



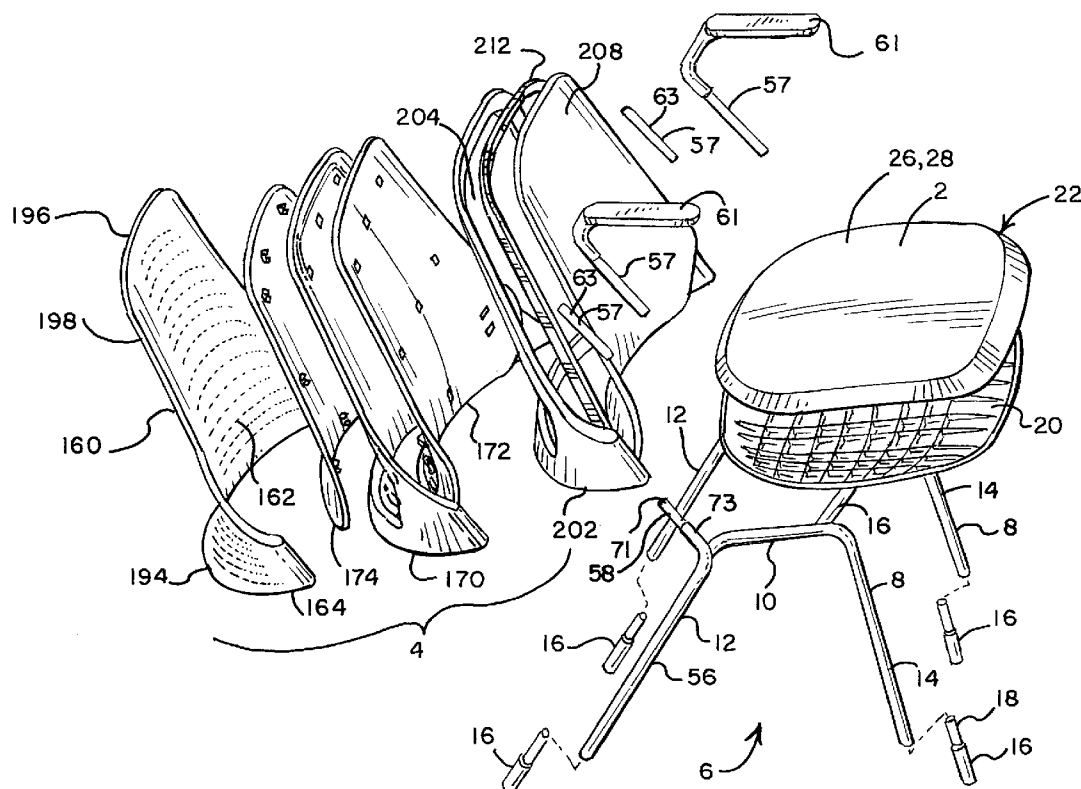
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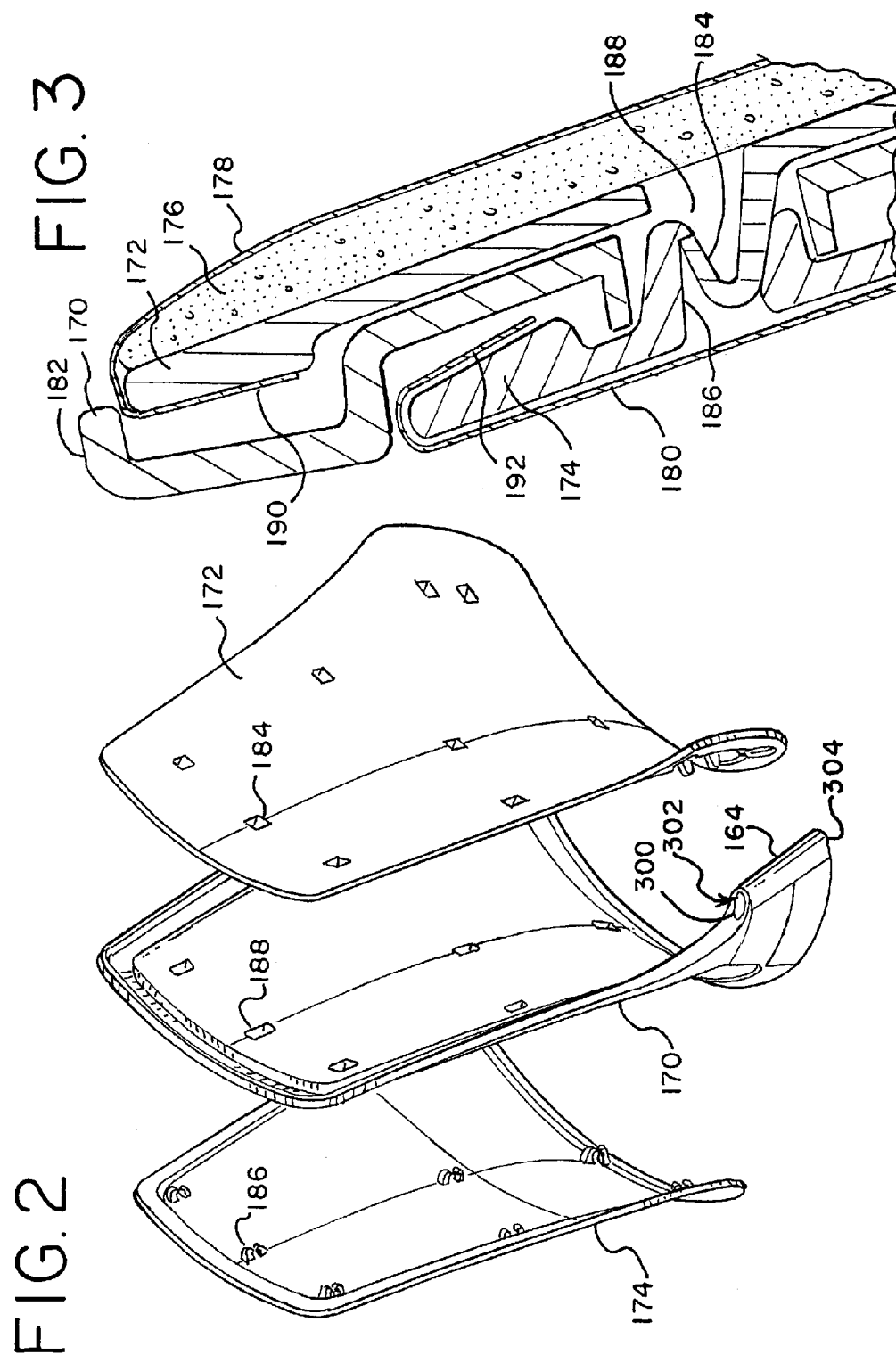
(19) **United States**(12) **Patent Application Publication**
IACOVONI et al.(10) **Pub. No.: US 2011/0272986 A1**(43) **Pub. Date: Nov. 10, 2011**(54) **CHAIR CONSTRUCTION AND METHOD THEREFORE****Publication Classification**(76) Inventors: **Joseph IACOVONI**, Grand Rapids, MI (US); **Andrew J. Kurrasch**, Saugatuck, MI (US); **Timothy Hoogland**, Zeeland, MI (US); **Douglas VanDeRiet**, Holland, MI (US)(51) **Int. Cl.**
A47C 3/00 (2006.01)
A47C 4/02 (2006.01)(52) **U.S. Cl. 297/311; 297/440.1**(21) Appl. No.: **13/083,754**(22) Filed: **Apr. 11, 2011****Related U.S. Application Data**

(60) Provisional application No. 61/323,654, filed on Apr. 13, 2010.

(57) **ABSTRACT**

In one embodiment, a chair includes a frame and a seat support coupled to the frame. The seat support is slidable relative to the frame from a disengaged position to an engaged position. A seat member is coupled to the seat support. The seat member is slidable relative to the seat support from a disengaged position to an engaged position. Methods of assembly are also provided.





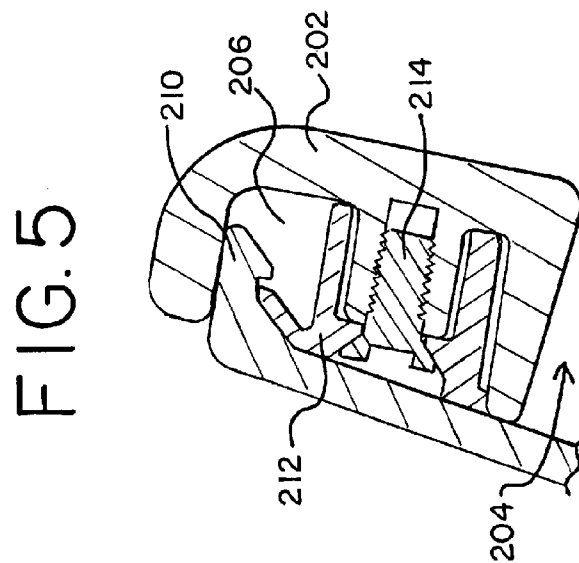
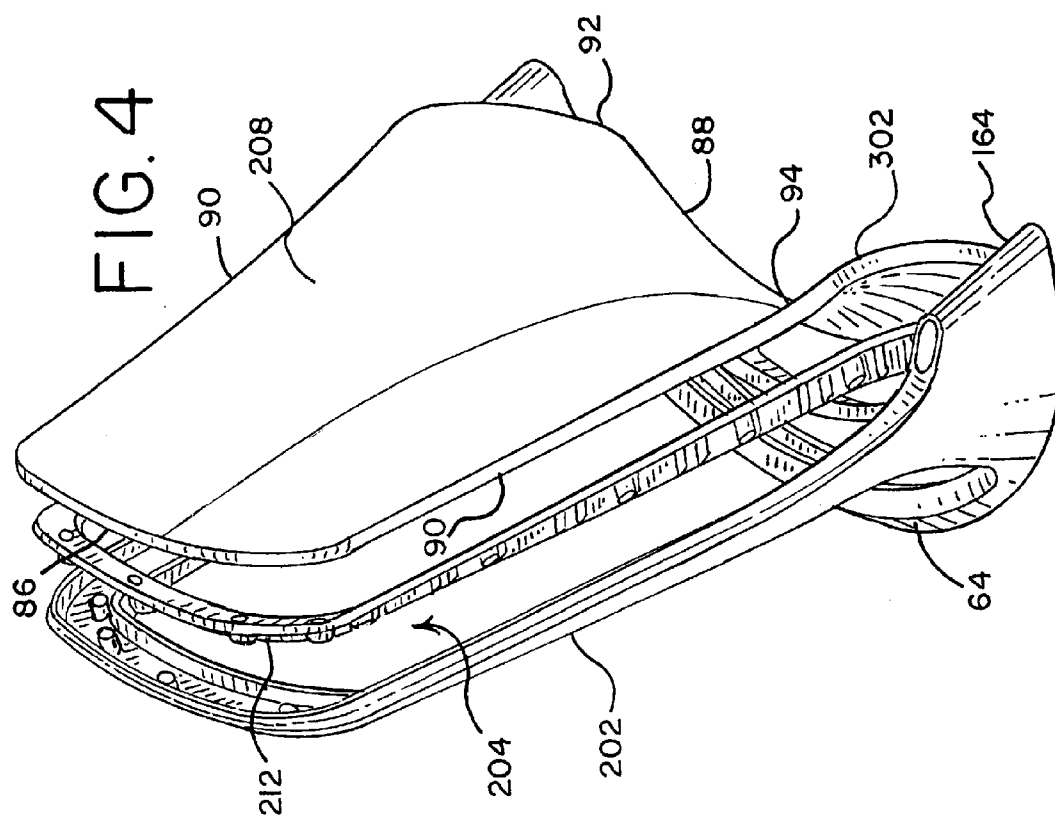


FIG. 6

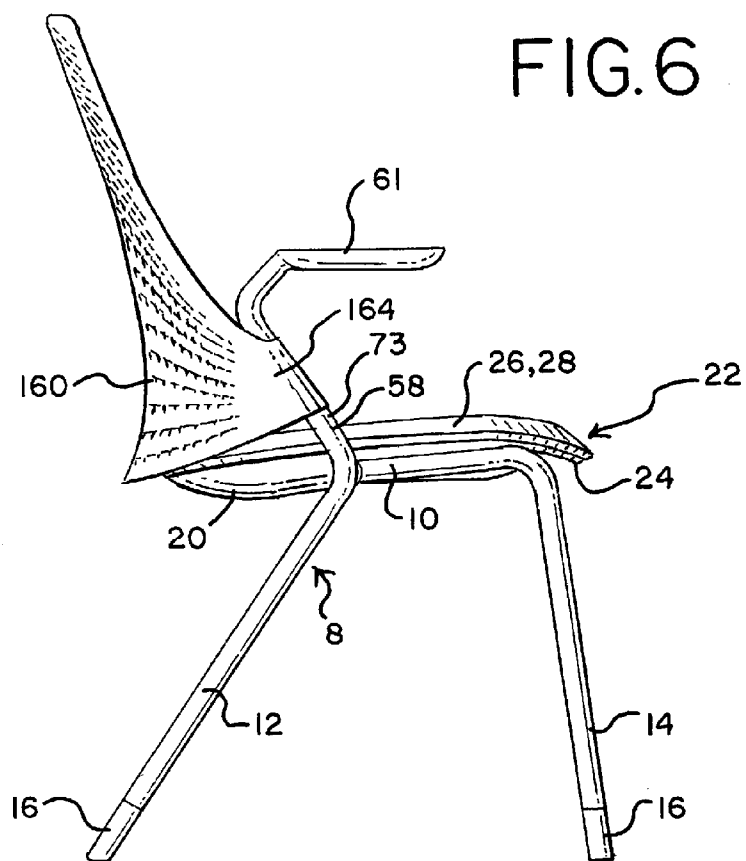


FIG. 7

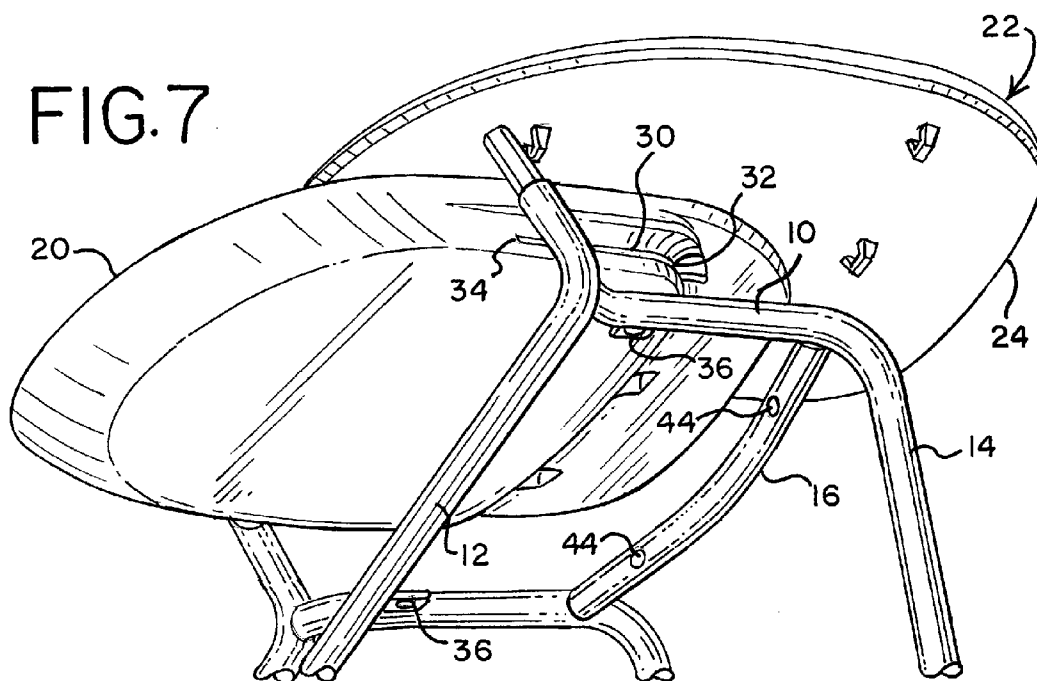


FIG. 8

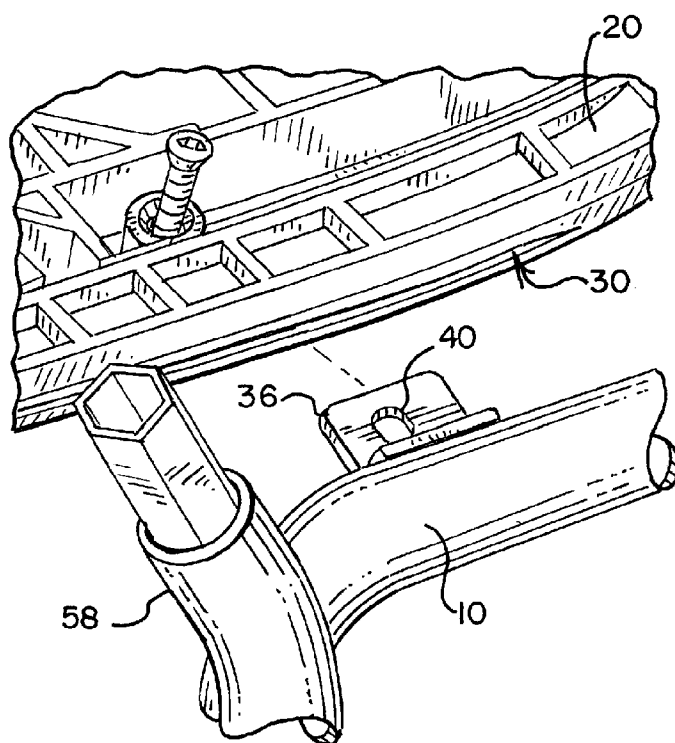


FIG. 9

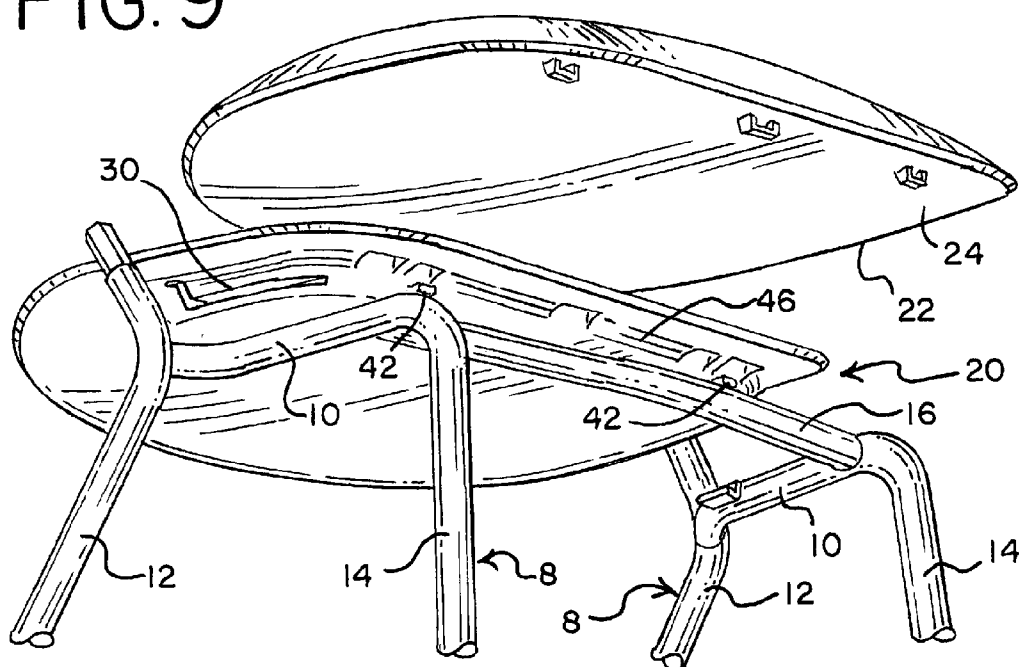


FIG. 10A

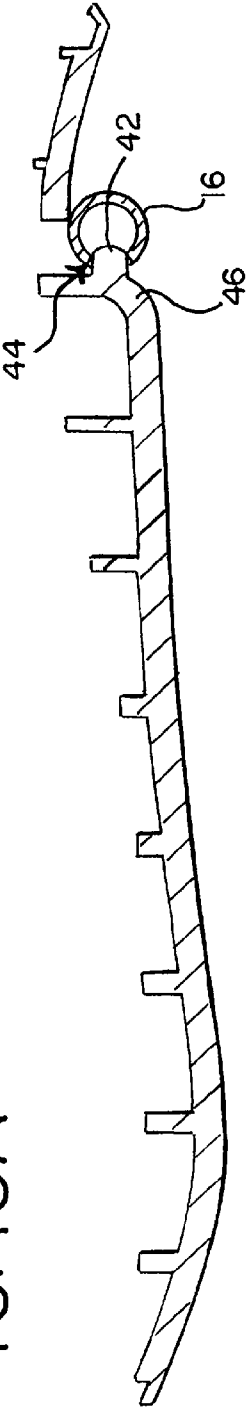


FIG. 10B

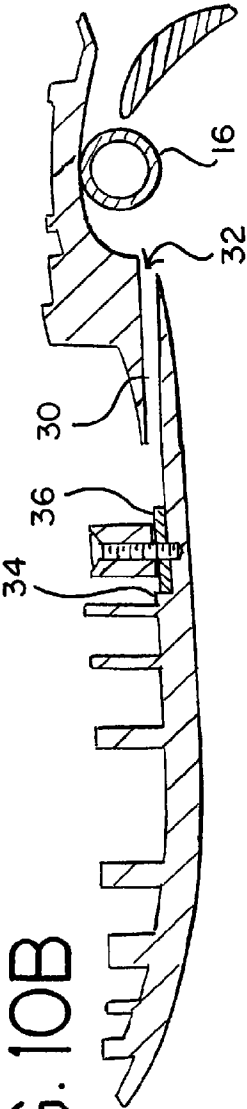


FIG. 11

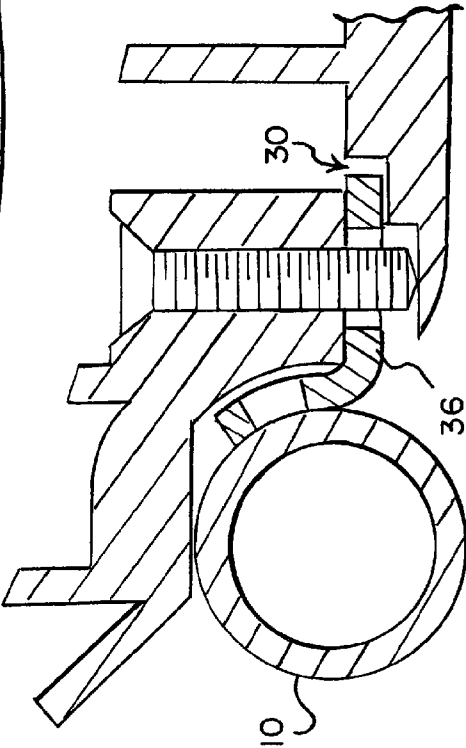


FIG. 12

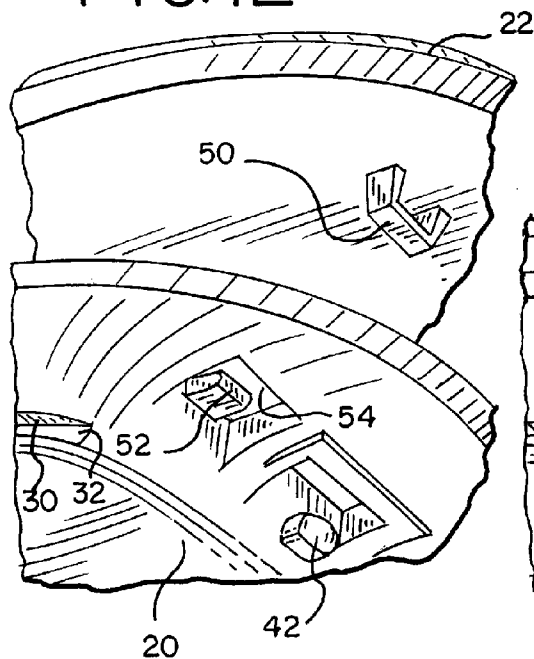


FIG. 13

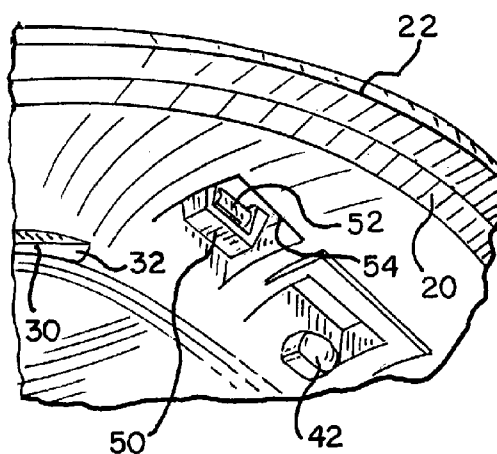


FIG. 14A

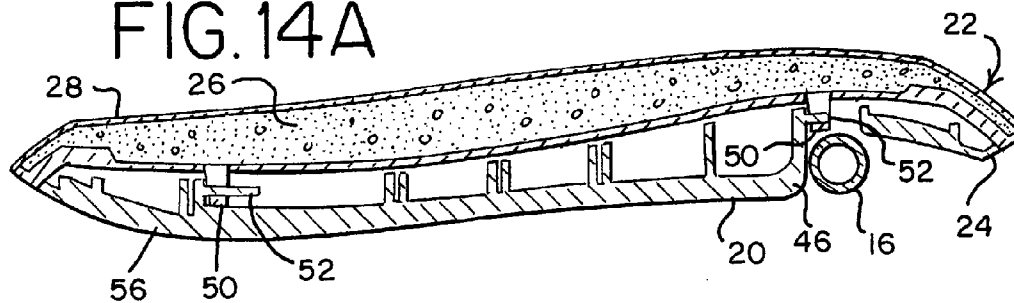
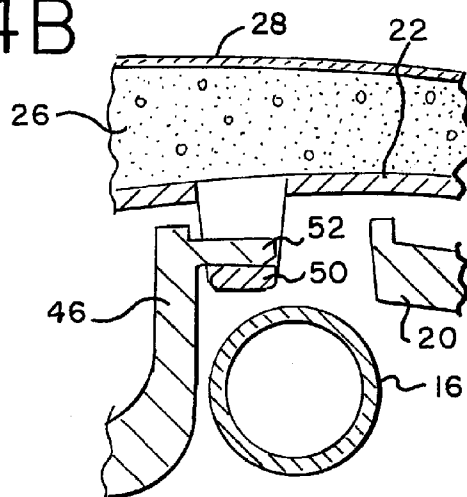
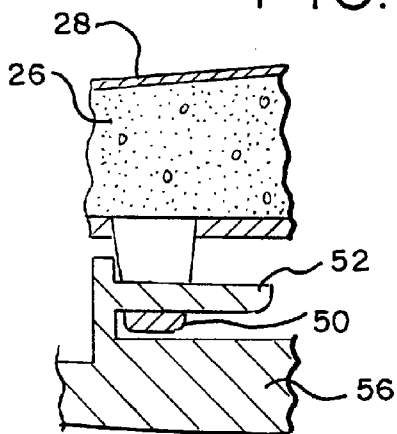
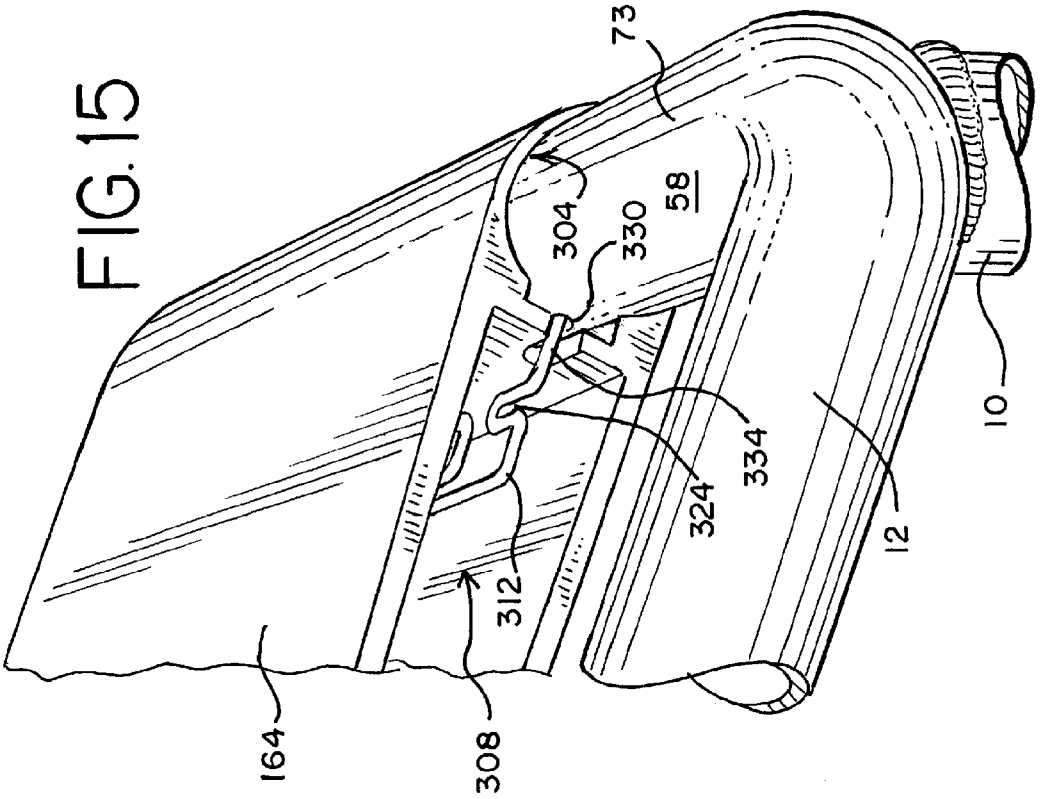
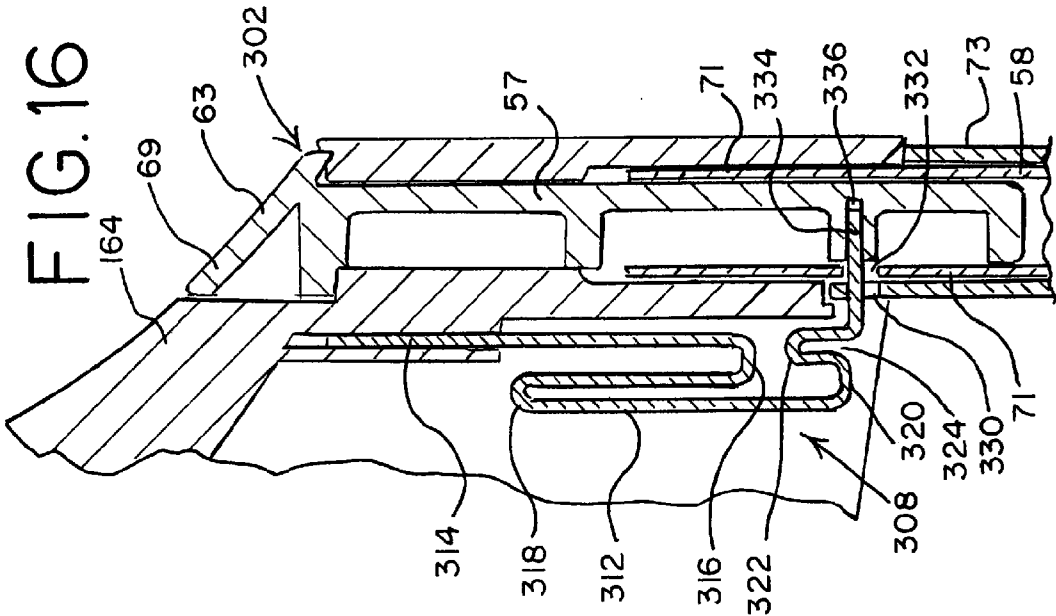


FIG. 14B





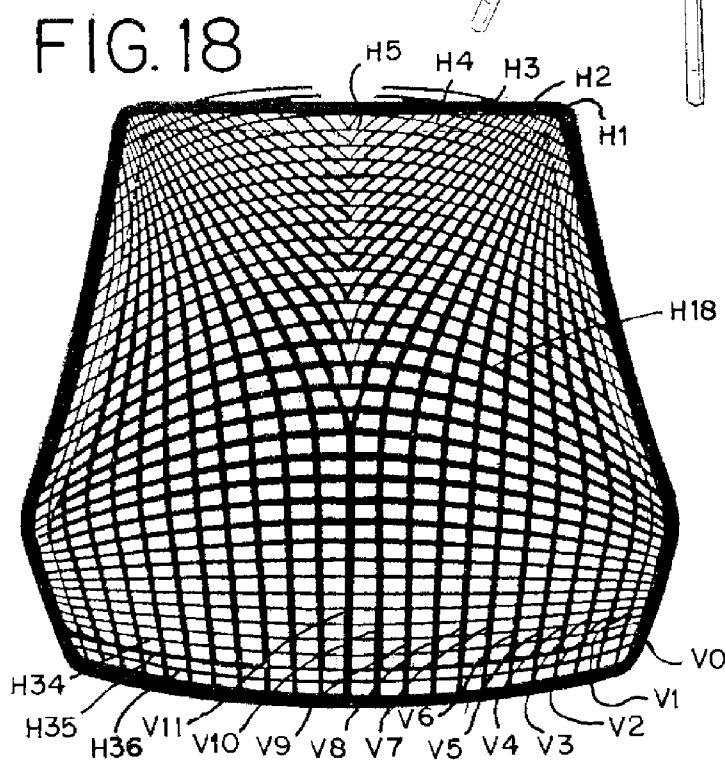
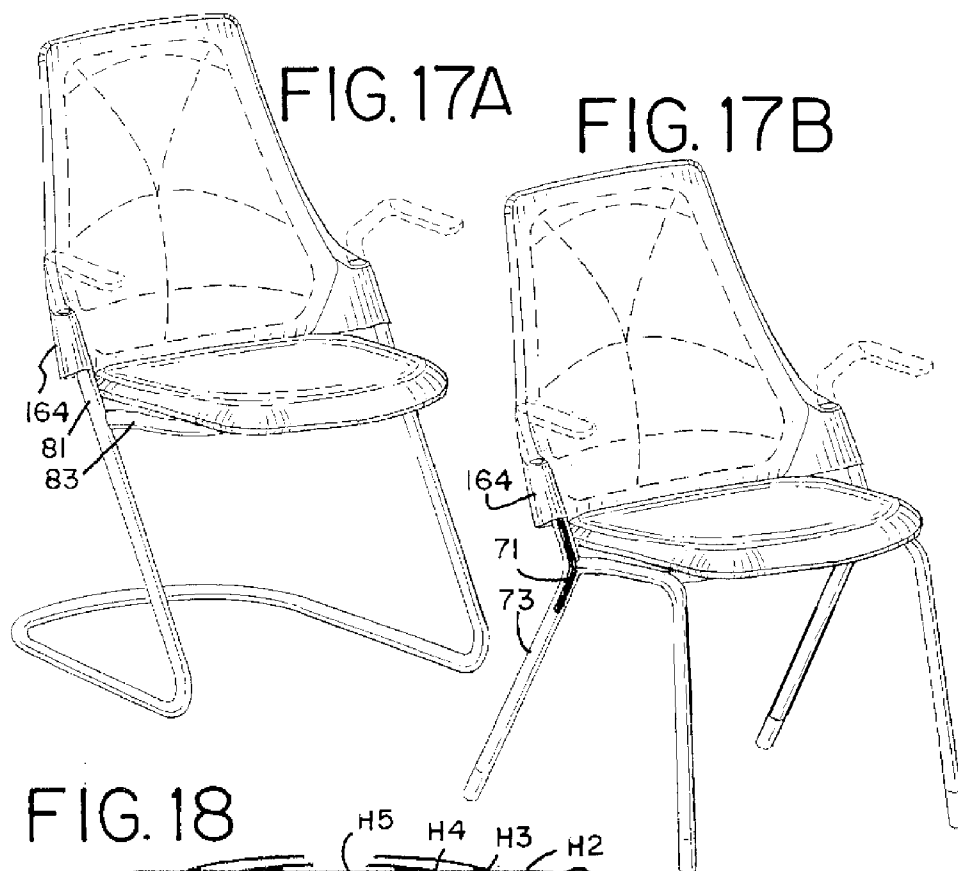


FIG. 19

HORIZONTAL

CROSS SECTION

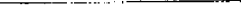
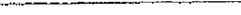
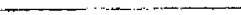
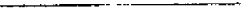
STRAND	INSIDE- OUTSIDE WIDTH	BRUSH	CENTER	ARM
H1	3.88mm-2.1mm		2.5 ◀	2.5 ◀
H2	3.88mm-2.1mm			
H3	3.88mm-2.1mm			
H4	3.88mm-2.1mm			
H5	3.88mm-2.1mm			
H6	3.88mm-2.5mm		3 ◀	2.5 ◀
H7	3.88mm-2.5mm			
H8	3.88mm-2.5mm			
H9	3.88mm-2.5mm			
H10	3.88mm-2.5mm			
H11	3.88mm-3.09mm		3.5 ◀	2.5 ◀
H12	3.88mm-3.09mm			
H13	3.88mm-3.2mm		3.5 ◀	2.5 ◀
H14	3.88mm-3.2mm			
H15	4.58mm-3.3mm		4 ◀	2.5 ◀
H16	5mm-3.3mm		4 ◀	2.5 ◀
H17	5.8mm-3.4mm		4 ◀	2.5 ◀
H18	7.4mm-3.4mm		4.5 ◀	2.5 ◀
H19	8.2mm-3.58mm		4.5 ◀	2.5 ◀
H20	8.6mm-3.7mm		4.5 ◀	2.5 ◀
H21	9mm-3.7mm		5 ◀	2.5 ◀
H22	9mm-3.7mm			
H23	9mm-3.7mm			
H24	9mm-3.7mm			
H25	7.4mm-3.42mm		4.5 ◀	2.5 ◀
H26	6.6mm-3.3mm		4.5 ◀	2.5 ◀
H27	6mm-3mm		4 ◀	2.5 ◀
H28	5mm-3mm		4 ◀	2.5 ◀
H29	4.2mm-3mm		4 ◀	2.5 ◀
H30	3.88mm-3mm		3.5 ◀	2.5 ◀
H31	3.88mm-3mm			
H32	3.88mm-3mm			
H33	3.88mm-3mm			
H34	3.88mm-3mm			
H35	3.88mm-3.48mm		3.5 ◀	2.5 ◀
H36	3.88mm-3.88mm			

FIG. 20

VERTICAL

STRAND	INSIDE- OUTSIDE WIDTH	BRUSH	CENTER	ARM
V0	4mm-2 mm		3 	3 -
V1	5mm-1.66mm		3 	3 -
V2	5.17mm-1.72mm		3 	3 -
V3	5.35mm-1.76mm		3 	3 -
V4	5.53mm-1.84mm		3 	3 -
V5	5.71mm-1.9mm		3 	3 -
V6	5.88mm-1.96mm		3 	3 -
V7	6.06mm-2mm		3 	3 -
V8	6.24mm-2mm		3 	3 -
V9	6.42mm-2.14mm		3 	3 -
V10	6.6mm-2.2mm		3 	3 -
V11	6.6mm-2.5mm		3 	3 -

CHAIR CONSTRUCTION AND METHOD THEREFORE

[0001] This application claims the benefit of U.S. Provisional Application No. 61/323,654, filed Apr. 13, 2010, the entire disclosure of which is hereby incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates generally to a chair, and in particular, to a chair construction, together with methods of use and assembly.

BACKGROUND

[0003] Chairs are often constructed using numerous fasteners, such as screws, rivets, nuts and bolts and the like. Assembly of the chair may be time consuming, requiring a technician to handle, position and manipulate multiple fasteners, components and various tools. In some instances, expensive tooling fixtures may be required to hold and situate the components relative to each other, such that the technician may then secure the components together. Moreover, the technician must locate the proper size and type of fastener for each joint being assembled. In addition, the fasteners must be located and removed at the end of the life cycle to allow for recycling of the components. Such actions may be time consuming and expensive.

SUMMARY

[0004] The present invention is defined by the following claims, and nothing in this section should be considered to be a limitation on those claims.

[0005] In one aspect, one embodiment of a chair includes a frame configured with at least one of a tab or a slot. The frame also is configured with at least one of an opening and/or a protuberance. A seat support is configured with at least one of the other of the tab or the slot, and with at least one of the other of the opening or the protuberance. The seat support is moveable between a first position, wherein the tab is disengaged from the slot and the protuberance is disengaged from the opening, and a second position, wherein the tab is engaged with the slot and the protuberance is received in the opening.

[0006] In another aspect, one embodiment of a method of assembling a chair includes positioning the seat support relative to the frame and thereby aligning the tab with the slot and the protuberance with the opening. The method further includes moving the seat support and frame relative to each other from a first position, wherein the tab is disengaged from the slot and the protuberance is disengaged from the opening, to a second position, wherein the tab is engaged with the slot and the protuberance is received in the opening.

[0007] In yet another aspect, one embodiment of a chair includes a frame and a seat support coupled to the frame. The seat support is slidable relative to the frame in a horizontal direction from a disengaged position to an engaged position. A seat member is coupled to the seat support. The seat member is slidable relative to the seat support in a horizontal direction from a disengaged position to an engaged position.

[0008] In yet another aspect, one embodiment of a method of assembling a chair includes sliding a seat support relative to a frame in a horizontal direction from a disengaged position to an engaged position, immobilizing the seat support relative

to the frame in the engaged position, sliding a seat member relative to the seat support in a horizontal direction from a disengaged position to an engaged position, and immobilizing the seat member relative to the seat support in the engaged position.

[0009] In yet another aspect, a backrest for a chair includes a first insert member having at least one resilient tab member and a second insert member having at least one catch member. A frame is sandwiched between the first and second insert members. At least one opening is aligned with the tab member and the catch member, with the tab member being engaged with the catch member through the opening such that the first and second inserts are coupled together with the frame sandwiched therebetween.

[0010] The various embodiments of the chair and method for assembly provide significant advantages over other seating structures. For example and without limitation, the chair may be assembled quickly and easily with minimal parts, and without the need for tooling fixtures. Specifically, the seat may be assembled and secured to the frame in a matter of seconds without tools through the simple sliding engagement of the seat support to the frame and the seat member to the seat support. Indeed, in one embodiment, only a pair of fasteners are used to complete the entire assembly, thereby minimizing the risk of losing parts and requiring the manipulation of multiple tools. Likewise, the backrest and armrests (or plugs) may be quickly and easily assembled without separate fasteners. Moreover, in one embodiment, the backrest frame can be easily covered and sandwiched by the insert members simply by engaging mating tab/catch members. Indeed, the entire chair may be assembled without any separate fasteners, and in an alternative embodiment with only a pair of separate fasteners. In addition, the chair may be easily disassembled at the end of its life cycle to facilitate the separation and recycling of the various components.

[0011] The foregoing paragraphs have been provided by way of general introduction, and are not intended to limit the scope of the following claims. The various preferred embodiments, together with further advantages, will be best understood by reference to the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a perspective, exploded view of various alternative chair constructions.

[0013] FIG. 2 is a perspective view of an upholstered backrest configuration.

[0014] FIG. 3 is a cross-sectional view of an upper portion of the backrest shown in FIG. 2.

[0015] FIG. 4 is a perspective view of a flexible backrest configuration including a peripheral frame.

[0016] FIG. 5 is a cross-sectional view of a connection between a frame and a flexible member.

[0017] FIG. 6 is a side view of one embodiment of the chair.

[0018] FIG. 7 is a partial, exploded, bottom perspective view of one embodiment of the frame, seat support and seat member.

[0019] FIG. 8 is a partial, exploded, top perspective view of the frame and seat support.

[0020] FIG. 9 is a partial, exploded, front perspective view of one embodiment of the frame, seat support and seat member.

[0021] FIG. 10A is a longitudinal cross-sectional view through one embodiment of the interface between the frame cross member and the seat support.

[0022] FIG. 10B is a longitudinal cross-sectional view through one embodiment of the tab and slot interface of the frame and seat support.

[0023] FIG. 11 is a lateral cross-sectional view through one embodiment of the tab, frame and seat support.

[0024] FIG. 12 is a partial exploded view showing one embodiment of the interface between the seat support and seat member.

[0025] FIG. 13 is a partial view of one embodiment of the interface between the seat support and seat member.

[0026] FIG. 14A is a longitudinal cross-sectional view through one embodiment of the frame, seat support and seat member.

[0027] FIG. 14B shows enlarged portions of the longitudinal cross-sectional view shown in FIG. 14A.

[0028] FIG. 15 is a partial, bottom perspective view of one embodiment of the interface between the frame and backrest.

[0029] FIG. 16 is a cross-sectional view of one embodiment of the interface between the frame, backrest and insert member.

[0030] FIG. 17A is a perspective view of one embodiment of a chair.

[0031] FIG. 17B is a perspective view of another embodiment of a chair.

[0032] FIG. 18 is a front view of one embodiment of a backrest member showing various bands.

[0033] FIG. 19 is a table with diagrams showing the various band properties for the laterally extending bands shown in FIG. 18.

[0034] FIG. 20 is a table with diagrams showing the various band properties for the diagonal/vertical bands shown in FIG. 18.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

[0035] It should be understood that the term “plurality,” as used herein, means two or more. The term “longitudinal,” as used herein means of or relating to length or the lengthwise direction, and in general corresponds to a direction running between a front and back or top to bottom, for example from a front of a seat to a back thereof, or from a bottom of a backrest to the top thereof, and vice versa. The term “lateral,” as used herein, means situated on, directed toward or running from side to side. The term “coupled” means connected to or engaged with whether directly or indirectly, for example with an intervening member, and does not require the engagement to be fixed or permanent, although it may be fixed or permanent. The terms “first,” “second,” and so on, as used herein are not meant to be assigned to a particular component so designated, but rather are simply referring to such components in the numerical order as addressed, meaning that a component designated as “first” may later be a “second” such component, depending on the order in which it is referred. It should also be understood that designation of “first” and “second” does not necessarily mean that the two components or values so designated are different, meaning for example a first direction

may be the same as a second direction, with each simply being applicable to different components.

Support Frame and Seat:

[0036] Referring to FIGS. 1 and 6-9, a seating structure is shown. The seating structure is configured as a chair, and includes a seat 2, a backrest 4 and a base 6. In one embodiment, the base includes a frame 56 having a pair of side members 8, each configured with a longitudinally extending side support 10 and front and rear legs 14, 12. The side members are connected with a cross member 16. Each of the side members has a post 58 extending upwardly and rearwardly from the rear leg. The posts are coupled to the backrest 4. Each of the side members 8 is formed from a tubular structure, shown as having a circular cross section, although it should be understood that other shapes and configurations would also be suitable. Glides 16 or casters are mounted to the bottom of the legs, with an insert portion 18 of the glide being disposed in the legs 14, 12. In alternative embodiments, the frame may be configured as a sled base, or be supported by a pedestal base.

[0037] The seat includes a seat support 20, configured as a seat pan in one embodiment, and a seat member 22. The seat member 22 may be configured as a shell 24 covered with a layer of foam 26 and upholstery 28. In other embodiments, an upper surface of the shell may be exposed, or may have an opening, with a suspension material stretched across the opening. The seat support may be made of various materials, including for example and without limitation a glass filled nylon. The seat member shell may be made of polypropylene.

[0038] Referring to FIGS. 7-11, the seat support 20 includes a longitudinally extending slot 30 formed along each side thereof, with the slot having a mouth 32 at a forward end thereof, and a stop 34 formed at a rear end thereof. Each of the side frame members 8 includes an insert member 36, configured in one embodiment as a tab member extending laterally inwardly. The tab members 36 may include a mounting flange 38, which is coupled to the frame by welding, adhesives, fasteners (such as screws or rivets), and other suitable known attachment devices, and/or combinations thereof. The tab has an opening 40 therethrough, configured as a slot in one embodiment. The tab members 36 have a thickness and length shaped to mate with one of the slots 30 formed in the side of the seat support 20. It should be understood that, in an alternative embodiment, the slot may be formed in the side of the frame member, with the tab extending laterally from the seat support, or some combination thereof.

[0039] The seat support 20 further includes a plurality of insert members 42, configured as two protuberances or tabs, extending longitudinally forwardly from a front portion 46 of the seat support. The frame cross member 16 is configured with a corresponding plurality of openings 44 shaped and positioned to receive the protuberances 42. It should be understood that the seat support may be configured with a plurality of openings, and the cross member configured with a plurality of tabs, or with each configured with some combination thereof. It also should be understood that the cross member may be positioned adjacent a rear portion of the seat support, or some intermediate location.

[0040] In operation, the seat support 20 is positioned in a disengaged position relative to the frame, with the tabs 36 aligned and positioned adjacent the mouths 32 of the slots 30. The seat support 20 is then slid forwardly in a horizontal direction with the tabs 36 sliding in the slots 30. It should be

understood that the tab members 36, slots 30, protuberances 42 and openings 44 may be positioned and oriented such that the seat support is slid rearwardly relative to the frame from the disengaged to the engaged position, for example when a cross member is positioned at a rear portion of the frame.

[0041] It should be understood that movement in the horizontal direction has a horizontal vector component, but may also include some movement in the vertical direction. Eventually, the seat support 20 is slid forwardly until the protuberances 42 are aligned with the openings 44. The seat support 20 is then slid to an engaged position, with the protuberances 42 inserted in the openings 44, and with the tabs 36 engaging the stop member 34. A lock member 48, shown as a fastener, is then inserted through the seat support and through the opening in the tab member, so as to fix or immobilize the seat support relative to the frame. The fastener may be a threaded fastener, such as a screw. However, it should be understood that the lock member may be integrally formed on the seat, for example as a resilient tab member, or may be a pin that can be inserted by hand, with a catch portion securing it with a snap fit. The load placed by the user on the seat support 20 is carried by and transferred directly to the frame 56 as shown in FIG. 11, with the bottom of the seat support bearing on the frame side support 10. The tab 36 interface with the seat support 20, including the lock member, prevents the seat from being lifted off of the frame, or from moving forwardly or rearwardly relative thereto.

[0042] The seat member 22, and in particular the shell 24, is configured with a plurality of catch members 50, shown in one embodiment as six. The catch members may be configured as loops in one embodiment. The seat support is configured with a corresponding number of insert members 52, with some of the insert members disposed in openings 54, and extending forwardly from a front portion 46 of the seat support, and with some of the insert members 52 extending forwardly from a rear portion 56 of the seat support. It should be understood that the seat member may be configured with insert members, and the seat member configured with catch members, or with both members configured with some combination of each.

[0043] In operation, the seat member 22 is positioned in a disengaged position relative to the seat support 20, with the insert members 52 aligned and positioned adjacent the catch members 50. The seat member 22 is then slid rearwardly in a horizontal direction with the insert members 52 sliding into the catch members 50. Eventually, the seat member 22 is slid rearwardly until the seat member snaps into an engaged position relative to the seat support 20. In this configuration, one or both of the insert member and catch member may be provided with interfacing snap-fit components, such as lips, or the front and rear portions of the seat member may snap into engagement with corresponding front and rear edges of the seat support as shown in FIG. 14. It should be understood that the insert members and catch members may be positioned and oriented such that the seat member is slid rearwardly relative to the seat support.

Backrest, Armrests and Plugs:

[0044] The backrest member 4 may be configured in many different arrangements and materials. In all of the embodiments shown in FIGS. 1-5, the backrest members 4 include a mounting portion 164 formed at the junction of side and bottom edges. In one embodiment, the mounting portions 164

are the only interface and support for the backrest to the frame 56. Of course, other support structures may be used in other embodiments.

[0045] The mounting portion 164 has an opening 302, with a bottom 304 and top 300 thereof. The frame posts 58 are inserted through a bottom of the opening. An insert member, which may be configured as either an armrests 61 or a plug 64, each having an insert portion 57 is inserted through a top 300 of the opening and into one of the posts 58 to complete the assembly. The plug has a cap portion 69 that mates with and matches the contour of the mounting portion. Alternatively, the insert member may have an opening, with the post being inserted into the insert member.

[0046] In one embodiment, the backrest member 6 and insert members 61, 64 are slid downwardly relative to the frame post 58, and the insert member is slid downwardly relative to the backrest member 6, from a disengaged position to an engaged position. The upper portion 71 of each post is configured with a polygonal, or non-circular cross-sectional shape that mates with a corresponding shape of the opening 302 formed through the mounting portion 164, such that the mounting portions 164 and/or insert member 61, 64 are non-rotatably fixed relative to the post member 58. In one embodiment, there are two features that prevent rotation. The first is the shape (e.g., hexagon) formed in the injection molded backrest member. That shape will mate with and provide a tight fit to the arm, which has a corresponding shape to prevent looseness of the arm. The second is the hexagon shape of the metal frame. This is a looser fit. When the arms are loaded heavily, the arms and back will deform and the arm load will be transferred to the hex tube 71 in the base. A lower portion of the post 58 is configured as a round tube 73, which is sized and shaped to match the other portions of the frame. The upper portion, which has an outermost cross-sectional periphery shaped to be received in the tube 73, may be welded, bonded or otherwise affixed to the lower portion. In one embodiment, shown in FIG. 17A, a sled base includes a hex tube 71 that is plug welded to the outer tube 81, with joint then covered by the cross tube 83. In the embodiment shown in FIG. 17B, the hex tube 71 is bent along with the outer tube 73 that prevents relative rotation therebetween, and may not need to be welded, bonded, or otherwise affixed to the lower portion, but may be in various suitable embodiments.

[0047] The mounting portion 164 of the backrest 4 has a cavity 308 formed on a bottom thereof. A lock member 310, including a retainer pin 312, is coupled to the mounting portion, with a grippable portion 320 exposed and accessible to the user in the cavity. In one embodiment, the lock member is formed from a resilient wire, with an upstanding leg 314 inserted in and engaging the mounting portion, and with first, second, third and fourth loops 316, 318, 320, 322, terminating in a horizontally extending leg 334. The fourth loop 322 forms a slot 324, which can be engaged by a tool, such as a screw driver, to bias the leg 334 to a disengaged position. The post, including the lower portion 73 and upper portion 71, and insert portion 57 each have openings 330, 332, 336 formed therein, which when aligned in an assembled position, are engaged by the leg 334 of the retainer pin 312 in an engaged position so as to lock the insert member 61, 64 and backrest 4 to the post 58. To disassemble either or both of the backrest 4 and insert member (plug or arm) 61, 64, for example to replace a plug with an armrest or vice versa, the retainer member 312 is biased to a disengaged position, with the insert

member and backrest then being removed and/or replaced with another or the same insert member and/or backrest member.

[0048] Referring to FIG. 1, in one embodiment, the backrest member 160 is simply made of a rigid plastic material, for example and without limitation glass-filled nylon, but with a shape similar to that shown in the other embodiments, namely a curved lower edge 194 longer than an upper edge 196, with a middle portion of the curved edge positioned below ends thereof, forwardly and downwardly extending side edges 198, a forwardly facing concave shape taken along a vertical centerline, and a forwardly facing convex shape extending laterally in the lumbar region. The backrest member 160 may have openings 162 formed therethrough to provide air circulation and improved aesthetics.

[0049] In another embodiment, shown in FIGS. 1-3, the backrest member includes a shell 170 coupled to front and rear inserts 172, 174. A layer of foam 176 covers the front, with fabric 178, 180 then covering the foam and the rear insert. A peripheral edge 182 of the shell remains exposed. The inserts each include a plurality of resilient tab members 184, 186, or catch members, that extend through openings 188 formed in the shell 170. The resilient tab members (catch members) 184, 186 are engaged with a snap fit to complete the assembly, sandwiching the shell 170 between the inserts. In one embodiment, the frame is provided with flange members that are engaged by and locate the insert members, such that the insert members and frame are not moveable relative to each other laterally or longitudinally. In one embodiment, the tab/catch members are the only components securing the insert members to the frame sandwiched therebetween. The front fabric layer 178 covers the foam layer 176 and has an edge portion 190 that extends into a spaced formed between the shell 170 and the front insert 172. Likewise, the rear fabric layer 180 has an edge portion 192 that extends into a spaced formed between the rear insert 174 and the shell 170. In one embodiment, the fabric may be stapled to the inserts, while in other embodiments, they may be glued. Again, the backrest assembly has a shape similar to that shown in the other embodiments, but with the mounting portion 200 at the junction of the side and bottom edges being the sole mounting portion, such that the curved support and upper supports may be eliminated. The mounting portion 163 engages a post 58, or other like support structure.

[0050] In yet another embodiment, shown in FIGS. 1 and 4-5, a peripheral frame 202 is provided that forms a central opening 204, and which has a channel 206 formed around a forwardly facing periphery thereof. A flexible member 208, is provided with a peripheral edge portion 210. A retainer 212 includes an edge portion 213 that engages the edge portion 210 of the flexible member and holds the flexible member in and against the frame channel 206. Fasteners 214, such as screws, tabs, snap-fit, etc. couple the retainer 212 to the frame 202, with the flexible member 208 disposed and trapped therebetween. Again, the backrest assembly has a shape similar to that shown in the other embodiments, but with the mounting portion 164 at the junction of the side and bottom edges being the sole mounting portion, such that the curved support and upper supports may be eliminated. The mounting portion engages a post, or other like support structure.

[0051] In the embodiment shown in FIGS. 1 and 4-5, the backrest member is made of a flexible elastomeric material, for example and without limitation an elastomeric copolyester, e.g., Amitel, or an elastomeric urethane. The backrest

member has a thickness between about 2.5 mm and 4.5 mm. The member can be configured with a plurality of openings formed therethrough, or thought of as a series of intersecting straps or bands that extend laterally (horizontally) and longitudinally (diagonally and vertically). The horizontal and vertical straps have different typical cross-sections. For example, the horizontal straps have a triangular cross section with the "top point" of the triangle facing the rear of the chair. The vertical straps are oval.

[0052] Referring to FIGS. 18-20, the height and thickness of a strand or band of material may vary, for example inversely such that the strand may appear to be thinner at the laterally aspects of the backrest, yet have approximately the same cross-section area. In various embodiments, any of the laterally or vertically/diagonally extending bands may vary in cross sectional area to create zones of higher stiffness. Referring to FIGS. 18 and 19, lateral bands H1-H36 are sequentially called out from the upper, outer corners to the bottom of the backrest, with various cross-sectional shapes and areas shown. Likewise, referring to FIGS. 18 and 20, diagonal/vertical bands V0-V11 are sequentially called out from an outermost lateral position (V1) moving inwardly, with a pair of V11 strands converging to form a single band along a centerline position at the bottom portion of the backrest member. Additional upper diagonal bands also converge at intersecting laterally bands as shown. The band or strand may be thickened in areas in which increased support (stiffness) is desired. For example, supporting the user at the core (near the centerline of the back) may be desirable, thus 'islands' of thicker strands or bands may be utilized to give increased support in the sacral, lumbar, and thoracic areas along the centerline of the backrest. This will increase the bending stiffness in that area. In various embodiments, the backrest member may be molded with a three-dimensional shape even when free of any tension or constraints, or may be molded or formed as a flat member, with the three-dimensional shape being introduced by way of the tension and connections to the support structure.

[0053] The elastomeric material may be oriented, for example by compression or stretching, to provide the backrest member with different load bearing characteristics in different directions. In other embodiments, the material is not oriented. Various oriented elastomeric materials and methods of making components from such materials are disclosed in U.S. Publication 2006, 0267258A1, published Nov. 30, 2006 and U.S. Publication 2006/0286359 A1, published Dec. 21, 2006, the entire disclosures of which are hereby incorporated herein by reference. The backrest member may alternatively be made of a fabric, or of an elastomeric membrane, for example as a woven membrane as disclosed in U.S. Pat. No. 6,059,368, the entire disclosure of which is hereby incorporated herein by reference.

[0054] In one embodiment, the backrest member has an upper portion with an upper edge 86, opposite side edges 90 and a lower edge 88. The upper edge 86 is shorter than the lower edge 88. The lower edge 88 has end portions 92 that are positioned forwardly of the upper edge 86, with the side edges 90 extending downwardly and forwardly from the upper edge 86 to the lower edge 88. The lower edge 88 has a forwardly facing concave shape, which mates with the curved bottom support 64 on the frame. A middle portion 94 of the lower edge is positioned rearwardly of the upper edge 86, and beneath an upper support surface of the seat member 22 and behind a rear portion of the seat 2. In

this way, and due to the curvature, length and positioning of the lower edge **86**, the lower edge has end portions **92** positioned in front of the upper edge **86** and a middle portion **94** positioned rearwardly of the upper edge **86** when the backrest is in a normal, upright position.

[0055] Further aspects of the backrest are disclosed in a U.S. Provisional Application (Attorney Docket No. 3591-1816) entitled SEATING STRUCTURE WITH A CONTOURED FLEXIBLE BACKREST and filed the same day as the present application, with the entire disclosure thereof hereby being incorporated herein in its entirety.

[0056] Although the present invention has been described with reference to preferred embodiments, those skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention. As such, it is intended that the foregoing detailed description be regarded as illustrative rather than limiting and that it is the appended claims, including all equivalents thereof, which are intended to define the scope of the invention.

1. A chair comprising:

a frame comprising one of a tab extending in a first direction or a slot extending in a second direction perpendicular to said first direction and one of an opening or a protuberance formed thereon, said opening facing said second direction and said protuberance extending in said second direction; and

a seat support having the other of said tab or said slot and the other of said opening or said protuberance, wherein said seat support is moveable in said second direction between a first position, wherein said tab is disengaged from said slot and said protuberance is disengaged from said opening, and a second position, wherein said tab is engaged with said slot and said protuberance is received in said opening.

2. The chair of claim **1** wherein said seat support is further moveable to a third position between said first and second positions, wherein said tab is engaged with said slot and said protuberance is disengaged with said opening.

3. The chair of claim **1** wherein said seat support is locked to said frame when said seat support is in said second position.

4. The chair of claim **3** further comprising a lock member inserted through said tab and engaging the other of said frame or said seat support defining said slot.

5. The chair of claim **1** wherein said frame comprises a pair of laterally spaced and longitudinally extending side frame members coupled to a laterally extending cross member, wherein said tab is connected to and extends laterally inwardly from one of said side frame members and said seat support comprises said slot, and wherein said cross member comprises said one of said opening or said protuberance.

6. The chair of claim **5** wherein said cross member comprises a plurality of said openings and said seat support comprises a plurality of said protuberances.

7. The chair of claim **1** further comprising a seat member coupled to said seat support.

8. The chair of claim **7** wherein one of said seat member and said seat support comprises an insert member, and the other of said seat member and said seat support comprises a catch member, wherein said seat member is moveable relative to said seat support from a first position, wherein said insert

member is disengaged from said catch member, to a second position, wherein said insert member is engaged with said catch member.

9. The chair of claim **8** wherein said frame comprises an upwardly extending post, and further comprising a backrest having a mounting portion with an opening formed therein, wherein said post is disposed in a bottom of said opening formed in said mounting portion, and further comprising an insert member disposed through a top of said opening formed in said mounting portion, wherein said insert member is engaged with said post, and further comprising a lock member disposed through said mounting portion, said post and said insert member.

10. The chair of claim **9** wherein said insert member comprises one of an armrest or a plug.

11. The chair of claim **9** wherein said lock member comprises a releasable retainer pin moveably mounted to said backrest, wherein said retainer pin is accessible through an opening formed in the bottom of said mounting portion, and is moveable between a lock position, wherein said retainer pin is engaged with said post and said insert member, and an unlocked position, wherein said retainer pin member is disengaged with said post and said insert member.

12. A method of assembling a chair comprising:

providing a frame comprising one of a tab or a slot and a cross member comprising one of an opening or a protuberance formed thereon;

providing a seat support having the other of said tab or said slot and the other of said opening or said protuberance; positioning said seat support relative to said frame and thereby aligning said tab with said slot and said protuberance with said opening; and

moving said seat support and said frame relative to each other from a first position, wherein said tab is disengaged from said slot and said protuberance is disengaged from said opening, to a second position, wherein said tab is engaged with said slot and said protuberance is received in said opening.

13. The method of claim **12** wherein said moving said seat support and said frame relative to each other from said first position to said second position comprises moving said seat support and said frame relative to each other from said first position to a third position, wherein said tab is engaged with said slot and said protuberance is disengaged with said opening, and then moving said seat support and said frame relative to each other from said third position to said second position.

14. The method of claim **12** further comprising locking said seat support to said frame when said seat support is in said second position.

15. The method of claim **14** wherein locking said seat support to said frame comprises inserting a lock member through said tab and engaging the other of said frame or said seat support defining said slot.

16. The method of claim **12** wherein said frame comprises a longitudinally extending side frame member coupled to said cross member, wherein said tab is connected to and extends laterally inwardly from said side frame member.

17. The method of claim **12** further comprising coupling a seat member to said seat support.

18. The method of claim **17** wherein one of said seat member and said seat support comprises an insert member, and the other of said seat member and said seat support comprises a catch member, and wherein said coupling said seat member to said seat support comprises moving said seat member relative

to said seat support from a first position, wherein said insert member is disengaged from said catch member, to a second position, wherein said insert member is engaged with said catch member.

19. The method of claim **18** wherein said frame comprises an upwardly extending post, and further comprising providing a backrest having a mounting portion with an opening formed therein, disposing said post in a bottom of said opening formed in said mounting portion, disposing an insert member through a top of said opening formed in said mounting portion, engaging said insert member with said post, and locking said mounting portion and said insert member to said post.

20. The method of claim **19** wherein said locking said mounting portion and said insert member to said post comprises moving a lock member coupled to said backrest from a unlocked position, wherein said lock member is disengaged from said post and said insert member, to a locked position, wherein said lock member is engaged with said post and said insert member.

21. A method of assembling a chair comprising:

sliding a seat support relative to a frame in a horizontal direction from a disengaged position to an engaged position;

immobilizing said seat support relative to said frame in said engaged position;

sliding a seat member relative to said seat support in a horizontal direction from a disengaged position to an engaged position; and

immobilizing said seat member relative to said seat support in said engaged position.

22. The method of claim **21** further comprising sliding a backrest relative to a frame in a downward direction from a

disengaged position to an engaged position, and immobilizing said backrest relative to said frame in said engaged position.

23. The method of claim **22** further comprising sliding an insert member relative to said backrest and said frame from a disengaged position to an engaged position, and immobilizing said insert member.

24. The method of claim **23** wherein said immobilizing said backrest and said immobilizing said insert member are performed simultaneously.

25. A chair comprising:

a frame;

a seat support coupled to said frame, wherein said seat support is slidable relative to said frame in a horizontal direction from a disengaged position to an engaged position; and

a seat member coupled to said seat support, wherein said seat member is slidable relative to said seat support in a horizontal direction from a disengaged position to an engaged position.

26. The chair of claim **25** further comprising a backrest coupled to said frame, wherein said backrest is slidable relative to said frame in a downward direction from a disengaged position to an engaged position.

27. The chair of claim **26** further comprising an insert member coupled to said frame, wherein said insert member is slidable through an opening formed in said backrest relative to said frame in a downward direction from a disengaged position to an engaged position.

28-33. (canceled)

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