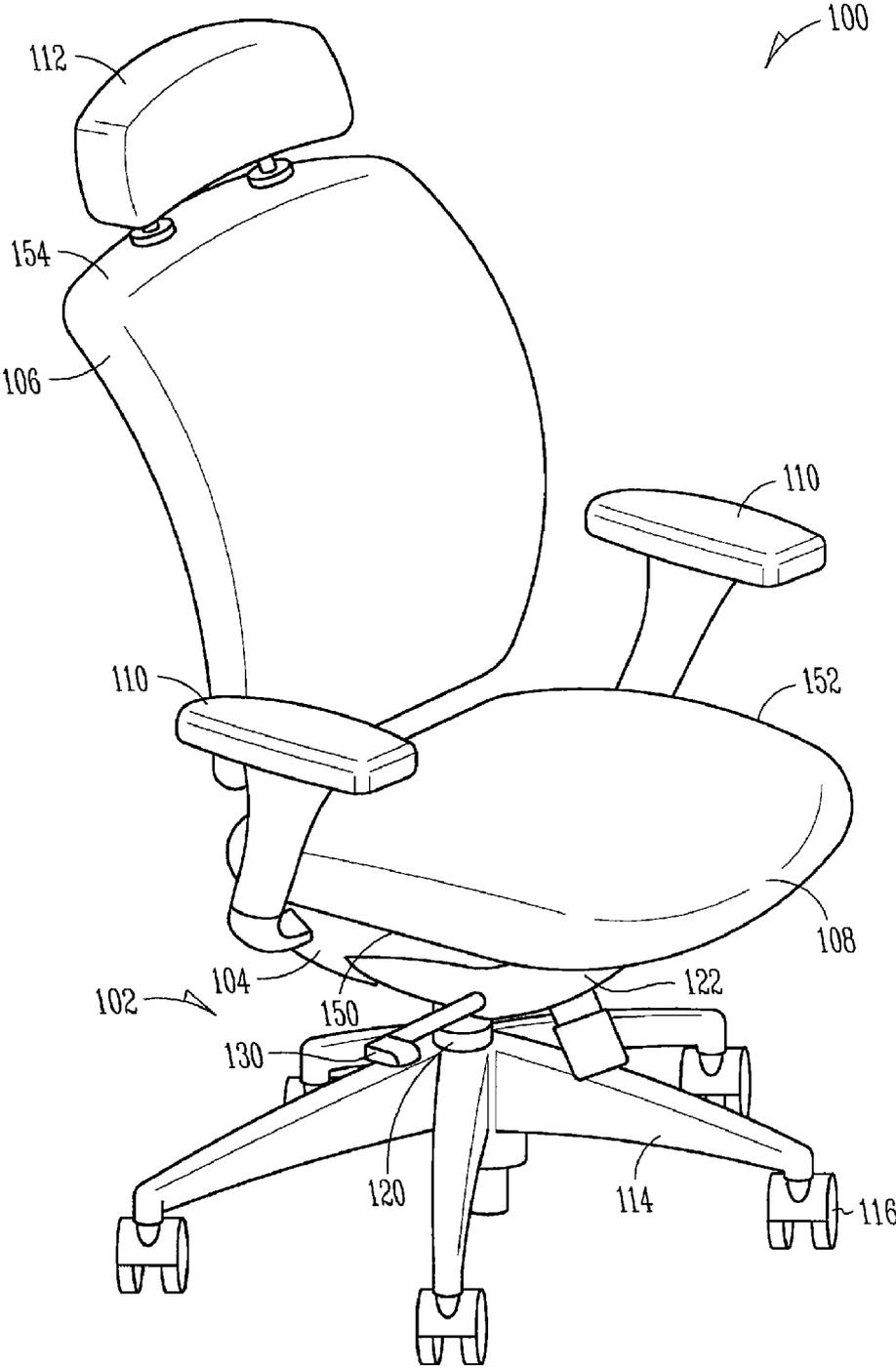


FIG. 1A

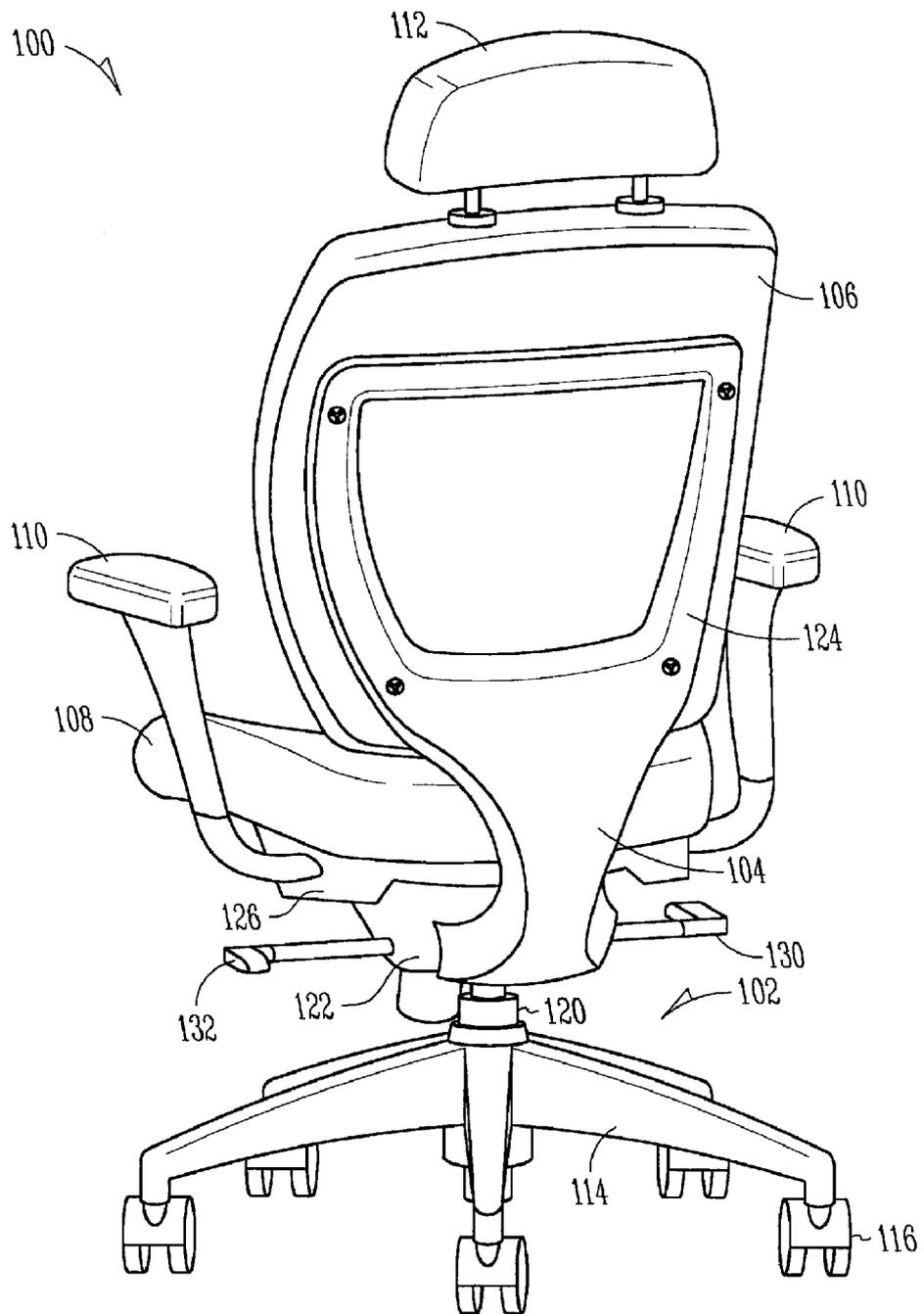


FIG. 1B

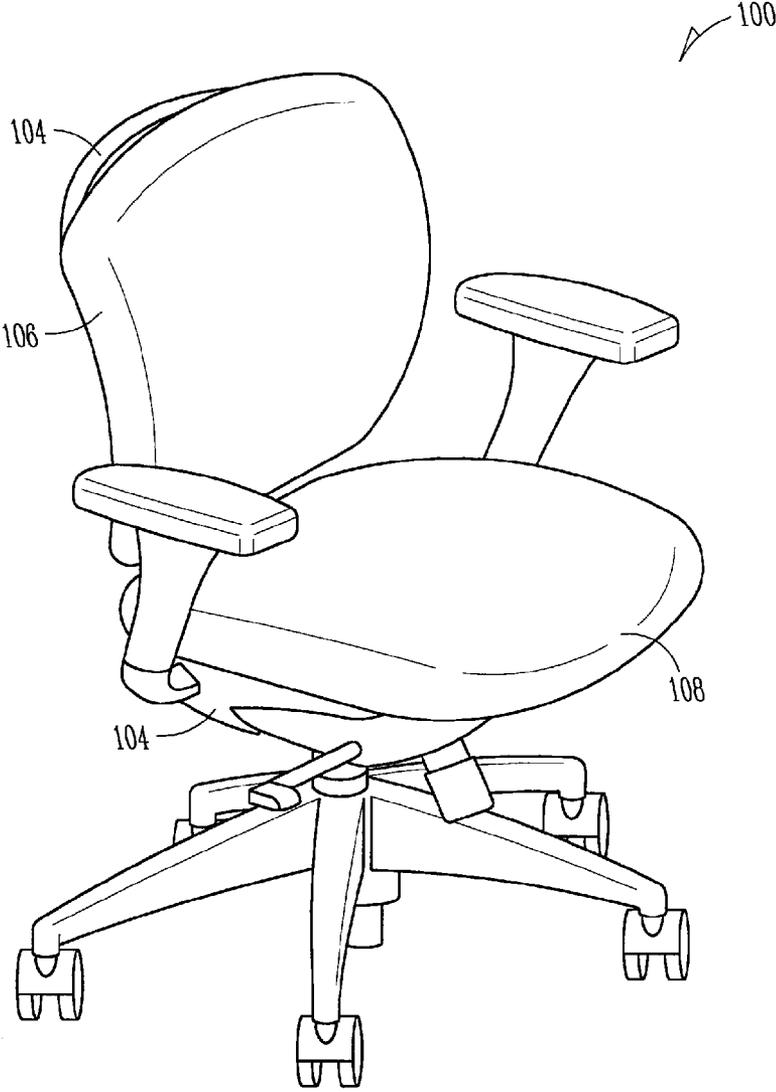


FIG. 2

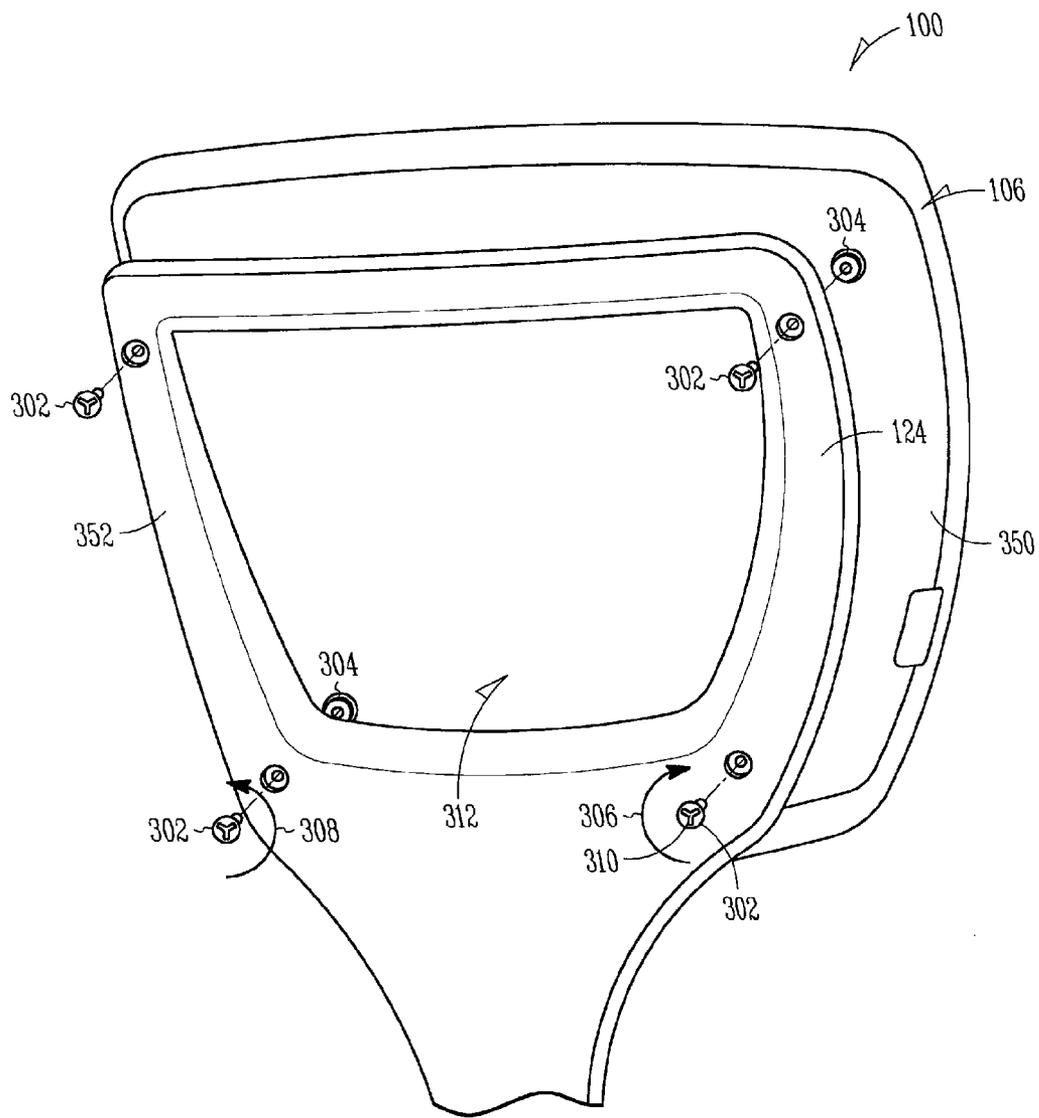


FIG. 3

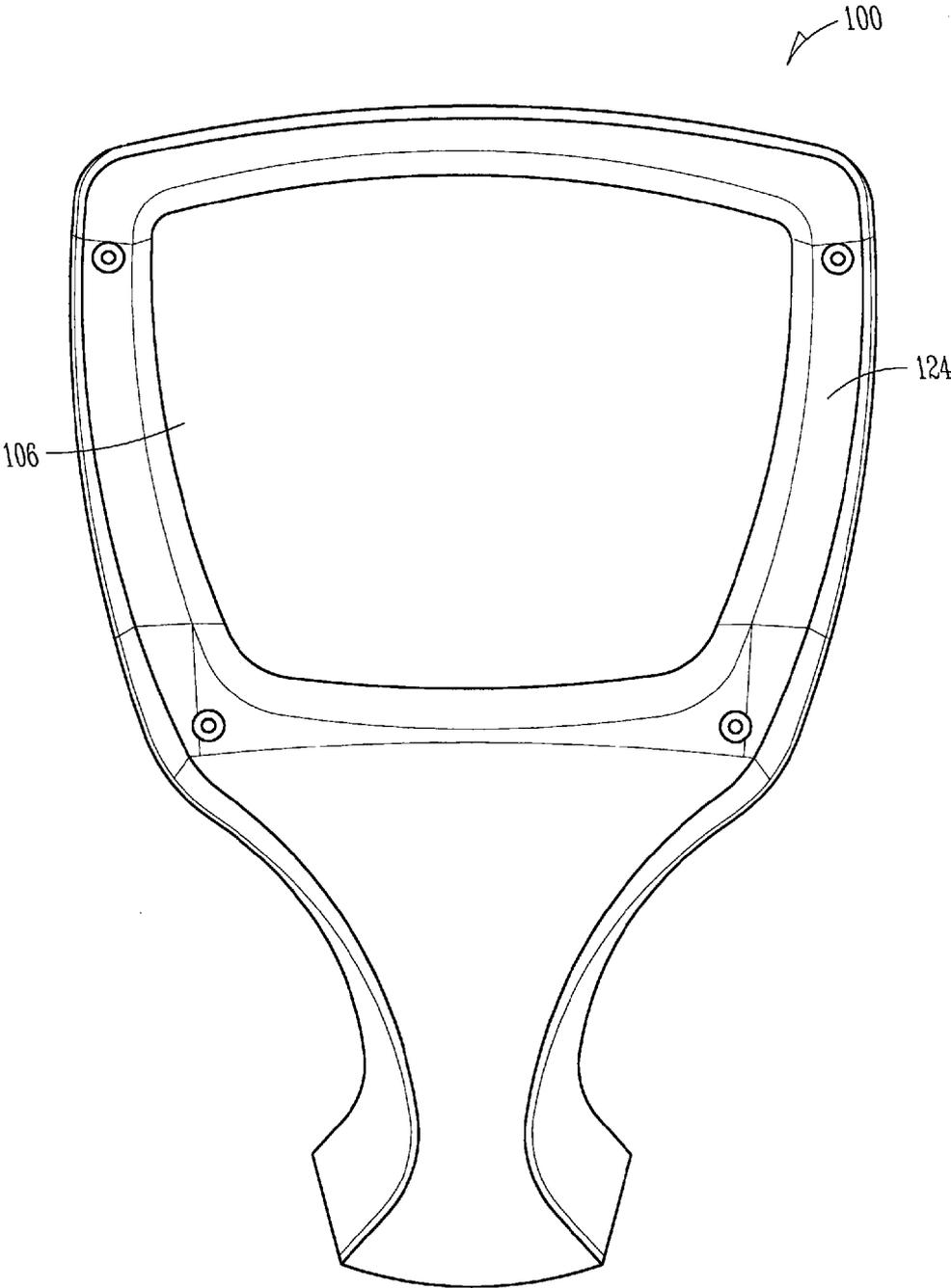


FIG. 4A

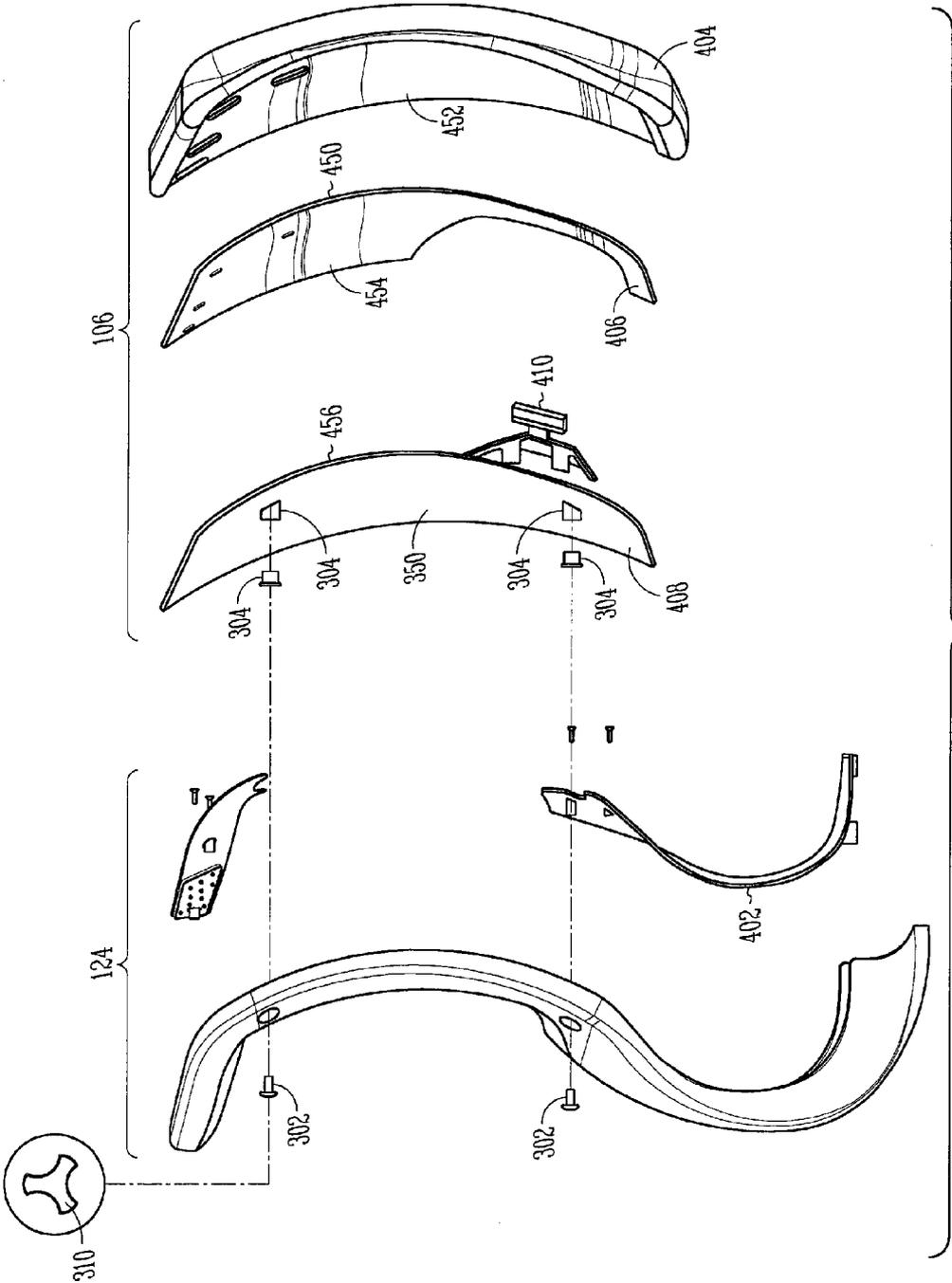


FIG. 4B

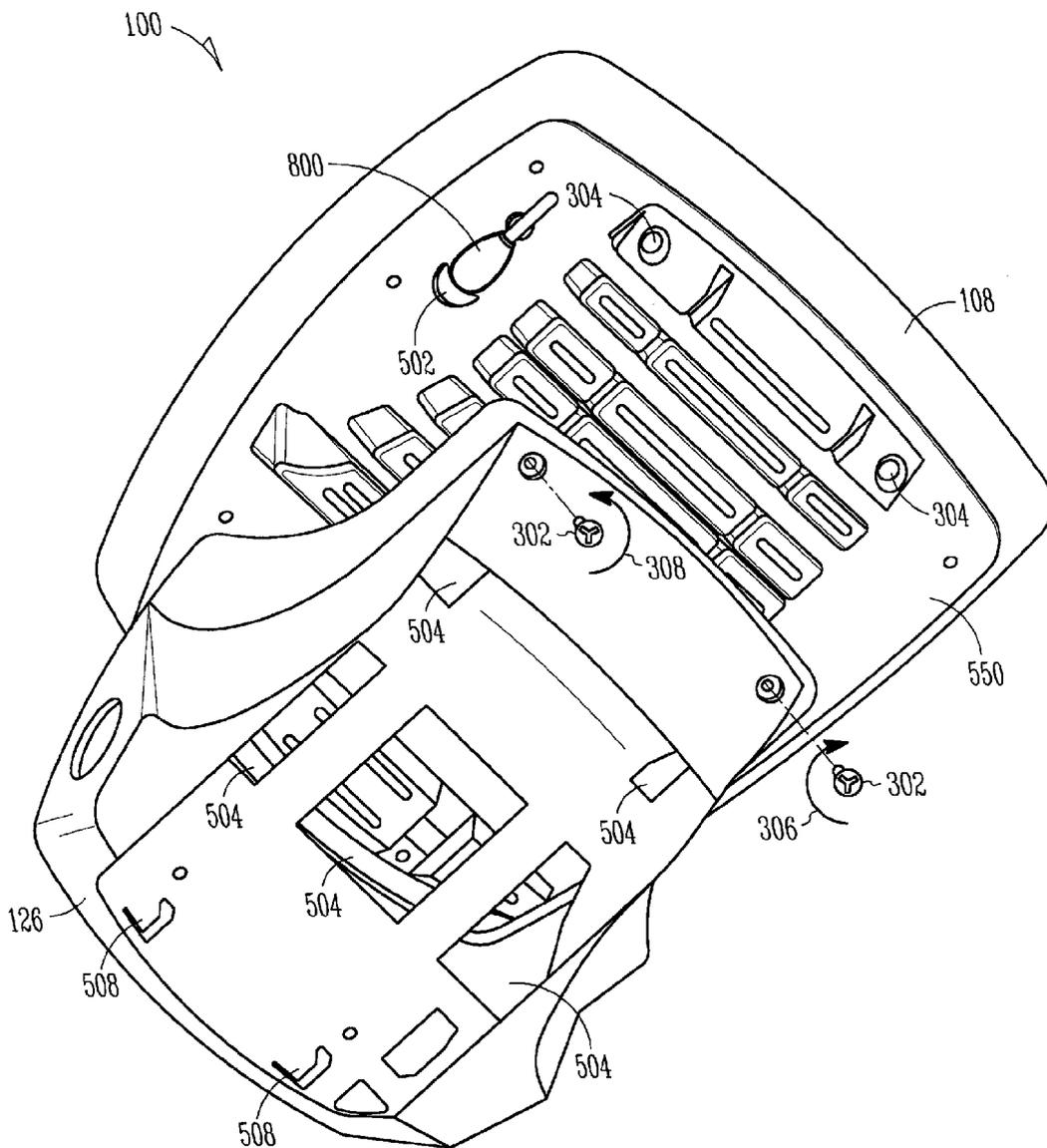


FIG. 5

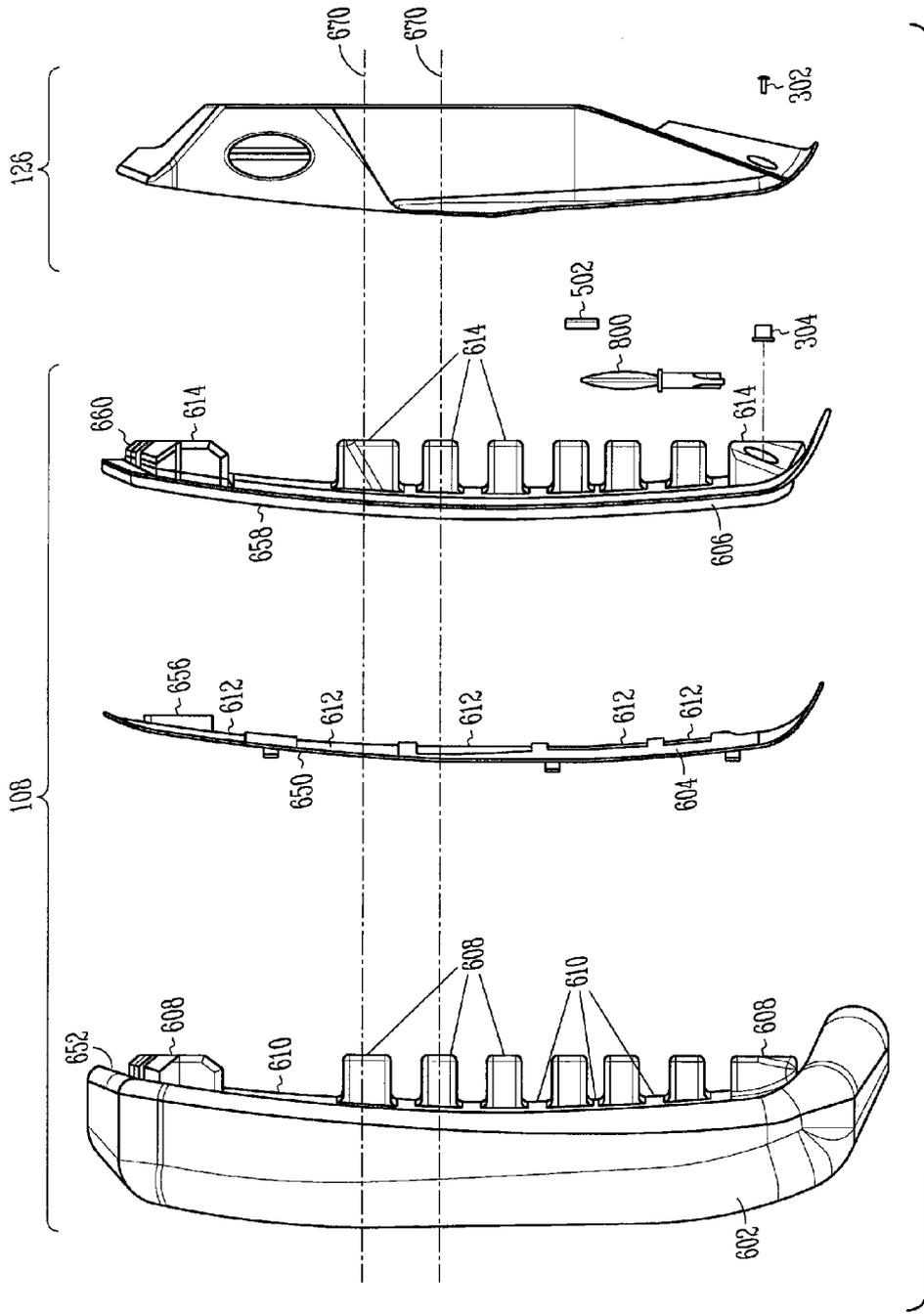


FIG. 6A

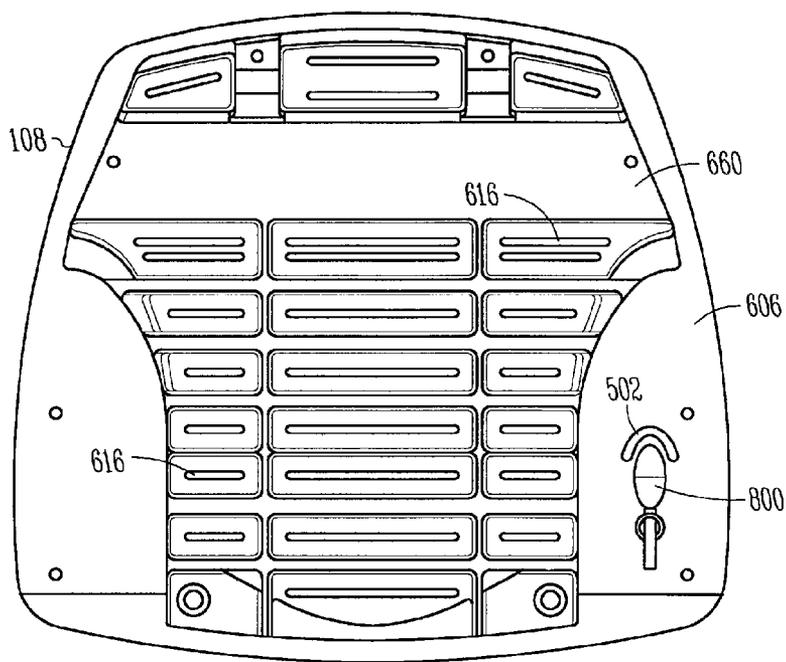


FIG. 6B

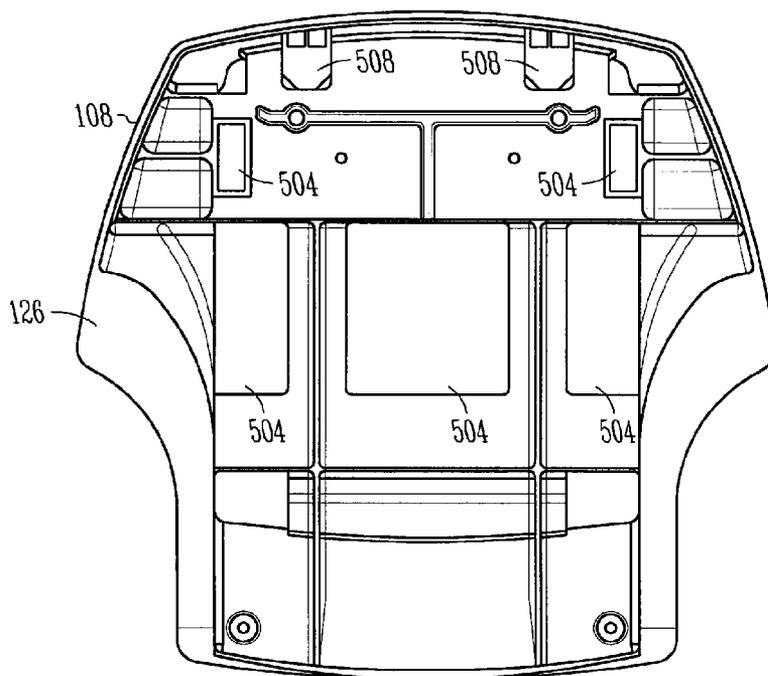


FIG. 6C

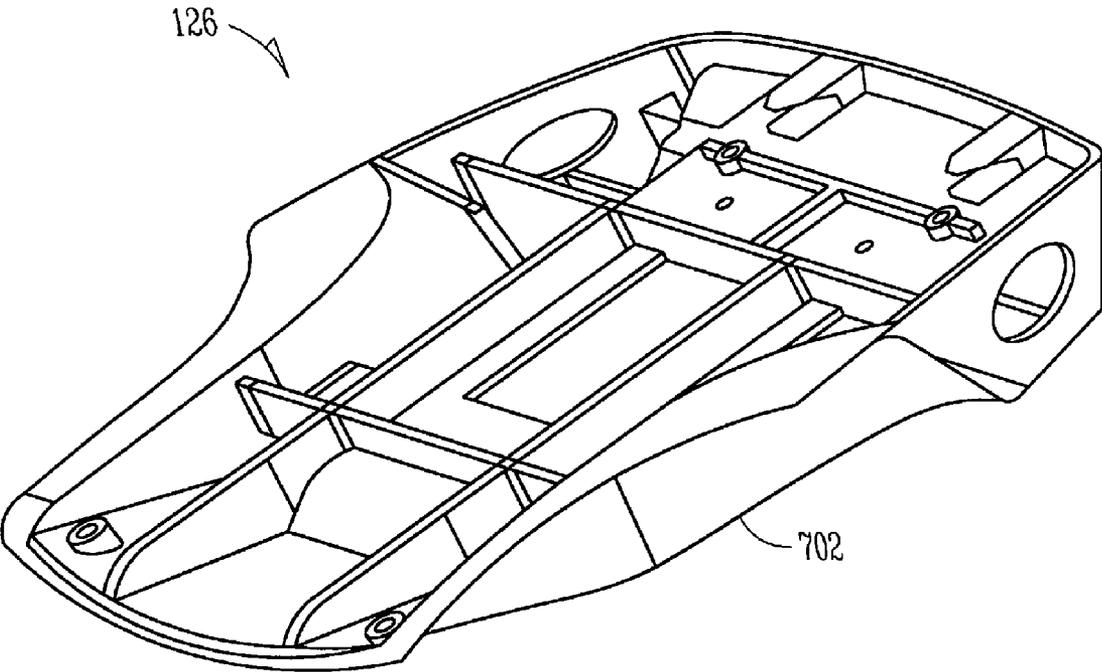


FIG. 7A

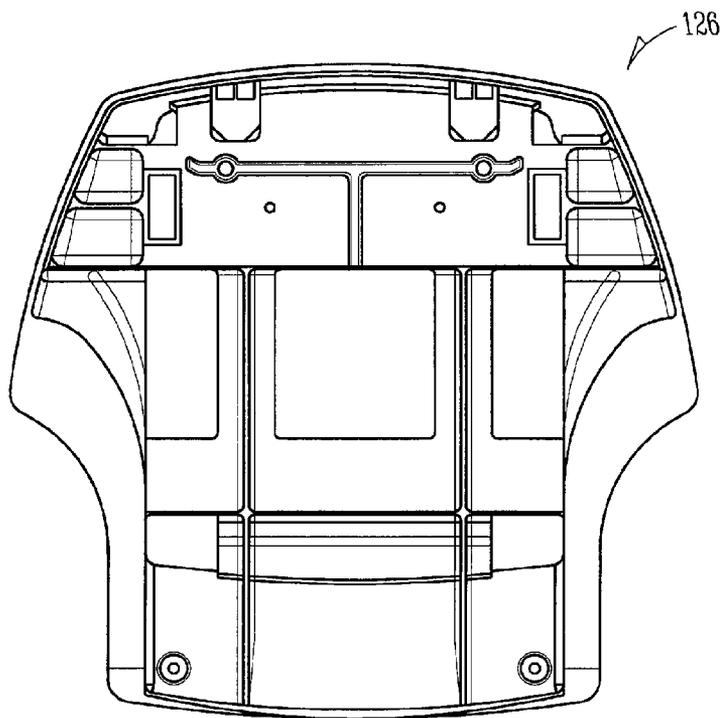


FIG. 7B

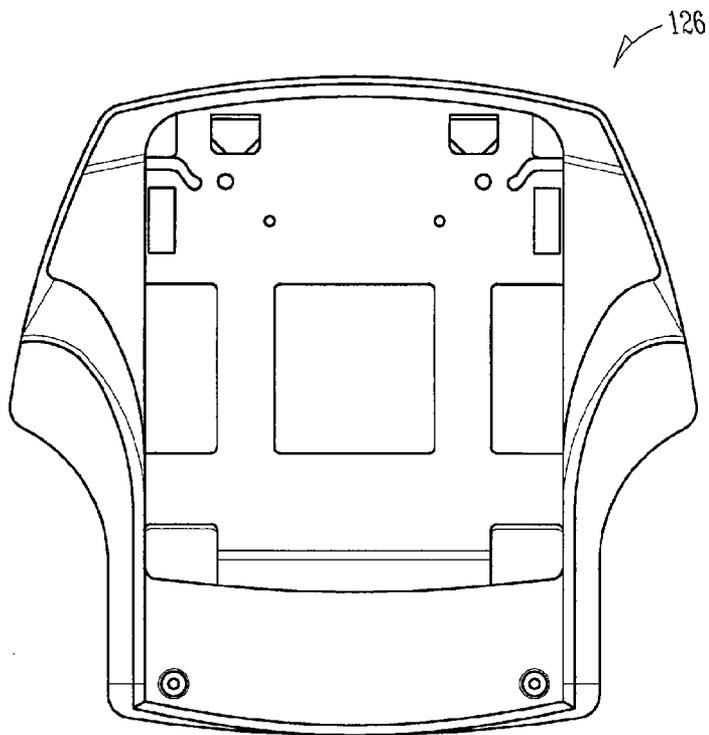


FIG. 7C

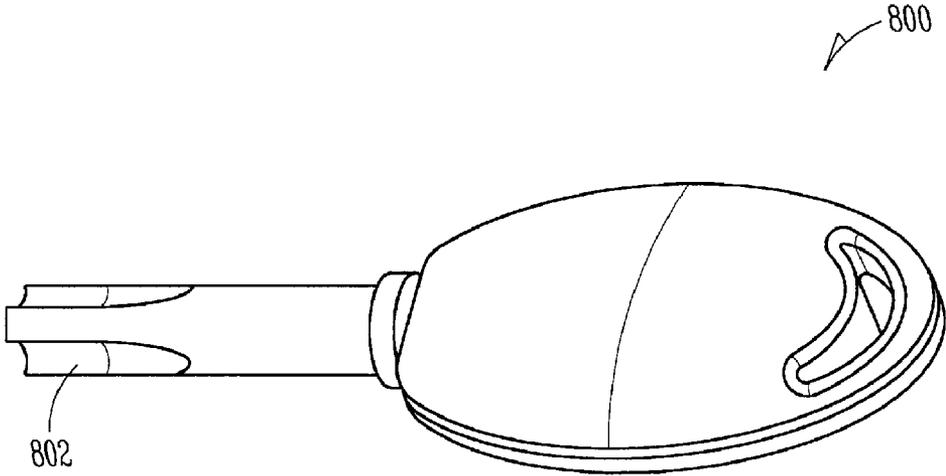


FIG. 8

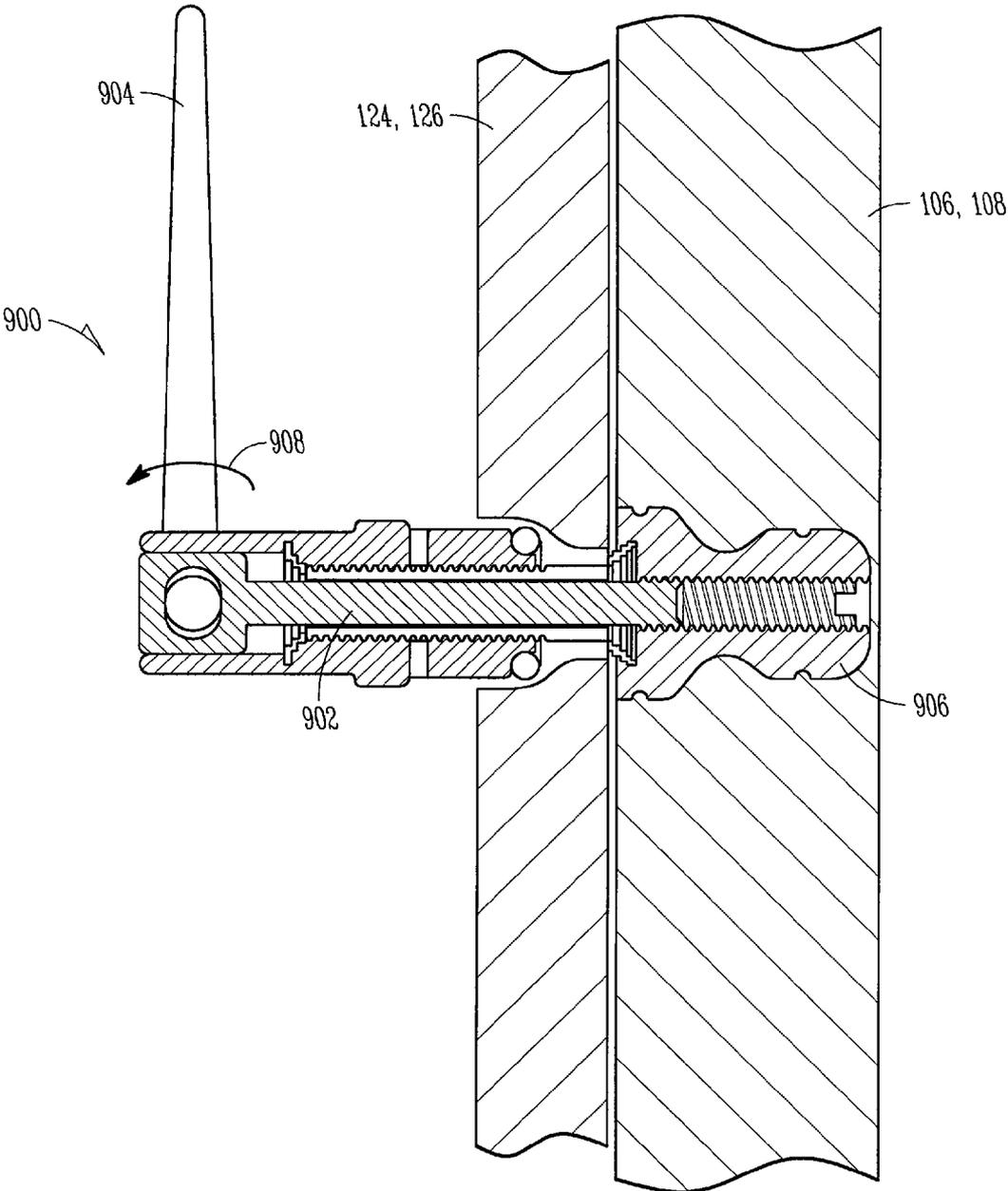


FIG. 9

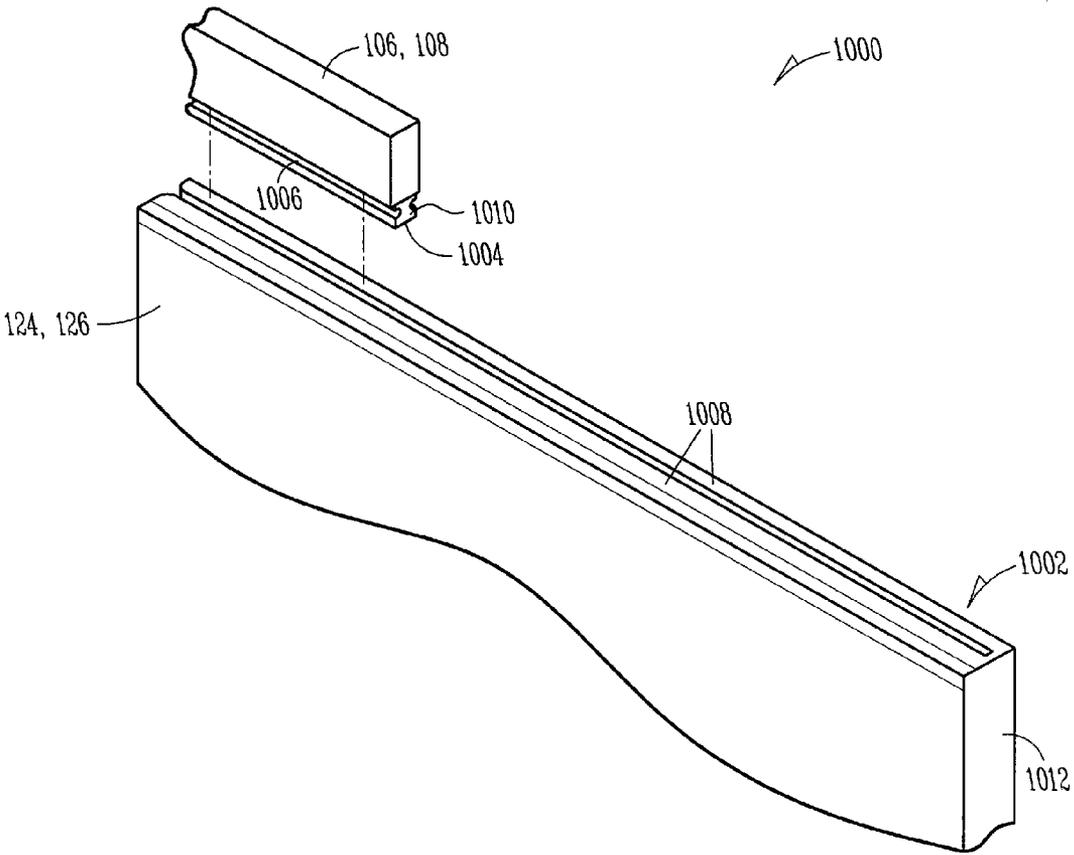


FIG. 10

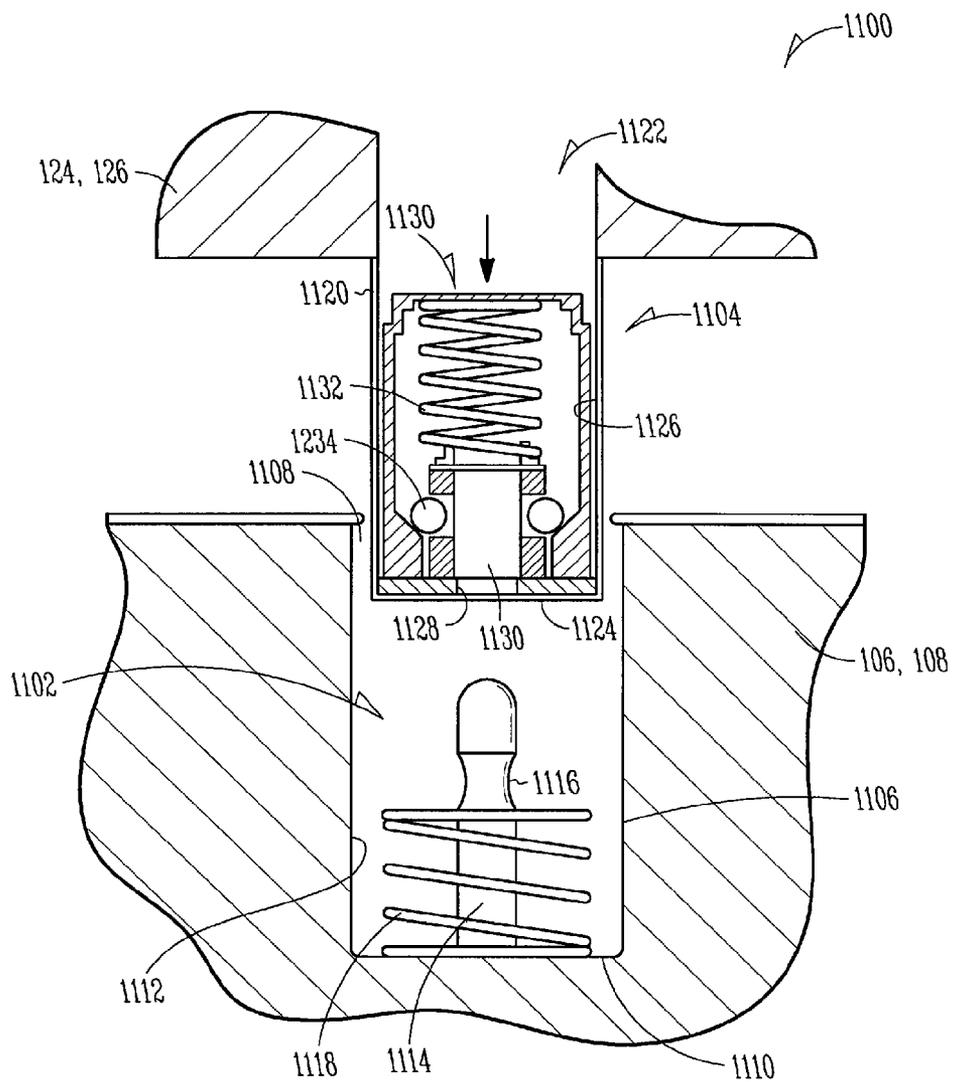


FIG. 11

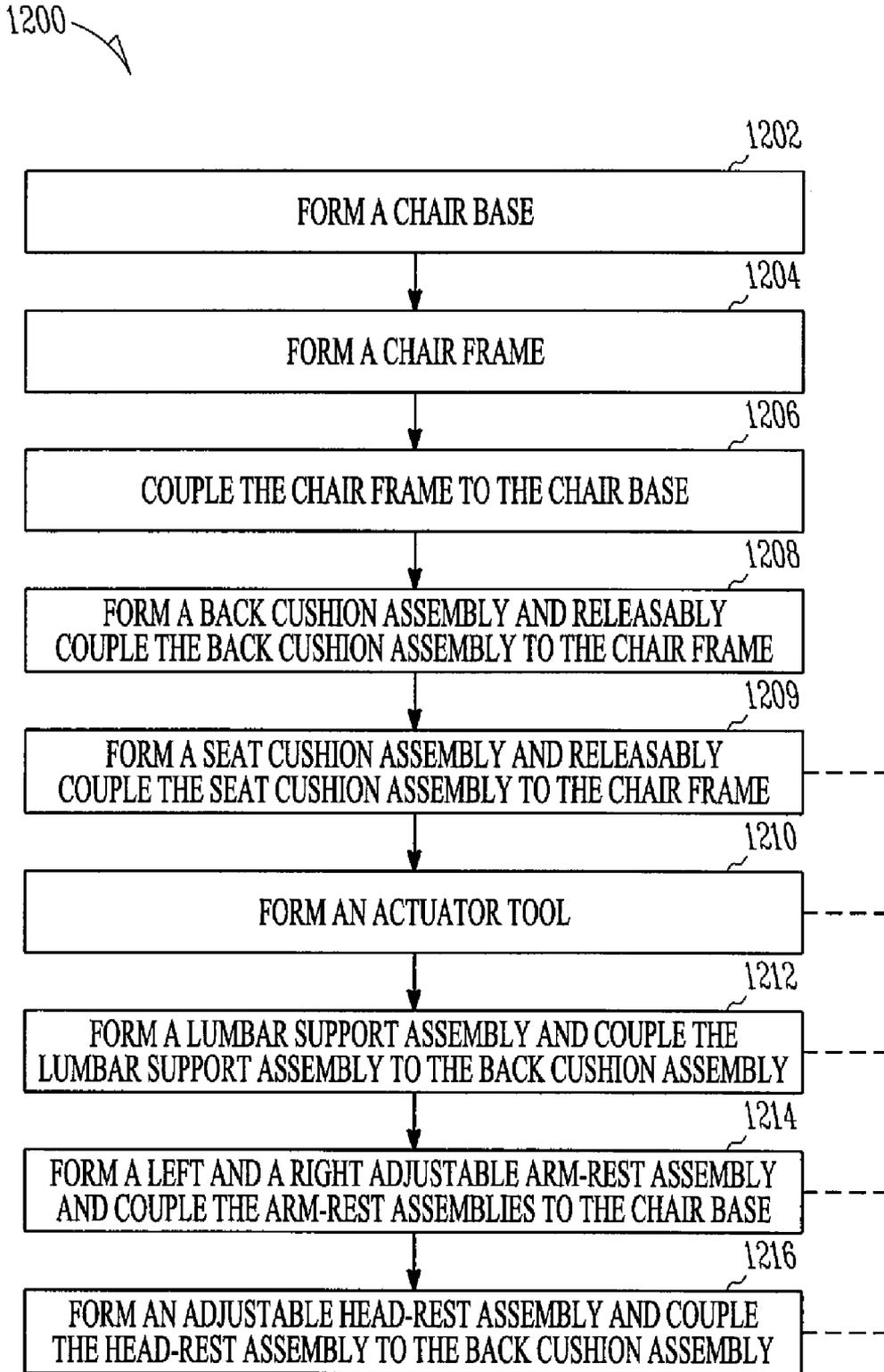


FIG. 12

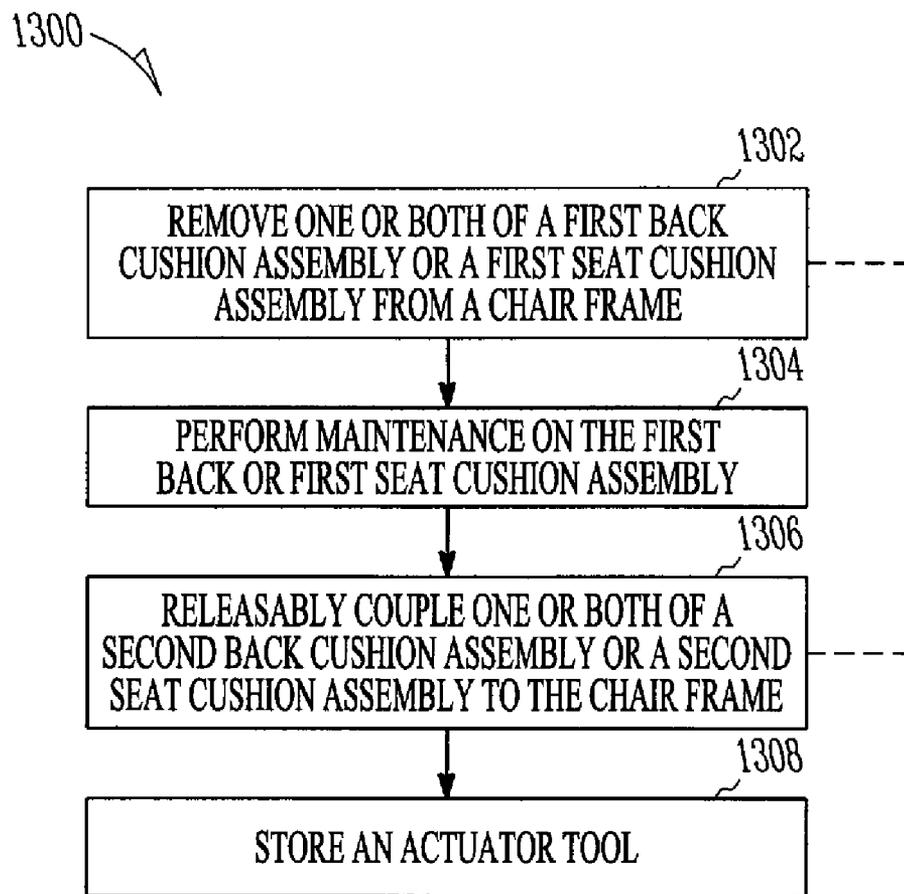


FIG. 13

CHAIR HAVING REMOVABLE BACK OR SEAT CUSHION ASSEMBLIES AND METHODS RELATED THERETO

PRIORITY OF INVENTION

[0001] This non-provisional application claims the benefit of priority under 35 U.S.C. § 119(e) to U.S. Provisional Patent Application Ser. No. 60/804,363, filed Jun. 9, 2006, which is herein incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] This patent document pertains generally to office-type furniture. More particularly, but not by way of limitation, this patent document pertains to an office-type chair having removable back or seat cushion assemblies and methods related thereto.

BACKGROUND

[0003] Modern chairs, and particularly office-type chairs, are typically provided with fabric-covered cushions designed to provide comfort to an occupant sitting thereon. One problem associated with fabric-covered cushions is that over time the cushions get dirty, worn, or damaged, such that they need to be cleaned, repaired, or replaced. Still other times, the replacement of fabric-covered cushions may be desired for size-changing, remodeling, or upgrading purposes. Unfortunately, the fabric-covered cushions of typical office chairs are permanently attached to an associated chair frame, and therefore are not easily removable, if at all, for one or more of the aforementioned desired purposes. For this reason, currently used chair constructions are often discarded in their entirety when repair or replacement of the cushions is necessary or desired.

[0004] Yet another problem associated with many office-type chairs is that constructions thereof do not allow air to travel through the associated chair cushions. As a result, the chair occupant may be left feeling uncomfortably hot at their back or seated regions. As a further result of no air flow, the cushions may develop a foul smell over time, such as a stale or musty smell.

[0005] What is needed is a chair having back or seat cushion assemblies that are easily, quickly, and reliably removable from, and attachable to, an associated chair frame. What is further needed is a chair having a conformable, breathable cushion assembly.

OVERVIEW

[0006] A chair comprising a chair base, a chair frame mounted to the chair base, a back cushion assembly, and a seat cushion assembly, along with related methods, is described. The chair frame includes an upper and lower frame portion. One or both of the back cushion assembly or the seat cushion assembly can be releasably coupled to the upper frame portion or the lower frame portion, respectively. Such releasable coupling can be achieved via one or more quick-release connectors brought into coupling engagement or disengagement via a rotational, sliding, or push-button movement. In varying examples, the back and seat cushion assemblies each comprise at least one support member and a foam cushion attached thereto. A downward-oriented surface of the seat cushion support member can comprise an integrated tool housing to store a connector actuator tool when not in use.

[0007] In Example 1, a chair comprises a chair base; a chair frame mounted to the chair base, the chair frame including an upper frame portion and a lower frame portion; a back cushion assembly including at least one back support member and a back cushion attached to the back support member; and a seat cushion assembly including at least one seat support member and a seat cushion attached to the seat support member, the seat cushion assembly releasably attached to the lower frame portion with at least a first quick-release connector brought into coupling engagement via a rotational, sliding, or push-button movement.

[0008] In Example 2, the chair of Example 1 is optionally configured such that the back cushion assembly is releasably attached to the upper frame portion using at least a second quick-release connector.

[0009] In Example 3, the chair of Example 2 is optionally configured such that one or both of the first or second quick-release connectors are configured to be brought into coupling engagement via a rotational movement amount of about 720-degrees or less.

[0010] In Example 4, the chair of Example 3 is optionally configured such that one or both of the first or second quick-release connectors include a 3/4-turn, 1/2-turn, or 3/4-turn fastener assembly.

[0011] In Example 5, the chair of at least one of Examples 1-4 is optionally configured such that the first quick-release connector includes a cam fastener assembly.

[0012] In Example 6, the chair of at least one of Examples 1-5 is optionally configured such that the first quick-release connector includes a sliding fastener assembly.

[0013] In Example 7, the chair of at least one of Examples 1-6 is optionally configured such that the first quick-release connector includes a push-button fastener assembly.

[0014] In Example 8, the chair of at least one of Examples 1-7 is optionally configured such that the upper frame portion comprises a ring-shaped region disposed with a central opening extending therethrough, and the back cushion assembly is supported around a peripheral edge by, and coupled to, the ring-shaped frame region.

[0015] In Example 9, the chair of at least one of Examples 1-8 is optionally configured such that one or both of the upper frame portion or the lower frame portion are configured to receive and support cushion assemblies of at least two different sizes.

[0016] In Example 10, the chair of at least one of Examples 1-9 is optionally configured such that at least one of the back support member or the seat support member comprise a cushion stiffener panel and an outer protective shell.

[0017] In Example 11, the chair of Example 10 optionally comprises a lumbar support assembly, the lumbar support assembly projecting from, and coupled to, an inward-oriented surface of the outer protective shell associated with the back support member.

[0018] In Example 12, the chair of at least one of Examples 1-11 optionally comprises an actuator tool, a distal end of which is configured to be received by a non-circular void in a head portion of the first quick-release connector.

[0019] In Example 13, the chair of Example 12 is optionally configured such that the at least one seat support member comprise an integrated tool housing configured to retain the actuator tool when not in use.

[0020] In Example 14, a method of manufacture comprises forming a chair base; forming a chair frame, including forming an upper frame portion and forming a lower frame portion; coupling the chair frame to the chair base; forming a back cushion assembly, including forming at least one back support member and forming a back foam cushion; forming a seat cushion assembly, including forming at least one seat support member and forming a seat foam cushion; and releasably coupling one or both of the back cushion assembly to the upper frame portion or the seat cushion assembly to the lower frame portion, including rotating, sliding, or push-button activating at least a first quick-release connector in an engaging direction.

[0021] In Example 15, the method of Example 14 optionally comprises forming an actuator tool having a distal end configured to be received by a head portion of the first quick-release connector.

[0022] In Example 16, the method of at least one of Examples 14-15 optionally comprises forming a lumbar support assembly; and rotatably coupling the lumbar support assembly to a portion of the back cushion assembly.

[0023] In Example 17, the method of at least one of Examples 14-16 is optionally configured such that forming the chair frame includes forming an upper frame portion configured to receive and support a plurality of back cushion assembly sizes.

[0024] In Example 18, the method of at least one of Examples 14-17 is optionally configured such that forming the chair frame includes forming a lower frame portion configured to receive and support a plurality of seat cushion assembly sizes.

[0025] In Example 19, a method of use comprises removing one or both of a first back cushion assembly or a first seat cushion assembly from a chair frame, including rotating, sliding, or push-button deactivating at least one quick-release connector in a disengaging direction; and releasably coupling at least one of a second back cushion assembly or a second seat cushion assembly to the chair frame, including rotating, sliding, or push-button activating at least one quick-release connector in an engaging direction.

[0026] In Example 20, the method of Example 19 is optionally configured such that rotating the at least one quick-release connector in the disengaging or engaging direction includes rotating the connector an amount of 720-degrees or less.

[0027] In Example 21, the method of at least one of Examples 19-20 is optionally configured such that rotating the at least one quick-release connector includes using an actuator tool storable beneath the first or second seat cushion assembly.

[0028] In Example 22, the method of Example 21 optionally comprises storing the actuator tool on a downward-orientated surface of the first or second seat cushion assembly.

[0029] In Example 23, the method of at least one of Examples 19-22 is optionally configured such that releasably coupling at least one of the second back cushion assembly or second seat cushion assembly to the chair frame includes releasably coupling at least one new back or seat cushion assembly to the chair frame.

[0030] In Example 24, the method of Example 23 is optionally configured such that releasably coupling the at least one new back or seat cushion assembly to the chair

frame includes coupling a back or seat cushion assembly having a different size than a removed back or seat cushion assembly.

[0031] In Example 25, the method of at least one of Examples 19-24 optionally comprises performing maintenance on the first back or seat cushion assembly after removal, including one of cleaning or refurbishing the cushion assembly.

[0032] In Example 26, the method of at least one of Examples 19-25 is optionally configured such that releasably coupling at least one of the second back or seat cushion assembly to the chair frame includes coupling a cleaned or refurbished cushion assembly to the chair frame.

[0033] The chair constructions and method discussed herein may overcome many deficiencies of current chair constructions and methods. As one example, the present chair constructions provide a chair having back or seat cushion assemblies that are easily, quickly, and reliably removable from, or attachable to, an associated chair frame. In addition, the present chair constructions advantageously provide a breathable seat cushion assembly. A breathable seat cushion assembly allows air to flow through a foam seat cushion, and thereby may provide conforming comfort and cooling to an occupant. Further, the breathable seat cushion assembly allows fresh air to flow therethrough. These and other examples, advantages, and features of the present chair constructions and methods will be set forth, in part, in the detailed description that follows, and in part, will become apparent to those skilled in the art by reference to the following description, claims, and appended drawings or by practice of the same.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] In the drawings, which are not necessarily drawn to scale, like numerals describe similar components throughout the several views. The drawings illustrate generally, by way of example, but not by way of limitation, various embodiments discussed in the present document.

[0035] FIG. 1A is a front isometric view of a chair, as constructed in accordance with at least one embodiment.

[0036] FIG. 1B is a rear isometric view of a chair, as constructed in accordance with at least one embodiment.

[0037] FIG. 2 is a front isometric view of another chair, as constructed in accordance with at least one embodiment.

[0038] FIG. 3 is a rear isometric view of a back cushion assembly, an upper chair frame portion, and one or more quick-release connectors, as constructed in accordance with at least one embodiment.

[0039] FIG. 4A is a rear view of a back cushion assembly and an upper chair frame portion, as constructed in accordance with at least one embodiment.

[0040] FIG. 4B is a side exploded view of a back cushion assembly, an upper chair frame portion, and one or more quick-release connectors, as constructed in accordance with at least one embodiment.

[0041] FIG. 5 is an underside isometric view of a seat cushion assembly, a lower frame portion, and one or more quick-release connectors, as constructed in accordance with at least one embodiment.

[0042] FIG. 6A is a side exploded view of a seat cushion assembly, a lower chair frame portion, and one or more quick-release connectors, as constructed in accordance with at least one embodiment.

[0043] FIG. 6B is an underside view of a seat cushion assembly, as constructed in accordance with at least one embodiment.

[0044] FIG. 6C is an underside view of a seat cushion assembly and a lower chair frame portion, as constructed in accordance with at least one embodiment.

[0045] FIG. 7A is an isometric view of a lower chair frame portion, as constructed in accordance with at least one embodiment.

[0046] FIG. 7B is a top view of a lower chair frame portion, as constructed in accordance with at least one embodiment.

[0047] FIG. 7C is an underside view of a lower chair frame portion, as constructed in accordance with at least one embodiment.

[0048] FIG. 8 is an isometric view of an actuator tool for use with one or more quick-release connectors, as constructed in accordance with at least one embodiment.

[0049] FIG. 9 is a sectional view of a quick-release connector, a chair frame portion, and a cushion assembly portion, as constructed in accordance with at least one embodiment.

[0050] FIG. 10 is an isometric view of a quick-release connector including a first member integratable with a chair frame portion and a second member integratable with a cushion assembly, as constructed in accordance with at least one embodiment.

[0051] FIG. 11 is a sectional view of a quick-release connector, a chair frame portion, and a cushion assembly portion, as constructed in accordance with at least one embodiment.

[0052] FIG. 12 illustrates a method of manufacturing a chair, as constructed in accordance with at least one embodiment.

[0053] FIG. 13 illustrates a method of disassembling and reassembling a chair, as constructed in accordance with at least one embodiment.

DETAILED DESCRIPTION

[0054] The following detailed description includes references to the accompanying drawings, which form a part of the detailed description. The drawings show, by way of illustration, specific embodiments in which the present chair constructions and methods may be practiced. These embodiments, which are also referred to herein as “examples,” are described in enough detail to enable those skilled in the art to practice the present chair constructions and methods. The embodiments may be combined, other embodiments may be utilized or structural and logical changes may be made without departing from the scope of the present chair constructions and methods. It is also to be understood that the various embodiments of the present chair constructions and methods, although different, are not necessarily mutually exclusive. For example, a particular feature, structure or characteristic described in one embodiment may be included within other embodiments. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present chair constructions and methods are defined by the appended claims and their legal equivalents.

[0055] In this document the terms “a” or “an” are used to include one or more than one; the term “or” is used to refer to a nonexclusive or, unless otherwise indicated; the terms “upwardly,” “downwardly,” “inwardly,” and “outwardly,” or variants thereof, refer to directions with respect to the

geometric center of the present chair; and the terms “front” and “rear” refer to directions with respect to an occupant seated in the present chair. In addition, it is to be understood that the phraseology or terminology employed herein, and not otherwise defined, is for the purpose of description only and not of limitation.

[0056] The chair constructions and methods discussed herein advantageously provide back or seat cushion assemblies that are easily and quickly removable from, and attachable to, an associated chair frame. The removability and attachment of the cushion assemblies from or to the chair frame, respectively, comes by way of one or more quick-release connectors, such as ¼-, ½-, or ¾-turn fasteners, cam fasteners, sliding fasteners, or push-button fasteners. Through simple rotational, sliding, or push-button activating movement of the one or more quick-release connectors, for example, the cushion assemblies may be quickly removed from the chair frame for cleaning, repairing, or replacement, and thereafter reattached to the chair frame for occupant use. In addition, the present chair constructions and methods provide a breathable seat cushion assembly providing the comfort of foam, while still allowing air to flow into and out of the foam to and from the surrounding atmosphere. As a result of the air flow allowance, the seat cushion assembly is able to assume its preformed configuration when an occupant leaves the seat and provide a cooling means to the occupant when seated.

[0057] Reference is now made to the drawings, and initially to FIGS. 1A-1B, which illustrate isometric views of one example of an office-type chair **100** according to the present subject matter. As shown, the chair includes a chair base **102**, a chair frame **104**, a back cushion assembly **106**, and a seat cushion assembly. Optionally, the chair can further include adjustable arm supports **110**, such as a left and a right adjustable arm support, or a head-rest support **112**. As shown, the adjustable arm supports **110** can be disposed on opposite sides **150**, **152** of the chair projecting in an upward orientation, while the head-rest support can be disposed on a top side **154** of the back cushion assembly **106**.

[0058] In this example, but not limited thereto, the chair base **102** includes a plurality of leg members **114** each having a caster or roller wheel **116** disposed at a respective outer end thereof. The caster or roller wheels **116** provide rolling support to the chair **100**. In some examples, the chair base **102** includes a simple support structure without caster or roller wheels. At the center of the chair base **102** is an upwardly projecting pedestal **120**, such as a pneumatic height-adjusting cylinder. The pneumatic height-adjusting cylinder can be manipulated via a height-adjusting handle **130**. An upper portion of the pedestal **120** connects to a box-like control housing **122** to which an upper **124** (FIG. 1B) and a lower **126** (FIG. 1B) portion of the chair frame **104** are mounted. In one example, portions of the chair frame **104** are composed of aluminum, which is lightweight, strong, and offers long life. A region substantially approximating an L-shape **402** (FIG. 4B) couples the upper frame portion **124** to the control housing **122**, while a downward-oriented surface **702** (FIG. 7A) of the lower frame portion **126** (e.g., a seat receptacle) couples the lower frame to the control housing **122**. Among other things, the control housing **122** can house therein a tilt control mechanism, such as a synchro-tilt control mechanism, permitting vertical rear-

ward tilting of the back cushion assembly 106 and attached upper frame portion 124 via manipulation of a tilt control handle 132.

[0059] FIG. 2 illustrates an isometric view of another example of an office-type chair 100, according to the present subject matter. The chair 100 in this example, unlike the chair examples of FIGS. 1A, 1B, does not include a head-reset assembly 112. As shown, the chair 100 includes, among other things, a back cushion assembly 106, a seat cushion assembly 108, and a chair frame 104. As discussed in greater detail below, particularly with respect to FIGS. 4B and 6A, both the back cushion assembly 106 and the seat cushion assembly 108 include at least one back support member and a cushion, such as a foam cushion, attached to an inward-oriented surface of the support member. Foam cushions advantageously adjust to a unique shape of an occupant's body, thereby providing comfort to the occupant while seated in the chair 100. As also discussed in greater detail below, at least one of the back and seat cushion assemblies 106, 108, respectively, are releasably coupled to the chair frame 104 via one or more quick-release connectors, such as 1/4-, 1/2-, or 3/4-turn fasteners. Other quick-release connectors include cam fasteners, sliding fasteners, push-button fasteners or the like.

[0060] The example arrangement of FIG. 3 illustrates an upper portion of a chair 100 according to the present subject matter, and particularly illustrates an exploded view of a back cushion assembly 106, an upper frame portion 124, and one or more rotational quick-release connectors 302 for coupling between the same. The back cushion assembly 106, by way of rotating the one or more quick-release connectors 302, can be releasably attached to the upper frame portion 124. In various examples, the upper frame portion 124 is configured to receive and support different sized back cushion assemblies to accommodate a wide range of users. The rotation of the one or more quick-release connectors 302 can be made using an actuator tool 800 (FIG. 8) configured to be stored on an underside of the chair 100 (see, e.g., FIG. 5).

[0061] One or more connector receptacles 304 are arranged in a predetermined pattern on an outward-oriented surface 350 of the back cushion assembly 106 to receive a distal end of the one or more quick-release connectors 302. The connector receptacles 304 are configured (e.g., include internal threads) to engage the quick-release connectors 302 when the connectors are rotated in a first engaging direction (e.g., direction 306 for right-handed fasteners), such that the back cushion assembly 106 may be securely attached to the upper frame portion 124. In one example, an amount of the engaging rotation is 1080-degrees or less, such as about 720-degrees or less or about 360-degrees or less, thereby providing for quick and easy attachment of the cushion assembly. In a similar manner, the connector receptacles 304 are configured to disengage the quick-release connectors 302 when the connectors are rotated in a second disengaging direction (e.g., direction 308 for right-handed fasteners), such that the back cushion assembly 106 may be quickly and easily removed for cleaning, repair, or replacement. In one example, an amount of the disengaging rotation is 1080-degrees or less, such as about 720-degrees or less or about 360-degrees or less, thereby providing for quick and easy detachment of the cushion assembly.

[0062] As shown, the upper frame portion 124 can include a ring-like region 352 disposed in a surrounding relation to a central opening 312 extending therethrough. In this

example, the back cushion assembly 106 is supported solely around a peripheral edge thereof by the ring-like frame region. Such construction transmits transverse loading substantially uniformly outward to the surrounding ring-like region. Four quick-release connectors 302 and corresponding receptacles 304 can be disposed at the four corner locations of the ring-like shape to releasably secure the back cushion assembly 106 to the upper frame portion 124. A head portion of the one or more quick-release connectors can include a non-circular, such as non-standard, void 310 (see also FIG. 4B) to help prevent unauthorized removal of the back cushion assembly. Such non-circular void 310 may require a custom-made actuator tool 800 (FIG. 8) to effect rotation of the connectors 302.

[0063] FIG. 4A is a rear unexploded view of an upper portion of a chair 100 according to the present subject matter, and particularly illustrates a back cushion assembly 106 and an upper frame portion 124. FIG. 4B illustrates a side exploded view of the back cushion assembly 106, the upper frame portion 124, and one or more quick-release connectors 302.

[0064] As shown, the back cushion assembly 106 includes a cushion 404, such as a foam cushion, and at least one back support member, such as a stiffener panel 406 and an outer protective shell 408. The cushion 404 is disposed on, and coupled to, an inward-oriented surface 450 of the stiffener panel 406, such that an outward-oriented surface 452 of the cushion extends co-extensively over the panel's inward-facing surface. An outward-oriented surface 454 of the stiffener panel 406 is disposed in abutting relationship to an inward-oriented surface 456 of the outer protective shell 408. In this example, an outward oriented surface 350 of the outer protective shell 408 comprises one or more connector receptacles 304 configured to receive and retain a distal portion of one or more quick-release connectors 302, such as rotatable, slidable, or push-button fasteners. The connector receptacles 304 can be separate pieces attached to the outer protective shell 408 via ultrasonic welding. In this way, the one or more quick-release connectors 302 can be inserted through the upper frame portion 124 and into the connector receptacles 304, thereby holding the back cushion assembly 106 to the upper frame portion 124.

[0065] The back cushion assembly 106 can further include a lumbar support assembly 410. In this example, the lumbar support assembly 410 projects from an inward-oriented surface 456 of the outer protective shell 408. The lumbar support assembly 410 can provide the chair 100 with an adjustable arch-shaped lumbar region to help support an occupant's back. Among other things, the lumbar assembly 410 can be pivotally attached to the outer protective shell 408 so as to fit the occupant's back ergonomically, providing a comfortable feel to the occupant.

[0066] Material options for the back cushion assembly 106 are numerous. In one example, the cushion 404 comprises polyurethane (PU) resilient foam. In another example, the cushion 404 comprises open-celled foam that is preformed into a specified shape. In yet another example, the cushion 404 comprises multi-layered foam. The foam can be aesthetically colored as desired by coloring the foam itself or covering the foam with a desired colored thin, flexible upholstery layer. In a further example, one or both of the stiffener panel 406 and the outer protective shell 408 can

comprise a resilient polymeric material, such a sheet of polypropylene or similar engineering-type stiff structural material.

[0067] The example arrangement of FIG. 5 illustrates a lower portion of a chair 100 according to the present subject matter, and particularly illustrates an exploded view of a seat cushion assembly 108, a lower frame portion 126, an actuator tool 800, and one or more quick-release connectors 302. The seat cushion assembly 108, by way of rotating, sliding, or push-button activating the one or more quick-release connectors 302, can reliably be attached to the lower frame portion 126. In various examples, the lower frame portion 126 is configured to receive and support different sized seat cushion assemblies to accommodate a wide range of users. The rotation of the one or more quick-release connectors 302 can be brought about using the actuator tool 800, which is configured to be stored on an underside of the chair 100 in an integrated tool housing 502. In one example, the tool housing 502 includes one or more detents arranged to hold the actuator tool 800. In another example, the actuator tool is magnetized and is held within the tool housing 502 using one or more magnets. In yet another example, the actuator tool 800 is held within the tool housing 502 using a hook-and-loop arrangement.

[0068] One or more connector receptacles 304 are arranged in a predetermined pattern on a downward-oriented surface 550 of the seat cushion assembly 108 to receive a distal end of the one or more quick-release connectors 302. The connector receptacles 304, in one example, are configured (e.g., include internal threads) to engage the quick-release connectors 302 when the connectors are rotated in a first engaging direction (e.g., direction 306 for right-handed fasteners), such that the seat cushion assembly 108 may be securely attached to the lower frame portion 126. In a similar manner, the connector receptacles 304 are configured to disengage the quick-release connectors 302 when the connectors are rotated in a second disengaging direction (e.g., direction 308 for right-handed fasteners), such that the seat cushion assembly 108 may be quickly and easily removed for cleaning, repair, or replacement. In this example, two quick-release connectors 302 and corresponding receptacles are disposed at a front edge of the seat cushion assembly 108, while two tabs 508 (see also FIG. 6C) are disposed at a back edge of the seat assembly to releasably secure the seat cushion assembly 108 to the lower frame portion 126.

[0069] As shown and further discussed below, the lower frame portion 126 includes one or more air-venting passages 504 allowing surrounding air to enter and exit the seat cushion assembly 108, and more specifically a cushion 602 (FIG. 6C) of the assembly. As discussed, a breathable seat cushion assembly 108, among other things, allows air to flow through a foam seat cushion, and thereby may provide conforming comfort and cooling to an occupant. In addition, the breathable seat cushion assembly 108 allows fresh air to flow therethrough. Further, the breathability of the seat cushion assembly 108 allows the foam cushion 602 to return to a preformed configuration when an occupant leaves the seat (i.e., after conforming to a unique profile of the occupant).

[0070] FIG. 6A illustrates a side exploded view of an air-permeable seat cushion assembly 108, a lower frame portion 126, and one or more quick-release connectors 302. As shown, the seat cushion assembly 108 includes a cushion 602, such as a foam cushion, and at least one seat support

member, such as a stiffener panel 604 and an outer protective shell 606. The foam cushion 602 includes a plurality of projections 608 extending downward, each of the projections separated by a valley-like region 610. Among other things, the projections 608 facilitate the breathability of the seat cushion 602, specifically the intake and discharge of air from and to the surrounding atmosphere. The cushion 602 is disposed on, and coupled to, an upward-oriented surface 650 of the stiffener panel 604, such that a downward-oriented surface 652 of the cushion 602 extends co-extensively over the panel's upward-oriented surface 650. The stiffener panel 604 includes a plurality of voids 612 sized and shaped to allow the plurality of projections 608 to extend therethrough and into projection mating cavities 614 of the outer protective shell 606. As shown in FIG. 6B, the downward most portions of the projection mating cavities 614 include one or more air-venting passages 616.

[0071] A downward-oriented surface 656 of the stiffener panel 604 is disposed in abutting relationship to an upward-oriented surface 658 of the outer protective shell 606. In this example, a downward-oriented surface 660 of the outer protective shell 606 comprises one or more connector receptacles 304 configured to receive and retain a distal portion of one or more quick-release connectors 302. The connector receptacles 304 can be attached to the outer protective shell 606 via ultrasonic welding or similar techniques. In this way, the one or more quick-release connectors 302 can be inserted through the lower frame portion 126 and into the connector receptacles 304, thereby holding the seat cushion assembly 108 to the lower frame portion 126.

[0072] Material options for the seat cushion assembly 108 are numerous. In one example, the cushion 602 comprises polyurethane (PU) resilient foam. In another example, the cushion 602 comprises open-celled foam that is preformed into a specified shape. In yet another example, the cushion 602 comprises multi-layered foam. The foam can be aesthetically colored as desired by coloring the foam itself or covering the foam with a desired thin, flexible upholstery layer. In a further example, one or both of the stiffener panel 604 and the outer protective shell 606 can comprise a resilient polymeric material, such a sheet of polypropylene or similar engineering-type stiff structural material.

[0073] FIG. 6B is an underside unexploded view of the seat cushion assembly 108. As shown, the downward-oriented surface 660 of the outer protective shell 606 can include an integrated tool housing 502 to retain the actuator tool 800 when not in use. FIG. 6B also illustrates one or more air-venting passages 616 which, in combination with the stiffener panel voids 612 and the air-venting passages 504 of the lower frame portion 126 (FIG. 6C), allow the seat cushion 602 to breath (i.e., intake and discharge air), as shown by the air-flow lines 670 in FIG. 6A. FIG. 6C is an underside unexploded view of the seat cushion assembly 108 and the lower chair frame portion 126. Advantageously, the seat cushion assembly 108 and lower frame portion 126 illustrated in FIGS. 6A-6C and discussed in the text associated therewith, allow for a removable and breathable foam seat cushion.

[0074] FIGS. 7A-7C illustrate various views of one example of a lower frame portion 126, as constructed in accordance with at least one example of the present subject matter. More particularly, FIG. 7A illustrates an isometric view of the lower frame portion 126, FIG. 7B illustrates a top view of the lower frame portion 126, and FIG. 7C

illustrates an underside view of the lower frame portion 126. The upward-oriented portion of the lower frame assembly 126 (FIG. 7B) is configured to receive the seat cushion assembly 108. The downward-oriented surface of the lower frame assembly 126 (FIG. 7C) is configured to couple to a chair base 102 (FIGS. 1A, 1B), such as a control housing 122. In one example, but as may vary, the lower frame portion 126 can comprise aluminum or other metal having similar characteristics.

[0075] FIG. 8 is an isometric view of one example of an actuator tool 800, which may be used, for instance, to rotate one or more quick-release connectors 302 (FIG. 3) and thereby remove or attach a back or seat cushion assembly 106, 108 (FIGS. 1A, 1B) from and to, respectively, a chair frame 104. As shown, the actuator tool 800 can include a distal driving portion 802 configured to mate with a non-circular void 310 (FIG. 3, FIG. 4B) in a head portion of the one or more rotatable quick-release connectors 302. In one example, the distal driving portion 802 includes a non-standard shape (e.g., non-flat-head screwdriver like or non-Phillips screwdriver like) to prevent unauthorized removal of the back or seat cushion assembly from the chair frame. In another example, but as may vary, the actuator tool 800 includes a metal insert and a plastic over-mold. When not in use, the actuator tool 800 can be stored on an underside of the chair 100 (FIGS. 1A, 1B), such as a downward-oriented surface of a seat cushion assembly 108 (FIG. 5) in an integrated tool housing 502.

[0076] FIG. 9 is a sectional view of a quick-release connector, and more specifically a rotatable cam fastener assembly 900 example, which can be used to couple a back cushion assembly 106 or a seat cushion assembly 108 to an upper 124 or lower 126 chair frame portion, respectively. As shown, the cam fastener assembly 900 can include a control rod 902, a cam lever 904, and a connector receptacle nut 906. Attached to one end of the control rod 902 is the cam lever 904. Attached to the other end of the control rod 902 is the connector receptacle nut 906. In this example, the connector receptacle nut 906 is embedded in a portion of the back 106 or seat 108 cushion assemblies and includes internal threads configured to receive external threads of the control rod 902. The back 106 or seat 108 cushion assemblies are removed from the upper 124 or lower 126 chair frame portion in a quick-release manner by opening the cam lever 904, such as in direction 908. A similar, but reversed operation is used for cushion assembly attachment. Other cam fastener assemblies including one or both of a rotating or sliding component which transforms rotary motion into linear motion or vice versa can also be used to couple a back cushion assembly 106 or a seat cushion assembly 108 to an upper 124 or lower 126 chair frame portion, respectively.

[0077] FIG. 10 is an isometric view of a quick-release connector, and more specifically a slidable fastener assembly 1000 example, which can be used to couple a back cushion assembly 106 or a seat cushion assembly 108 to an upper 124 or lower 126 chair frame portion, respectively. As shown, the slidable fastener assembly 1000 includes an elongated track portion 1002 and a slidable fastener portion 1004. In one example, the elongated track portion 1002 can be integrated with the upper 124 or lower 126 chair frame portions, while the slidable fastener portion 1004 can be integrated with the back 106 or seat 108 cushion assemblies. In this example, the elongated track 1002 is configured to slidably receive an intermediate portion 1006 of the slidable

fastener 1004 between its track rails 1008 and is configured to slidably receive a retaining portion 1010 of the slidable fastener 1004 within its track body 1012. The retaining portion 1010 of the slidable fastener 1004 is sized and shaped to be retained within the track body 1012, thereby securing the back 106 or seat 108 cushion assemblies to an upper 124 or lower 126 chair frame portion, respectively, in a quick and easy manner.

[0078] FIG. 11 is a sectional view of a quick-release connector, and more specifically a push-button fastener assembly 1100 example, which can be used to couple a back cushion assembly 106 or a seat cushion assembly 108 to an upper 124 or lower 126 chair frame portion, respectively. As shown, the push-button fastener assembly 1100 can include a female portion 1102 and a male portion 1104. In this example, but not limited thereto, the female portion 1102 is integrated with the back 106 or seat 108 cushion assemblies, while the male portion 1104 is integrated with the upper 124 or lower 126 chair frame portion. The female portion 1102 can include a cylindrical housing 1106 having an open upper end 1108, a closed lower end 1110, and a cylindrical side wall therebetween 1112. A bolt 1114 having a seating recess 1116 and a spring 1118 therearound can extend from the closed lower end 1110.

[0079] The male portion 1104 can likewise include a cylindrical housing 1120 having an open upper end 1122, a closed lower end 1124, and a cylindrical side wall 1126 therebetween. In this example, the closed lower end 1124 has an aperture therethrough which connects to an inner cylinder 1128. A movable cam 1130 is slidably disposed within the open upper end 1122 of the cylindrical housing 1120.

[0080] The movable cam 1130 has an open lower end 1132 for receiving the inner cylinder 1128 and a spring 1132 on an upper end thereof. A set of retaining balls 1234 are disposed within the movable cam 1130 for engaging the seating recess 1116 of the bolt 1114 of the female portion 1102 when the bolt extends through the inner cylinder 1128 in the locked orientation. In order to release the male portion 1204 from the female portion 1202 in a quick-release manner, and thus release the back 106 or seat 108 cushion assemblies from the upper 124 or lower 126 chair frame portion, the cam 1130 can be pushed inwardly against the urging of the spring 1132 so that the retaining balls 1234 slide outwardly and subsequently disengage the seating recess 1116 of the bolt 1114.

[0081] FIG. 12 illustrates one example of a method 1200 of manufacturing a chair. At 1202, a chair base is formed. In one example, the chair base includes multiple legs and a pedestal projecting upward from a center of the multitude of legs. Forming the chair base can further include forming a control housing mounted to the top of the pedestal. In another example, each leg includes a wheel at an outer end thereof for providing rolling support to the chair. At 1204, a chair frame including an upper frame portion and a lower frame portion is formed. In one example, forming the upper frame portion comprises forming a ring-shape region and a substantially L-shape region. In another example, forming the lower frame portion comprises forming a seat receptacle having one or more air-venting passages. At 1206, the chair frame is coupled to the chair base. In one example, the upper frame portion is coupled to the control housing by way of the

substantially L-shaped frame region. In another example, the lower frame portion is coupled to the control housing by way of the seat receptacle.

[0082] At **1208**, a back cushion assembly is formed and releasably coupled to the chair frame. Forming the back cushion assembly includes forming at least one back support member and forming a back foam cushion. In one example, forming the at least one back support member includes forming a stiffener panel and an outer protective shell. Releasably coupling the back cushion assembly to the chair frame can include rotating, sliding, or push-button activating one or more quick-release connectors in a first engaging direction. In another example, releasably coupling the back cushion assembly to the chair frame includes releasably coupling the back cushion assembly to the ring-shaped frame region.

[0083] In a similar manner to the back cushion assembly, at **1209**, a seat cushion assembly is formed and releasably coupled to the chair frame. Forming the seat cushion assembly includes forming at least one seat support member having an integrated tool housing and forming a seat foam cushion. In one example, forming the at least one seat support member includes forming a stiffener panel and an outer protective shell. Releasably coupling the seat cushion assembly to the chair frame includes rotating, sliding, or push-button activating one or more quick-release connectors in the first engaging direction. In another example, forming the seat foam cushion includes forming a plurality of projections extending from a downward-oriented surface of the cushion. In yet another example, releasably coupling the seat cushion assembly to the chair frame includes releasably coupling the seat cushion assembly to the seat receptacle.

[0084] At **1210**, an actuator tool is optionally formed. Forming the actuator tool includes forming a shaft distal end configured to be received by a head portion of the one or more quick-release connectors. In addition, forming the actuator tool includes forming the tool to be received in and retained by the tool housing integrated with the at least one seat support member. At **1212**, a lumbar support assembly is optionally formed and coupled to the back cushion assembly, and particularly to an inward-oriented surface of the outer protective shell associated with the back cushion assembly. At **1214**, a left and a right adjustable arm-rest assembly are optionally formed and coupled to the chair base, and particularly to the control housing. At **916**, a head-rest assembly is optionally formed and coupled to the back cushion assembly.

[0085] FIG. 13 illustrates one example of a method **1300** of using a chair, particularly disassembling and reassembling the chair. At **1302**, one or both of a first back cushion assembly (if present) or a first seat cushion assembly is removed from a chair frame. Removing the first back or seat cushion assembly from the chair frame includes rotating, sliding, or push-button deactivating one or more quick-release connectors in a second disengaging direction, such as by using an actuator tool—a distal end of which is configured to be received by a head portion of the one or more quick-release connectors. In one example, the chair includes a stool or other like structure without an upper back frame portion. In such an example, it is a first seat cushion assembly which is removed from the chair frame at **1302**. At **1304**, maintenance, such as cleaning or refurbishing, is optionally performed on the first back and first seat cushion assembly removed from the chair frame.

[0086] At **1306**, one or both of a second back cushion assembly or a second seat cushion assembly is releasably coupled to the chair frame. Releasably coupling the second back or seat cushion assembly to the chair frame includes rotating, sliding, or push-button deactivating the one or more quick-release connectors in a second disengaging direction using the actuator tool. In one example, the second back or seat cushion assembly comprises a new cushion assembly of different size. In another example, the second back or seat cushion assembly comprises a cleaned or refurbished cushion assembly. At **1308**, the actuator tool is stored on a downward-oriented surface of the first or second seat cushion assembly attached to the chair frame.

[0087] The chair constructions and method discussed herein may overcome many deficiencies of current chair constructions and methods. As one example, the present chair constructions provide a chair having back or seat cushion assemblies that are easily, quickly, and reliably removable from, or attachable to, an associated chair frame. In addition, the present chair constructions advantageously provide a breathable seat cushion assembly. A breathable seat cushion assembly allows air to flow through a foam seat cushion, and thereby may provide conforming comfort and cooling to an occupant. Further, the breathable seat cushion assembly allows fresh air to flow therethrough. As discussed, the breathable seat cushion assembly may be achieved by an outer protective shell and lower frame portion, each having one or more air-venting passages.

[0088] It is to be understood that the above description is intended to be illustrative, and not restrictive. For instance, although a majority of the foregoing discusses chair components individually or in specific combinations, any combination of the chair components described herein is within the scope of the present subject matter. In addition, while the above text discusses and figures illustrate office-type chairs, the present subject matter is not so limited. Many other chair embodiments and contexts, such as for non-office environments, will be apparent to those of skill in the art upon reviewing the above description. Further, the present chair constructions can include mesh cushion assemblies in ways similar to their foam counterparts discussed herein. The scope should, therefore, be determined with reference to the appended claims, along with the full scope of legal equivalents to which such claims are entitled.

[0089] The Abstract of the Disclosure is provided to comply with 37 C.F.R. §1.72(b), requiring an abstract that will allow the reader to quickly ascertain the nature of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims.

What is claimed is:

1. A chair comprising:

- a chair base;
- a chair frame mounted to the chair base, the chair frame including an upper frame portion and a lower frame portion;
- a back cushion assembly including at least one back support member and a back cushion attached to the back support member; and
- a seat cushion assembly including at least one seat support member and a seat cushion attached to the seat support member, the seat cushion assembly releasably attached to the lower frame portion with at least a first quick-

release connector brought into coupling engagement via a rotational, sliding, or push-button movement.

2. The chair of claim 1, wherein the back cushion assembly is releasably attached to the upper frame portion using at least a second quick-release connector.

3. The chair of claim 2, wherein one or both of the first or second quick-release connectors are configured to be brought into coupling engagement via a rotational movement amount of about 720-degrees or less.

4. The chair of claim 3, wherein one or both of the first or second quick-release connectors include a 1/4-turn, 1/2-turn, or 3/4-turn fastener assembly.

5. The chair of claim 1, wherein the first quick-release connector includes a cam fastener assembly.

6. The chair of claim 1, wherein the first quick-release connector includes a sliding fastener assembly.

7. The chair of claim 1, wherein the first quick-release connector includes a push-button fastener assembly.

8. The chair of claim 1, wherein the upper frame portion comprises a ring-shaped region disposed with a central opening extending therethrough; and

wherein the back cushion assembly is supported around a peripheral edge by, and coupled to, the ring-shaped frame region.

9. The chair of claim 1, wherein one or both of the upper frame portion or the lower frame portion are configured to receive and support cushion assemblies of at least two different sizes.

10. The chair of claim 1, wherein at least one of the back support member or the seat support member comprise a cushion stiffener panel and an outer protective shell.

11. The chair of claim 10, further comprising a lumbar support assembly, the lumbar support assembly projecting from, and coupled to, an inward-oriented surface of the outer protective shell associated with the back support member.

12. The chair of claim 1, further comprising an actuator tool, a distal end of which is configured to be received by a non-circular void in a head portion of the first quick-release connector.

13. The chair of claim 12, wherein the at least one seat support member comprises an integrated tool housing configured to retain the actuator tool when not in use.

14. A method of manufacture, comprising:
forming a chair base;
forming a chair frame, including forming an upper frame portion and forming a lower frame portion;
coupling the chair frame to the chair base;
forming a back cushion assembly, including forming at least one back support member and forming a back foam cushion;
forming a seat cushion assembly, including forming at least one seat support member and forming a seat foam cushion; and
releasably coupling one or both of the back cushion assembly to the upper frame portion or the seat cushion assembly to the lower frame portion, including rotating, sliding, or push-button activating at least a first quick-release connector in an engaging direction.

15. The method of claim 14, further comprising forming an actuator tool having a distal end configured to be received by a head portion of the first quick-release connector.

16. The method of claim 14, further comprising forming a lumbar support assembly; and
coupling the lumbar support assembly to a portion of the back cushion assembly.

17. The method of claim 14, wherein forming the chair frame includes forming an upper frame portion configured to receive and support a plurality of back cushion assembly sizes.

18. The method of claim 14, wherein forming the chair frame includes forming a lower frame portion configured to receive and support a plurality of seat cushion assembly sizes.

19. A method of use, comprising:

removing one or both of a first back cushion assembly or a first seat cushion assembly from a chair frame, including rotating, sliding, or push-button deactivating at least one quick-release connector in a disengaging direction; and

releasably coupling at least one of a second back cushion assembly or a second seat cushion assembly to the chair frame, including rotating, sliding, or push-button activating at least one quick-release connector in an engaging direction.

20. The method of claim 19, wherein rotating the at least one quick-release connector in the disengaging or engaging direction includes rotating the connector an amount of about 720-degrees or less.

21. The method of claim 19, wherein rotating the at least one quick-release connector includes using an actuator tool storable beneath the first or second seat cushion assembly.

22. The method of claim 21, further comprising storing the actuator tool on a downward-orientated surface of the first or second seat cushion assembly.

23. The method of claim 19, wherein releasably coupling at least one of the second back cushion assembly or second seat cushion assembly to the chair frame includes releasably coupling at least one new back or seat cushion assembly to the chair frame.

24. The method of claim 23, wherein releasably coupling the at least one new back or seat cushion assembly to the chair frame includes coupling a back or seat cushion assembly having a different size than a removed back or seat cushion assembly.

25. The method of claim 19, further comprising performing maintenance on the first back or seat cushion assembly after removal, including one of cleaning or refurbishing the cushion assembly.

26. The method of claim 19, wherein releasably coupling at least one of the second back or seat cushion assembly to the chair frame includes coupling a cleaned or refurbished cushion assembly to the chair frame.

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