

## **PLAYARD WITH COMPACT FOLDED CONFIGURATION AND STORAGE LATCH**

### **CROSS-REFERENCE TO RELATED APPLICATIONS**

**[0001]** This application claims a priority benefit to U.S. Provisional Application No. 62/979,728, filed on February 21, 2020, entitled, “X-Frame Playard with Offset Frame Members.” The aforementioned application is incorporated by reference herein in its entirety.

### **BACKGROUND**

**[0002]** A playard (also referred to herein as a “playpen” or a “game bed”) is a framed enclosure that provides a safe and comfortable space for a young child (e.g., an infant, a toddler) to sleep and play without significant supervision from a caregiver. The playard typically includes a support structure (e.g., a frame) that outlines an interior space of the playard; the playard also includes soft padding (also referred to herein as “soft goods”) placed within the interior space to provide a partially enclosed cushioned space to contain the child. Playards are generally foldable and/or collapsible to improve portability. For example, the caregiver may fold the playard for storage and/or transport and unfold the playard for use. Various types of playards have been manufactured and commercialized over the years with designs that have evolved, in part, depending on whether the playard is used primarily in outdoor settings or indoor settings.

**[0003]** FIG. 1A shows one example of a conventional outdoor playard 10a in an unfolded configuration. As shown, the playard 10a includes a frame 46 with multiple X-frame assemblies 20a that outline an interior space 11. Each X-frame assembly 20a includes X-frame tubes 22a and 22b that form a crossing pattern. In this example, the X-frame assemblies 20a are pivot-only X-frame assemblies where the X-frame tubes 22a and 22b are only rotatably coupled to each other and to other X-frame tubes to such that the frame 46 is foldable. As shown in the exploded-view inset in FIG. 1A, the playard 10a is provided with a latch 16 that attaches to the X-frame tubes 22a and 22b to lock the X-frame assemblies 20a in place when unfolded. Soft goods 12 are attached to the X-frame assemblies 20a and disposed along the sides and the floor of the interior space 11 for providing a partially enclosed space 13 for the child that is shaped and/or dimensioned to be similar to or smaller than the interior space 11 of the frame 46. As shown, the soft goods 12 includes webbing 14 along a top edge of the partially enclosed space 13 that functions as a top rail to

increase the mechanical rigidity and stability of the playard 10a when the playard 10a is deployed. FIG. 1A also shows the playard 10a includes a canopy cover 40 disposed above the partially enclosed space 13 and mounted to the X-frame assemblies 20a to provide shade for a child.

**[0004]** FIG. 1B shows another example of a conventional outdoor playard 10b. As shown, the playard 10b includes a frame 46 with multiple pivot and slidable X-frame assemblies 20b coupled to adjoining leg support assemblies 24. Each leg support assembly 24 includes a leg tube 25, a corner (hidden beneath the soft goods 12) at the top of the leg tube 25, and a slider 26a or 26b that slides along the leg tube 25. The X-frame tubes 22a and 22b of each X-frame assembly 20 are coupled to respective sliders 26a and/or 26b and corners of the leg support assemblies 24. Thus, when the playard 10b is being folded or unfolded, the X-frame tubes 22a and 22b undergo both rotation and displacement along the leg tubes 25 via the sliders 26a and/or 26b. Compared to the pivot-only X-frame assemblies 20a of the playard 10a, the pivot and slidable X-frame assemblies 20b of the playard 10b enable the playard 10b to be folded more compactly thus occupying less space in a folded configuration; additionally, the pivot and slidable X-frame assemblies 20b allow the frame 46 to provide a larger interior space 11 and, hence, a larger partially enclosed space 13 for a child when the playard 10b is in an unfolded configuration.

**[0005]** As before, the soft goods 12 may be attached to the leg support assemblies 24 and/or the X-frame assemblies 20b. The playard 10b also includes a pair of latches 16a and 16b respectively mounted to sliders 26b on leg support assemblies 24 disposed on opposing sides of the playard 10b. As shown in the inset of FIG. 1B, the sliders 26b are different from the sliders 26a due to including features to lock the latches 16a and 16b. The playard 10b also includes a canopy cover 40 disposed above the partially enclosed space 13 and mounted to the corners of the leg support assemblies 24.

**[0006]** FIG. 1C shows an example of a conventional indoor playard 10c. As shown, the playard 10c includes a frame 46 formed from multiple legs 30 and rigid top rails 32 to provide a rigid frame supporting soft goods 12. The frame 46 also includes a bottom support structure 34 so that the floor of the partially enclosed space 13 defined by the soft goods 12 is suspended off the ground. Compared to the outdoor playards 10a and 10b, the indoor playard 10c does not include X-frame assemblies to facilitate folding and/or unfolding. Instead, the top rails 32 are coupled to a hinge 36, which allows the playard 10c to be collapsed into a smaller form as shown in FIG. 1D.

Additionally, the bottom support structure 34 is also foldable. Thus, to fold the playard 10c, the caregiver needs to first remove some of the soft goods 12, pull up a bottom hub to fold the bottom support structure 34 (step 'A' in FIG. 1D), and then unlock and fold the top rails 32 (step 'B' in FIG. 1D). The caregiver needs to perform these steps in reverse to setup the playard 10c.

**[0007]** FIG. 1C also shows the playard 10c includes a bassinet accessory 60 disposed within the partially enclosed space 13 to provide an elevated surface above the ground to support the child. The elevated surface may reduce the physical strain experienced by a caregiver when placing their child into the playard 10c and/or when taking their child out of the playard 10c by providing a more accessible and easier to reach space compared to the bottom of the playard 10c. The elevated surface of the bassinet accessory 60 also allows the caregiver to more easily monitor their child as well. Conventional bassinet accessories are typically configured to support infants and/or children weighing less than 15 lbs.

#### SUMMARY

**[0008]** The Inventors have recognized and appreciated that a foldable playard provides a caregiver a convenient and safe space for their child to play and/or sleep once the playard is setup, which alleviates the caregiver from having to continuously monitor their child. However, the Inventors have also recognized that conventional playards in some instances may be cumbersome to setup and/or stow away due, in part, to complicated mechanisms for folding, unfolding, latching and/or unlatching the playard (and correspondingly protracted procedures that the caregiver needs to perform while generally caring for their child). The complexity of conventional playards also results in a bulkier product, which is more difficult to handle and more expensive to manufacture and purchase as a consumer.

**[0009]** First, the Inventors have observed that conventional playards typically include various support structures, in addition to their frames, to provide more rigid boundaries outlining the interior space, so as to better contain the child and/or to increase the mechanical rigidity and stability of the frame. In many instances, one or more additional support structures are added to the frame of a conventional playard to ensure the playard meets various consumer safety standards related to the mechanical properties of the frame (e.g., American Society for Testing and Materials (ASTM) F406-19 entitled, "Standard Consumer Safety Specification for Non-Full-Size Baby Cribs/Play Yards").

**[0010]** With reference again to FIG. 1A and FIG. 1B, as noted above the respective frames 46 of the playards 10a and 10b include X-frame assemblies 20a and 20b to facilitate folding and/or unfolding of the frames 46. When unfolded, the X-frame assemblies 20a and 20b are disposed along the respective sides of the frames 46, thus providing a mechanically rigid and stable structure.

**[0011]** However, FIG. 1A shows the X-frame tubes 22a and 22b of the X-frame assembly 20a in the playard 10a, when unfolded, span the sides of the frame 46; this results in a top portion 47 of the interior space 11 above the X-frame assembly 20a that is not mechanically supported by the frame 46. If flexible, compliant soft goods 12 are placed over the frame 46 as shown in FIG. 1A, a child could potentially climb out of the playard 10a through the top portion 47 by folding and/or collapsing the soft goods. In view of the foregoing, as an additional support structure, the soft goods 12 includes an integrated webbing 14 that is pulled taut when the frame 46 is unfolded such that the webbing 14 mechanically functions as a top rail. In this manner, the webbing 14 provides a more rigid boundary spanning the top portions 47 of the interior space 11 to support the soft goods and to better keep the child within the playard 10a.

**[0012]** FIG. 1B similarly shows that the X-frame tubes 22a and 22b of the X-frame assembly 20b in the playard 10b, when unfolded, do not mechanically support the top portions 47 of the interior space 11 above the X-frame tubes 22a and 22b. Thus, similar to the playard 10a, the playard 10b includes webbing 14 that is directly coupled to the leg support assemblies 24 as an additional support structure. When the frame 46 of the playard 10b is unfolded, the webbing 14 is once again pulled taut to form a top rail and thereby provide a more rigid boundary spanning the top portions 47 of the interior space. It should be appreciated that without the webbing 14, the playards 10a and 10b are unlikely to comply with various consumer safety standards, such as ASTM F406-19.

**[0013]** As noted above in connection with FIG. 1C, the playard 10c includes rigid top rails 32 that connect adjacent legs 30. In this manner, the frame 46 of the playard 10c provides mechanical support structures that span the top and side boundaries of the interior space 11. However, a frame that only has vertical or nearly vertical legs and top rails is often prone to mechanical instability. For example, the frame may tilt to one side due to the bottom portion of the legs being mechanically unconstrained and/or due to backlash or slop between the joints connecting the rails and the legs together. This mechanical instability may be further exacerbated if the legs and the

rails are configured to move relative to one another, e.g., to facilitate folding of the playard. Given this mechanical instability, to reinforce the frame 46 the playard 10c includes an additional bottom support structure 34 that connects the legs 30 located at opposing corners of the frame 46.

**[0014]** The various support structures added to conventional playards as discussed above, and the various modifications made to the playards to accommodate these support structures, increase the complexity, number of parts, and cost of these playards.

**[0015]** For instance, the webbing 14 for the playards 10a and 10b needs to be sewn directly into the soft goods 12 or the X-frame assemblies 20a and 20b, and/or the leg support assemblies 24 need to incorporate additional structural features to directly attach to the soft webbing 14 - both of which increase design complexity resulting in higher manufacturing costs. For the playard 10c, the rigid top rails 36 and the bottom support structure 34 need to include additional mechanisms (e.g., the hinge 36, hinges connecting the various members of the bottom support structure 34) to facilitate tear down and folding of the playard 10c, which increase the number of parts for manufacture and assembly. As shown in FIG. 1D, these additional mechanisms also make it more difficult for the caregiver to setup and tear down the playard 10c by adding additional steps (e.g., steps 'A' and 'B'). In particular, the playard 10c is especially difficult to unfold since the playard 10c tends to tip over and/or partially collapse when partially unfolded.

**[0016]** The Inventors have also recognized that conventional playards often include frames with folding mechanisms tailored to improve the ease of folding and/or unfolding the frame at the expense of creating potential new safety hazards for the child.

**[0017]** For example, the playards 10a and 10b include X-frame assemblies 20a and 20b, respectively, which makes folding and/or unfolding the respective frames 46 appreciably easier for the caregiver. However, the X-frame tubes 22a and 22b and/or the leg tubes 25 form V-shaped and/or diamond-shaped openings, which can change in shape and/or size when the X-frame tubes 22a and 22b and the leg tubes 25 move relative to one another, thus creating a scissoring, shearing, and/or pinching hazard that can result in the entrapment of the child's neck.

**[0018]** Conventional playards with X-frame assemblies typically address potential entrapment hazards using two approaches depending, in part, on whether the frame is folded or unfolded. In the unfolded configuration, the openings in the frame may be sufficiently large to allow a child to insert their head through one of the openings of the frame. To reduce the risk of neck entrapment,

the openings formed by the rigid components of the frame may be positioned towards the top of the playard to make the openings less accessible to the child. Additionally, the rigid components may be arranged to have sufficient clearances that also reduce the likelihood of the child's neck getting pinched. For example, the respective bottom portions of the X-frame tubes 22a and 22b in the playard 10b may each form a V-shaped opening with the leg tube 25. When the frame 46 is unfolded, the X-frame tubes 22a and 22b are disposed in the upper half of the frame 46 and oriented with respect to the leg tubes 25 to form a relatively wide V-shaped opening.

**[0019]** In the folded configuration, the openings in the frame may be positioned lower towards the ground due to the displacement of the rigid components of the frame. However, the openings are typically reduced in size to such an extent that a child is unable to insert their head through an opening in the frame, which in turn reduces the risk of neck entrapment. Returning to the example of the V-shaped openings formed between the leg tube 25 and the respective X-frame tubes 22a and 22b in the playard 10b, the width of the V-shaped opening may be appreciably smaller than the average size of a child's head when the frame 46 is folded, thus preventing a child from inserting their head through an opening in the frame 46.

**[0020]** Although these two approaches are effective in reducing the risks of neck entrapment, the Inventors have recognized conventional playard frames typically benefit from these two approaches only when the frame is fully folded or fully unfolded. In other words, neck entrapment hazards may still exist when the playard is transitioning from the unfolded configuration to the folded configuration (or vice-versa). This may occur when a child playing outside the playard has access to the playard frame in a partially folded or partially unfolded state. This may also occur when the child is contained within the playard where the child may accidentally unlock and fold the frame from within the playard. For example, a child may be able to insert their head through the V-shaped openings in the playard 10b when the frame is at or near the unfolded configuration. If the frame were to fold thereafter, the size of the V-shaped openings decrease, which can result in the child's neck becoming pinched between the leg tube 25 and the X-frame tubes 22a or 22b.

**[0021]** FIGS. 1H and 1I show another conventional playard 10d with pivot and slidable X-frame assemblies 20b in a partially folded state (i.e., neither fully unfolded for use or fully folded for storage). Similar to the playard 10b, the frame 46 of the playard 10d includes multiple X-frame assemblies 20b that each include X-frame tubes 22a and 22b and multiple leg support assemblies

24 that each include a leg tube 25, a corner (hidden beneath the soft goods 12), and a slider 26a or 26b. The playard 10d also includes a pair of latches disposed on opposing sides of the frame 46 and integrated, in part, in the sliders 26b.

**[0022]** As shown in FIG. 1H, the sliders 26a and 26b move downwards along the respective leg tubes 25 as the playard 10d is folded, which causes the X-frame tubes 22a and 22b to rotate. FIG. 1I shows that as the playard 10d is folded, the gap between one X-frame tube 22b and one leg tube 25 decreases to such an extent that a probe 60 initially inserted between the X-frame tube 22b and the leg tube 25 becomes clamped between the X-frame tube 22b and the leg tube 25. For reference, the probe 60 is used to evaluate head and neck clearances in accordance with various consumer safety standards (e.g., ASTM F406-19 and/or F1004-09). Specifically, the probe 60 is shaped as rectangular prism with dimensions of 1.5 inches (W) by 1.5 inches (H) by 3.0 (L) inches.

**[0023]** The risks of entrapment posed by the X-frame assemblies 20a and 20b may be further exacerbated by the manner in which the playards are folded. For example, the playard 10a is folded when a downward force is applied to the X-frame tubes 22a and 22b. Similarly, the playards 10b and 10d are folded when a downward force is applied to the X-frame tubes 22a and 22b or the sliders 26a and 26b. If the playards 10a, 10b, and 10d are left in a partially folded state, the weight of a child's head may be sufficient to fold the playard, which can result in entrapment. The risks for entrapment may be further increased when the soft goods 12 are partially or fully removed when, for example, washing the soft goods 12 as the child may have greater access to the openings and/or gaps between the rigid components of the frame 46.

**[0024]** The Inventors have further recognized the folding mechanisms implemented in conventional playards may also have detrimental effects on other aspects related to the practical use of the playard.

**[0025]** For example, the X-frame assemblies 20a and 20b both span an appreciable portion (if not all) of the sides of the respective frames 46 as described above, which may interfere with the visibility of a child in the partially enclosed space 13 and thereby impede or obstruct a caregiver's ability to easily see the child in the playard.

**[0026]** More specifically, with reference again to FIG. 1A, the soft goods 14 in the playard 10a includes see-through portions along the sides of the partially enclosed space 13, which are intended to allow the caregiver to see their child. However, the X-frame tubes 22a and 22b in the pivot-only

X-frame assemblies 20a span the entire sides of the partially enclosed space 13, thus obstructing the see-through portions of the soft goods 14 and, hence, limiting a caregiver's ability to visually check on their child in the partially enclosed space 13. For the playard 10b, the pivot and slidable X-frame assemblies 20b do not span the entire sides of the partially enclosed space 13. However, FIG. 1B shows the combination of the X-frame assemblies 20b and the soft goods 14 instead covers nearly the top half of the partially enclosed space 13, thus limiting the areas in which the caregiver can see into the partially enclosed space 13.

**[0027]** In another example, the frame 46 of the playard 10c allows the caregiver to readily see into the partially enclosed space 13 at the expense of using a more complicated folding/unfolding mechanism as described above. Indoor playards are also typically designed to be aesthetically pleasing for indoor settings (e.g., the indoor playard should match other indoor furniture), which can often lead to compromises in other areas such as ease of use. For instance, X-frame assemblies are often only used for outdoor playards because the appearance of X-frame tubes clashes with most indoor furniture.

**[0028]** The Inventors further have also observed that conventional playards often include complex latches that are expensive to manufacture and difficult for consumers to use. For example, conventional playard frames that utilize pivot and slidable X-frame assemblies, such as the playards 10b or 10d shown in FIGS. 1B, 1H, and 1I, often include multiple latches disposed on opposing sides of the playard to prevent any one side of the playard frame from sagging downwards when locked in the unfolded configuration. In particular, as noted above FIG. 1B shows the playard 10b includes a pair of latches 16a and 16b disposed on opposing sides of the playard 10b. To lock or unlock the playard 10b, the caregiver needs to manually actuate each latch 16 one at a time, on different sides of the playard, which is inconvenient and cumbersome. In another example, the conventional indoor playard 10c shown in FIG. 1C includes separate latches for each hinge 36. As described above, the caregiver needs to first lock each latch for each hinge 36 before unfolding the bottom support structure 34, during which the playard 10c may tip over and/or partially collapse if not held up properly by the caregiver.

**[0029]** The inclusion of multiple latches increases the number of parts and, hence, the cost for manufacture. This drawback may be further exacerbated based on the placement and complexity of a given latch. For example, the latches 16a and 16b in the playard 10b are mounted to the sliders

of the leg support assemblies 24; as a result, the playard 10b needs to include different types of sliders, i.e., the sliders 26b forming part of the latches 16a and 16b, and the different sliders 26a for the remainder of the leg support assemblies 24. Accordingly, this playard design increases the number of unique parts that need to be manufactured, which in turn increases manufacturing cost.

**[0030]** Additionally, the Inventors have observed conventional playards typically do not include a latch to lock the playard in the folded configuration, which may increase the risk of the child being exposed to a playard in a partially unfolded or folded state. For example, if a child is left alone with the playards 10a, 10b, and 10d, the child may pull on the X-frame tubes 22a and 22b or, in the case of the playards 10b and 10d, pull on the leg tubes 25 or the sliders 26a and 26b in a manner that causes the frame 46 to unfold and/or fold. Thus, an entrapment hazard may be created if the child unfolds the playard to such an extent that they are able to insert their head through an opening in the frame 46.

**[0031]** The Inventors have also observed that conventional playards also include various accessories to augment the functionality and/or environment for the child.

**[0032]** For example, the playard 10c shown in FIG. 1C includes a bassinet accessory 60 to provide an elevated surface above the ground to support the child for their first several months of life. The Inventors have recognized and appreciated that a bassinet accessory provides caregivers a more convenient and accessible platform to place their child into the playard and/or to take their child out of the playard compared to the interior space of the playard (i.e., when the playard 10c does not include the bassinet accessory 60). The Inventors have also recognized a removable bassinet accessory effectively extends the lifetime use of the foldable playard from birth up until the child is typically able to climb out of the playard or weighs more than 30 lbs. However, the Inventors have also recognized that conventional bassinet accessories for playards often have to compromise between the accessibility of the elevated surface (e.g., how far the caregiver should reach into the playard to place their child into the bassinet accessory), ease of use (e.g., the procedure to fold and/or unfold the bassinet accessory and the foldable playard), and the overall size of the foldable playard and the bassinet accessory particularly when folded.

**[0033]** Bassinet accessories typically include a support structure to provide a flat surface for the child to sleep upon in order to meet various compliance standards (e.g., ASTM F2194 entitled, “Standard Consumer Safety Specification for Bassinets and Cradles”). For many conventional

bassinet accessories, the support structure is a rigid structure that is not foldable (or unfoldable) with the playard frame. Thus, the bassinet accessory should be removed before folding the playard and/or installed when unfolding the playard, which adds additional steps for the caregiver to setup and/or tear down the playard. Additionally, the removal of the bassinet accessory requires the caregiver to provide extra space to store and/or transport the foldable playard and the bassinet accessory as separate items and may also increase the likelihood of the caregiver forgetting or losing the bassinet accessory especially when transporting the playard from one location to another location.

**[0034]** Bassinet accessories that fold and unfold together with the playard frame have been previously demonstrated to address, in part, the limitations associated with the rigid bassinet accessories described above. However, the Inventors have recognized conventional foldable bassinet accessories often achieve foldability with the playard by compromising other aspects of the bassinet accessory.

**[0035]** For example, the bassinet accessory 60 provides the playard 10c with a relatively shallower elevated space to support the child (e.g., the top surface of the mattress is offset from the top rail 32 of the playard 10c by a distance less than or equal to about 10 inches). This is achieved, in part, by utilizing a more complex folding mechanism that requires the user to assemble and disassemble part of the bassinet accessory 60 to facilitate unfolding and folding. For instance, FIG. 1E shows the bassinet accessory 60 for the playard 10c includes bassinet soft goods 62 and two support tube assemblies 64 forming a support structure to support a mattress. As shown, each support tube assembly 64 includes support tubes 64a, 64b, and 64c mounted to a bottom portion of the bassinet soft goods 62.

**[0036]** To setup the bassinet accessory 60, the caregiver should manually connect the support tube 64a to the support tube 64b, and connect the support tube 64c to the support tube 64b, to form a rigid support tube assembly 64 spanning the length of the bassinet accessory 60. To tear down the bassinet accessory 60, the caregiver should manually disconnect the support tubes 64a-64c from one another. These additional steps not only make the bassinet accessory 60 more difficult to fold and/or unfold, but may also increase the likelihood of lost parts (e.g., the caregiver misplaces one of the support tubes separately from the mattress) and/or an improper setup especially if the caregiver does not properly connect the support tubes 64a-64c together.

**[0037]** In some conventional foldable bassinet accessories, simpler folding mechanisms (e.g., a mechanism that does not require assembly of two or more components for deployment or disassembly for storage) have been used to simplify setup and/or tear down. However, these simpler folding mechanisms often result in an increase to the overall size of the playard in the folded configuration (e.g., a portion of the bassinet accessory extends appreciably beyond the envelope of the playard when folded) or results in a relatively deeper bassinet accessory (e.g., the top surface of the mattress is offset from the top rail 32 of the playard 10c by a distance appreciably greater than 10 inches) to ensure the folding mechanism remains within the envelope of the folded playard. For the latter case, a deeper bassinet accessory results in the caregiver having to bend over further to place their child into the bassinet accessory and/or to take their child out of the bassinet accessory resulting in greater physical strain.

**[0038]** In another example, the playards 10a and 10b shown in FIG. 1A and FIG. 1B both include a canopy cover 40 to provide shade for a child when the playard is deployed in outdoor settings. However, the Inventors have recognized and appreciated that in some instances various accessories, and in particular canopy covers, often are prone to misuse and premature detachment from the playard, and/or may compromise the safety of the child.

**[0039]** Generally, conventional canopy covers are supported by a separate canopy cover frame that directly mounts onto a top portion of the playard (e.g., the corners), which is already covered with soft goods. The presence of the soft goods can make it difficult for a caregiver to determine the proper location(s) on the playard where the canopy cover should be mounted, which can often result in incorrect canopy cover installations. Additionally, conventional canopy covers often are not attached securely to the playard due, in part, to the stack of multiple fabric layers in the soft goods. As a result, conventional canopy covers for outdoor playards are often prone to premature detachment due, for example, to a gust of wind.

**[0040]** Conventional canopy covers are also prone to being detached by a child placed within the partially enclosed space of the playard. For example, FIG. 1F shows the playard 10a of FIG. 1A with the canopy cover 40 pulled off a corner 28 by a child in the playard. As shown, a canopy bow 44 supports the canopy cover 40 over the playard 10a. The canopy bow 44 is attached to a canopy clip 42, which in turn should attach to the corner 28 covered by the soft goods 12. However, the combination of the canopy clip 42 not being securely attached to the corner 28 and the child's

accessibility to the canopy clip 42 can lead to the removal of the canopy cover 40 by the child as shown in FIG. 1F. FIG. 1G shows another example where the child can further pull the canopy cover 40 into the partially enclosed space 13 of the playard 10a by pulling on the canopy bow 44 and/or the canopy clip 42.

**[0041]** In view of the foregoing observations by the Inventors, the present disclosure is thus directed to various inventive implementations of a foldable playard that is easier to operate (e.g., fold, unfold, latch and/or unlatch) as compared to conventional playards, structurally simpler with fewer parts for manufacture, provides desired clearances between the rigid components of the playard, and nonetheless sufficiently stable and rigid in structure so as to readily comply with various consumer safety standards (e.g., ASTM F406-19, referenced above).

**[0042]** In various inventive implementations, a foldable playard may generally include a frame that defines an interior space when unfolded, and soft goods that are mounted to the frame and partially disposed within the interior space to define a partially enclosed space for a child. In some implementations, a foldable playard includes an improved canopy cover assembly to cover the partially enclosed space (e.g., when the playard is deployed in an outdoor setting).

**[0043]** In one example of a frame for a foldable playard according to the present disclosure, the frame may be a closed frame that includes multiple leg support assemblies and X-frame assemblies arranged such that each leg support assembly is disposed along a side edge of the interior space, with the X-frame assemblies disposed between adjacent leg support assemblies along a side face of the interior space. The leg support assemblies enable the foldable playard to stand on the ground and the X-frame assemblies provide the structural support for the leg support assemblies as well as the mechanism to facilitate folding and/or unfolding of the playard. In some implementations, the leg support assemblies and the X-frame assemblies may define an interior space having a cross-section in the plane parallel to the ground that is polygonal in shape (e.g., a square, a rectangle, a hexagon).

**[0044]** Each leg support assembly of the frame of a foldable playard may include a leg tube, a corner mounted to a top end of the leg tube, a foot mounted to a bottom end of the leg tube, and a slider that slides between the corner and the foot. The top and bottom ends of the leg tube may align with top and bottom vertices of the interior space, respectively. Each X-frame assembly may include at least one pair of X-frame tubes (also referred to as a “X-tube”) where each X-frame tube

is rotatably coupled to at least another X-frame tube, the corner, and/or the slider. By coupling at least one of the X-frame tubes to the slider, the X-frame assembly becomes a pivot and slidable X-frame assembly in which the X-frame tubes are rotationally and translationally displaced when folding and/or unfolding the playard. In this manner, the combination of the X-frame assemblies and the leg support assemblies allows for a playard that folds into a smaller form occupying less volume and/or unfolds to provide a larger interior space and, hence, a larger partially enclosed space for the child as compared to conventional playards.

**[0045]** In one aspect, the X-frame assemblies of the frame of the foldable playard may be positioned sufficiently near a top portion of the interior space when the playard is deployed in an unfolded configuration such that each X-frame assembly effectively functions as a rigid top rail that mechanically connects adjacent leg support assemblies in the frame. Said in another way, the respective X-frame tubes of each X-frame assembly form a top perimeter structure that spans the top of the playard frame, thus outlining a top opening of the interior space. For example, each pair of X-frame tubes in each X-frame assembly may form a sufficiently shallow X-frame structure such that the X-frame tubes are mechanically similar to the rigid top rails in previous playards (e.g., the top rail 32 in the playard 10c).

**[0046]** However, unlike previous playards, the frames of the foldable playards disclosed herein are sufficiently rigid and stable with only X-frame assemblies coupling the leg support assemblies together. In other words, in example implementations, the frames of the foldable playards disclosed herein do not include a separate top rail (e.g., the webbing 14 of the playards 10a and 10b shown in FIG. 1A and FIG. 1B, or the top rail 32 of the playard 10c shown in FIG. 1C) or a bottom support structure (e.g., the bottom structure 34 of the playard 10c shown in FIG. 1C). Accordingly, the innovative frames described herein result in a more refined playard with sound mechanical stability using fewer parts.

**[0047]** In one aspect, the foldable playard frames disclosed in various examples herein achieve mechanical stability using fewer parts by reducing the length of the leg tubes as compared to conventional playards so as to make the frames less prone to being tilted and/or rotated (e.g., the resultant torque applied to a frame for a given force is reduced due to a shorter moment arm). As explained in greater detail below, in some implementations the length of a leg tube may be

dimensioned based only on the portions of the foot and the corner that overlap with the leg tube and the distance the slider travels to sufficiently fold and/or unfold the frame.

**[0048]** In another aspect, the foldable playard frame may provide clearances in accordance with various consumer safety standards (e.g., ASTM F406-19 and/or F1004-09). For example, each X-frame tube may be separated from a leg tube by a gap greater than or equal to 1.5 inches, which corresponds to the width of a partially bounded opening (e.g., a V-shaped opening, a diamond-shaped opening) below which the risk of neck entrapment is considered unacceptable as set forth in ASTM F406-19 and ASTM F1004-09. The partially bounded opening is considered to be an opening that is sufficiently large enough to fit a child's head in at least one configuration of the foldable playard (e.g., the unfolded configuration). In another example, each pair of X-frame tubes may be laterally offset from one another by a distance that is sufficiently small such that a child is unable to insert their head laterally between the X-frame tubes. For example, each pair of X-frame tubes may be laterally offset by a gap less than 1.5 inches.

**[0049]** In some implementations, the frame may be structurally designed to maintain the desired clearances when the foldable playard is in the deployed unfolded configuration, the compact folded configuration, and between the unfolded and folded configurations (e.g., while the foldable playard is being folded or unfolded). In some implementations, the frame may include various safety features, such as a mechanical stop, to reduce the likelihood or, in some instances, prevent the clearances from falling outside the desired range. For example, a Valco snap button disposed on the leg tube below the slider in the unfolded configuration may act as a mechanical stop to prevent the frame from being accidentally folded to such an extent that the desired gap between the X-frame tube and the leg tube falls below the desired range.

**[0050]** For example, each leg support assembly may be coupled to a X-frame assembly such that no portion of a X-frame tube is separated from a leg tube by a gap less than 1.5 inches. This may be accomplished, in part, by utilizing sliders and corners with arms (also referred to herein as "extended portions") that extend along the side faces of the interior space and rotatably couple to the respective X-frame tubes of the X-frame assemblies. The respective arms of each slider and corner may be shaped and/or dimensioned to position the X-frame tubes at a set distance from the leg tubes independent of the position of the slider along the leg tube. For instance, the respective arms of each slider may have a length,  $l_{sr}$ , defined as the distance from a base of the slider to a pin

joint where the X-frame tube is coupled to the slider, greater than or equal to 1.5 inches. In other words, the portion of the X-frame tube coupled to the arm of the slider, which is located closest to the leg tube and, hence, forms the narrowest portion of a V-shaped opening, may be separated from the leg tube by a distance greater than or equal to 1.5 inches. The respective arms of each corner may also have a length,  $l_{cr}$ , defined as the distance from a base of the corner to a pin joint where the X-frame tube is coupled to the corner, that is also greater than or equal to 1.5 inches.

**[0051]** In some implementations, the respective sliders and corners in a pair of leg support assemblies disposed on adjacent side edges of the interior space (i.e., side edges that share a single side face) may each have an arm that extends along the same side face. The respective arms of the sliders in the pair of leg support assemblies may be in colinear alignment with one another and, similarly, the respective arms of the corners may be in colinear alignment with one another. Said in another way, the respective arms of the slider and corner of one leg support assembly may each have an end that is aligned to the respective ends of the corresponding slider and corner of the other leg support assembly. In some implementations, the respective ends of the slider arms may be disposed proximate to one another or, in some instances, may physically contact one another when the playard is folded. Similarly, the respective ends of the corner arms may also be disposed proximate to one another or may physically contact one another in the folded configuration.

**[0052]** For foldable playards that include sliders and corners with colinearly aligned arms, the dimensions of the playard in the folded configuration are directly proportional to the sum of the respective lengths of the slider and corner arms disposed along the same side face. In particular, the side dimensions of the playard may be greater than or equal to two times the length of the respective arms of the sliders and corners in each pair of leg support assemblies disposed on adjacent side edges of the interior space. Thus, an increase in the length of the arms of the sliders and/or corners of the foldable playard, for example, to provide a playard frame with desired clearances results in a proportional increase to the overall size of the playard in the folded configuration.

**[0053]** In some implementations, the foldable playard frame may include sliders and corners with arms that are offset in position in order to allow for longer arms while maintaining a compact size, particularly in the folded configuration. Specifically, the respective arms of the sliders and corners may be offset from the respective side faces such that the arms of the slider and the corner in one

leg support assembly at least partially overlap the corresponding arms of the slider and the corner in another adjacent leg support assembly along the same side face in the folded configuration. Said in another way, the end of the arms in the slider or the corner of one leg support assembly may be disposed proximate to or, in some instances, may physically contact the corresponding base of the slider or the corner of the other leg support assembly in the folded configuration. In this manner, the respective lengths of the sliders and the corners may be dimensioned to provide the desired clearances (e.g., a length greater than or equal to 1.5 inches) while maintaining a compact folded size of the playard where the dimensions of the frame in the folded configuration are directly proportional to the length of the corner and the slider of only one leg support assembly.

**[0054]** The respective sliders and corners in the leg support assemblies may each have two arms that couple to respective X-frame assemblies disposed along adjacent side faces of the interior space (i.e., a pair of side faces sharing the same side edge). In some implementations, the respective arms of the sliders and corners may be offset in an asymmetric manner. For example, the first arm of a slider or corner may be offset away from the interior space and the second arm of the slider or corner may be offset towards the interior space. In this manner, the first arm of the slider or the corner of one leg support assembly may at least partially overlap the second arm of the slider or the corner of the other leg support assembly in the folded configuration. In some implementations, the same sliders and corners with asymmetrically offset arms may be used in each leg support assembly, thus simplifying manufacture and assembly of the playard frame.

**[0055]** However, it should be appreciated that, in some implementations, the respective arms of the sliders and corners may be offset in a symmetric manner. For example, the first and second arms of the slider or the corner of a first leg support assembly may both be offset away from the interior space or offset towards the interior space. The first and second arms of the slider or the corner of a second leg support assembly adjacent to the first leg support assembly may be offset in the opposite direction from the slider and the corner of the first leg support assembly. Said in another way, the direction the first and second arms of the slider or the corner are offset relative to the interior space may alternate for each successive leg support assembly disposed at each corner of the playard frame. In this manner, the first arm of the slider or the corner of the first leg support assembly may at least partially overlap the second arm of the slider or the corner of the second leg support assembly in the folded configuration.

**[0056]** The offset in the respective arms of the sliders and the corners may also simplify the shape of the X-frame tubes for each X-frame assembly. For example, the first arm of the slider in a first leg support assembly and the second arm of the corner in a second leg support assembly adjacent to the first leg support assembly may be offset together in a first direction (e.g., towards the interior space or away from the interior space) while the first arm of the corner in the first leg support assembly and the second arm of the slider in the second leg support assembly are off together in a second direction opposite the first direction. This arrangement allows for X-frame tubes that are straight tubes (i.e., a tube with no bends) with a constant cross section to couple the slider of the first leg support assembly to the corner of the second leg support assembly and, similarly, the corner of the first leg support assembly to the slider of the second leg support assembly. In some implementations, the X-frame tubes of each X-frame assembly may be laterally offset by a gap,  $w_x$ , defined as the distance between the respective centerline's of the X-frame tubes. The gap  $w_x$  may be chosen to provide sufficient spacing for the respective arms of the sliders and corners to overlap one another while being sufficiently small to prevent the child from inserting their head laterally between the X-frame tubes. For example, the gap  $w_x$  may range between 0.625 inches and 1.5 inches to provide sufficient spacing for the respective arms of the sliders and corners to overlap one another.

**[0057]** Additionally, the dimensions and/or materials of the X-frame tubes employed in foldable playard frames disclosed in various examples herein may be chosen to provide sufficient mechanical rigidity to the frame. For example, the X-frame tubes may be formed from steel tubing with an exterior diameter of about 0.625 inches and a total length of about 24.5 inches. However, it should be appreciated the X-frame tubes may be formed from other materials (e.g., aluminum, carbon fiber) having different dimensions depending, in part, on the mechanical properties of the material and the desired dimensions of the interior space provided by the frame. In some implementations, as noted above, a frame comprising only leg support assemblies and X-frame assemblies as disclosed herein, without additional support structures, may satisfy the various mechanical rigidity, stability, and/or strength requirements set forth in various consumer safety standards (e.g., ASTM F406-19, 7.3.3, 7.11).

**[0058]** It should be appreciated that soft goods may be coupled at various points along the frame so that the partially enclosed space formed by the soft goods opens properly when the playard is unfolded. However, the soft goods may generally be a compliant, flexible component that remains

loose instead of being pulled taut and, hence, does not appreciably improve the mechanical rigidity and/or stability of the frame.

**[0059]** Additionally, by placing the X-frame assemblies of the frame near the top portion of the interior space, the sides of the frame are more exposed to provide a larger window for the caregiver to see their child when the child is placed within the interior space. Furthermore, soft goods attached to the frame may more readily cover the X-frame assemblies using less material. In some implementations, the soft goods may partially cover the X-frame assemblies to provide access to a latch (described in more detail below), while in other implementations the soft goods may completely cover the X-frame assemblies such that no portion of the X-frame assemblies are observable when the playard is unfolded (which may improve, in part, the aesthetic appearance of the playard for both outdoor and indoor settings).

**[0060]** As discussed in greater detail below, the “top portion” of foldable playard frame in a given example implementation may generally refer to the portion of the frame proximate to the top ends of the leg tubes and/or the corners of each leg support assembly. The leg tubes of the respective leg support assemblies may generally have substantially identical lengths. In some implementations, the top portion of the frame may be defined as having: 1) a top horizontal plane that intersects the top ends of the leg tubes and/or the corners; and 2) a bottom horizontal plane that is offset vertically from the top horizontal plane such that the X-frame tubes are located entirely within the top and bottom horizontal planes when the X-frame assembly is unfolded. In some implementations, the bottom horizontal plane may be offset from the top horizontal plane by a distance less than or equal to 30% of the total length of the leg tubes and, more preferably, less than or equal to 20% of the total length of the leg tubes.

**[0061]** As noted above, in some implementations a foldable playard frame may include one or more X-frame assemblies forming a single X-frame structure with one pair of X-frame tubes. Each X-frame tube in the pair of X-frame tubes may be rotatably coupled to a corner of one leg support assembly, a slider of another leg support assembly, and the other X-frame tube in the pair of X-frame tubes. In other example implementations, a foldable playard frame may include one or more X-frame assemblies forming a double X-frame structure with two pairs of X-frame tubes. In examples employing this double X-frame structure, each X-frame tube is coupled to either a slider or a corner of one leg support, the X-frame tube within the same pair of X-frame tubes, and another

X-frame tube from another pair of X-frame tubes. In this manner, the frame may provide an interior space having a horizontal cross section in which the sides have different dimensions (e.g., an interior space with a rectangular shape).

**[0062]** In another aspect, a foldable playard frame according to the present disclosure may include a latch to maintain the frame in an unfolded configuration. In some implementations, the frame may only include a single latch to maintain the frame in the unfolded configuration. In some implementations, the single latch is configured such that, as a caregiver unfolds the frame (e.g., by moving the slider in one leg support assembly towards the corner), the single latch is automatically actuated to lock the frame in the unfolded configuration. In this manner, the process of unfolding and locking the playard may be readily accomplished with the caregiver positioned at one side and/or one corner of the playard (i.e., the caregiver does not have to move around the playard to actuate multiple latches). Furthermore, the caregiver may unfold and lock the playard using a single hand. For example, the single latch may automatically lock when the slider is displaced a sufficient distance along the leg tube.

**[0063]** In some implementations, the latch may be preferably disposed in the top portion of the frame as defined above. For example, the latch may include a latch member having a first end coupled to the corner of one leg support assembly and a second end that couples to a X-frame tube of one X-frame assembly or the slider. In this manner, the latch may be partially covered or, in some instances, fully covered by the soft goods.

**[0064]** The latch may also be coupled to various components of the frame including, but not limited to, an X-frame tube, a leg tube, a slider, and a corner. In some implementations, the latch may be coupled to the components of the X-frame assembly and/or the leg support assembly without having to modify the respective components of the X-frame assembly and the leg support assembly. For example, the latch may include a latch member that is rotatably coupled to the corner of one leg support assembly via a pin joint that also serves to rotatably couple an X-frame tube to the corner. In this manner, the playard may include a smaller number of unique parts for manufacture. In some implementations, the playard may include identical corners and/or identical sliders for the multiple leg support assemblies.

**[0065]** In some implementations, the latch may be a tool-less mechanism that is actuated in one or two steps by the caregiver. In one example, the latch member may couple respective components

of the X-frame assembly and/or the leg support assembly to maintain an unfolded configuration via various attachment mechanisms including, but not limited to, a snap-fit connection, a spring-loaded pin, and a spring-loaded rotational lock off mechanism.

**[0066]** In some implementations, the latch may be a double-action latch that includes a latch member (e.g., mounted to the corner of one leg support assembly) and a latch boss (e.g., mounted to a X-frame tube of one X-frame assembly). The latch boss may include an undercut portion and the latch member may include a latch opening to receive the latch boss with a tab disposed within the latch opening to engage the undercut portion. In some implementations, the tab may include a slot and the undercut portion may include a rib to align the latch member and the latch boss when locking the latch. The undercut portion and the tab may be shaped such that the caregiver is unable to unlock the latch by pulling the latch member without applying an excessive amount of force (e.g., greater than 10 lbs of force). Instead, the caregiver may first squeeze the respective X-frame tubes of the X-frame assembly to displace the latch boss within the latch opening of the latch member to disengage the tab from the undercut portion. While squeezing the X-frame tubes together, the caregiver may then pull the latch member off the latch boss, thus unlocking the latch.

**[0067]** In yet another aspect, the foldable playard frame according to the present disclosure may include a storage latch to lock the frame in the folded configuration. The storage latch may thus provide an additional safety feature that further reduces the likelihood of a child being exposed to a frame that is partially folded and/or unfolded (i.e., the sliders of the leg support assemblies are readily movable along the leg tube). In some implementations, the frame may only include a single storage latch to maintain the frame in the folded configuration. Similar to the latch described above, the storage latch may be configured to automatically engage when the caregiver folds the frame (e.g., by moving the slider in one leg support assembly towards the foot). Thus, the process of folding and locking the playard in the folded configuration may be readily accomplished using a single hand in a tool-less manner.

**[0068]** In some implementations, the storage latch may be disposed near a bottom end of the leg tube proximate to or, in some instances, abutting the foot of the leg support assembly. For example, the storage latch may be rigidly mounted to the leg tube and configured to physically contact a top surface of the slider in order to prevent the slider from moving towards the top end of the leg tube, hence, preventing the frame from unfolding. In some implementations, the storage latch may be

installed onto a leg support assembly without modifications to the slider. Said in another way, the same slider may be used in each leg support assembly independent of whether the leg support assembly includes the storage latch or not.

**[0069]** In some implementations, the storage latch may include a push button partially disposed with a cavity of the leg tube and a spring element disposed in the cavity to impart a spring force that displaces the push button outwards from the leg tube. The push button may include a restraining surface (e.g., a bottom surface) that contacts the top surface of the slider to maintain the playard in the folded configuration. When the caregiver presses the push button, the push button may be inserted into the cavity of the leg tube, thus allowing the caregiver to pull the slider up and past the push button in order to unfold the frame. The push button or the slider may further include a ramped surface shaped such that the slider presses the push button into the cavity of the leg tube when folding the frame (e.g., when the slider moves downwards along the leg tube). Once the slider moves past the push button, the spring element forces the push button outwards, thus automatically locking the frame in the folded configuration.

**[0070]** In some implementations, the storage latch may include a latch member rigidly coupled to the leg tube. In some implementations, the latch member may be integrally formed together with the foot of the leg support assembly. The latch member may be a mechanically compliant component that includes a hook disposed at its end to contact the top surface of the slider and, hence, maintain the playard in the folded configuration. When the caregiver pulls the latch member outwards, the latch member may bend such that the hook is physically decoupled from the slider, thus allowing the caregiver to move the slider upwards along the leg tube to unfold the frame. The hook may further include a ramped surface shaped such that the slider automatically bends the latch member in an outwards direction when the slider moves downwards along the leg tube to fold the frame, thus allowing the slider to move past the hook of the latch member. The latch member may have sufficient mechanical rigidity such that the internal restoring force generated when the latch member is bent returns the latch member to its original unbent form, thus automatically locking the frame in the folded configuration.

**[0071]** In yet another aspect, the foldable playard may include soft goods to define the partially enclosed space in which the child may play and/or sleep. Generally, the soft goods may cover a portion of the frame (e.g., the corners of the leg support assembly, a portion of the X-frame

assemblies). In some implementations, the soft goods may be coupled directly to the frame (e.g., a corner) via one or more snap-fit connections. The soft goods may further include a semi-rigid tab disposed near the top edge of the soft goods to support a snap-fit connector to ensure the soft goods remain flush against the frame when attached (i.e., the top edge of the soft goods does not flip upwards to expose an interior portion of the soft goods). The soft goods may further include a floor portion that directly rests on the ground, as well as side portions, where the floor and side portions define the bottom and sides of the partially enclosed space. In some implementations, the side portions may be transparent and/or see-through (e.g., a mesh) to allow the caregiver to readily see their child in the playard.

**[0072]** In yet another aspect, a foldable playard according to the present disclosure may also include a canopy cover assembly, disposed on top of the playard frame and soft goods, to provide shade for the child within the playard. The canopy cover assembly may generally include multiple canopy support assemblies that provide a canopy cover frame or support structure. Each canopy support assembly may generally include a canopy bow that supports the canopy cover and a canopy clip to mount the canopy support assembly to the frame. In some implementations, different types of canopies (e.g., a half canopy, a full canopy) may be mounted onto the playard depending on the coverage desired by the caregiver.

**[0073]** In some implementations, the canopy clip may include snap-in features to directly couple the canopy clip the leg tube of one leg support assembly. In this manner, the canopy clip may be more securely attached to the frame (i.e., the canopy clip does not attach to a portion of the frame covered by soft goods), thereby reducing the likelihood the canopy cover assembly is accidentally detached from the frame. Each canopy clip may be further disposed outside the interior space along an exterior portion of one leg support assembly (e.g., proximate to the corner and/or the slider when the playard is unfolded). Additionally, the canopy bow may couple to the canopy clip such that a portion of the canopy bow is also disposed outside the interior space near the corner and/or the slider of the leg support assembly. The particular placement of the canopy clip and the portion of the canopy bow that overlaps the exterior portion of the frame may further limit the child's access to the various components of the canopy cover assembly, thus reducing the likelihood the child can detach and pull the canopy cover into the playard.

[0074] In yet another aspect, a foldable playard according to the present disclosure may include a bassinet accessory, disposed within the interior space of the frame and the partially enclosed space of the playard soft goods, to provide an elevated surface to support the child. The bassinet accessory may generally include a support structure that defines a relatively smaller partially enclosed space affiliated with the bassinet accessory to contain the child when the bassinet accessory is unfolded (e.g., the relatively smaller partially enclosed space of the bassinet accessory may be disposed within the partially enclosed space of the playard soft goods).

[0075] The support structure of the bassinet accessory may include bassinet soft goods with side surfaces and a bottom surface that at least partially define and surround the relatively smaller partially enclosed space of the bassinet accessory. The support structure may further include a hub and multiple support tubes that together form a rigid structure in the deployed unfolded configuration. Each support tube may be rotatably (e.g., pivotably) coupled to the hub to facilitate folding and unfolding of the bassinet accessory. The bassinet accessory may also include a mattress disposed on the hub and the support tubes in the deployed unfolded configuration to provide a cushioned surface for the child to rest upon. The mattress may be removable and foldable.

[0076] The bassinet accessory and, in particular, the support structure may fold and unfold together with the frame and the soft goods when installed on the foldable playard. The bassinet accessory may provide a relatively shallow partially enclosed space to improve accessibility for the caregiver. For example, the distance from the top surface of the mattress to the top side of the foldable playard may range between 7.5 inches and about 10 inches. More generally, the height of the bassinet accessory when installed on the playard,  $h_{t,1}$ , which is defined as the distance between respective bottom corner portions of the bassinet soft goods and the top of the foldable playard (e.g., a top horizontal plane defined by the playard), may range between 7.5 inches and about 12 inches.

[0077] The bassinet accessory may also include a folding mechanism that does not require assembly and/or disassembly when folding and unfolding the bassinet accessory together with the foldable playard. Instead, the hub and the support tubes may form a foldable structure with integrated mechanical stops and/or a locking mechanism (e.g., a hub latch) to maintain the hub and the support tubes in the desired unfolded configuration. In this manner, the procedure for folding and unfolding the foldable playard together with the installed bassinet accessory may be

simplified compared to conventional bassinet accessories (e.g., the bassinet accessory 60 for the playard 10c).

**[0078]** In one example, the hub may be disposed at the center of the bottom surface of the bassinet soft goods and the support tubes may be disposed and oriented along the diagonal segments of the bottom surface. Said in another way, the support tubes may extend radially from the hub to the respective corner portions of the bottom surface of the bassinet soft goods. The support tubes may be further attached to the bassinet soft goods via one or more attachment mechanisms (e.g., a screw fastener, a strap) such that the bassinet soft goods and the support tubes move together. When folding or unfolding the bassinet accessory, the caregiver may pull up or push down on the hub, thus causing the support tubes and the bassinet soft goods to fold or unfold.

**[0079]** Additionally, the bassinet accessory may be disposed substantially within the interior space of the playard frame in both the unfolded and folded configurations such that the overall size of the foldable playard with the bassinet accessory remains substantially similar or the same as the foldable playard without the bassinet accessory. In this manner, the compact shape of the playard in the folded configuration is maintained for ease of storage and/or transport.

**[0080]** The bassinet accessory exhibiting the features described above (e.g., a relatively shallow height, a simple folding mechanism, and a compact size) may be accomplished in multiple ways. In one example, the support tubes may change in length between the folded and unfolded configurations. For instance, the hub may move in an upwards direction when folding the bassinet accessory and, conversely, in a downwards direction when unfolding the bassinet accessory. To ensure the hub does not extend appreciably outside the interior space of the playard as the playard is folded up, particularly given the relatively shallow height of the bassinet accessory, each support tube may be telescoping (e.g., each support tube may include a first support tube and a second support tube telescopically coupled to the first support tube).

**[0081]** When the bassinet accessory is unfolded, the extended support tube may have an overall length,  $L_{t,1}$ , greater than the height,  $h_{t,1}$ , of the bassinet accessory. However, when the bassinet accessory is folded, the first support tube may telescopically move towards the second support tube. Thus, the overall length of the support tube changes from  $L_{t,1}$  to a length,  $L_{t,2}$  in the folded configuration, where  $L_{t,2}$  is less than  $L_{t,1}$ . In various examples discussed in greater detail below, the length  $L_{t,2}$  may be approximately less than or equal to the height  $h_{t,1}$  of the bassinet accessory.

It should be appreciated that the height of the bassinet accessory,  $h_{t,l}$ , may in some circumstances change somewhat when folding and unfolding the bassinet accessory (e.g., the bottom of the bassinet soft goods may fold and bunch up). However, in other circumstances, respective bottom corners of the bassinet accessory soft goods do not undergo significant vertical displacement between the folded and unfolded configurations. In any event, the above constraints imposed on the length of the support tube and height of the bassinet accessory in the respective folded and unfolded configurations may still be satisfied so as to mitigate substantial protrusion of the hub above a top of the playard in the folded configuration.

**[0082]** For this example, the bassinet accessory may not include a separate locking mechanism (e.g., a hub latch) to maintain the unfolded configuration. Instead, a combination of the integrated mechanical stops and the weight of the hub, the support tubes, the mattress, and/or the child may ensure the bassinet accessory remains in the deployed unfolded configuration. In this manner, the number of parts and the cost for manufacture of the bassinet accessory may be reduced.

**[0083]** In another example, an interior space of the playard below the bassinet accessory in the unfolded configuration may be utilized to contain the hub and/or the support tubes of the bassinet accessory when folding up the playard for storage and/or transport in the folded configuration. This may be accomplished, in part, given the shallow height of the bassinet accessory, which results in a larger portion of the interior space of the playard frame being disposed directly below the bassinet accessory. For instance, the height,  $h_b$ , corresponding to the distance from the ground to the bottom surface of the bassinet soft goods may be greater than or equal to about 18 inches. For this example, the hub may move in a downwards direction when folding the bassinet accessory and, conversely, in an upwards direction when unfolding the bassinet accessory. To ensure the hub and/or the support tubes remain contained within the interior space of the playard, the length of the support tube,  $L_t$ , may be approximately equal to or less than the height,  $h_b$ .

**[0084]** For this example, the integrated mechanical stops may limit further upward movement of the hub once the hub and the support tubes are in the desired unfolded configured (e.g., the hub and the support tubes form a substantially flat platform supporting the mattress). The hub may further include a hub latch that, when actuated, prevents the hub from moving downwards. Thus, the combination of the mechanical stops and the hub latch may maintain the bassinet accessory in the deployed unfolded configuration.

**[0085]** In one example, a frame for a foldable playard has a compact folded configuration for storage of the frame and a deployed unfolded configuration to support the foldable playard in an upright position on a ground surface to contain a child in an interior space of the foldable playard. The frame includes a plurality of leg support assemblies extending upward from the ground surface when the frame is in the deployed unfolded configuration where each leg support assembly of the plurality of leg support assemblies includes a bottom end supported by the ground surface and a top portion opposite to the bottom end. The frame further includes a plurality of X-frame assemblies coupled to the plurality of leg support assemblies where each X-frame assembly of the plurality of X-frame assemblies is coupled to respective top portions of adjacent leg support assemblies of the plurality of leg support assemblies when the frame is in the deployed unfolded configuration such that, in the deployed unfolded configuration of the frame, the plurality of X-frame assemblies forms a top perimeter structure of the frame outlining the interior space of the foldable playard and the plurality of X-frame assemblies does not significantly impede visibility of the child when the child is in the interior space of the foldable playard. The plurality of X-frame assemblies constitutes the only interconnection in the frame between respective pairs of leg support assemblies of the plurality of leg support assemblies. Each leg support assembly may include a leg tube with an oval-shaped cross-section.

**[0086]** In another example, a foldable playard defining an interior space when in an unfolded configuration includes a plurality of leg support assemblies where each leg support assembly includes a leg tube disposed along a side edge of the interior space having a top end disposed at a top vertex of the interior space, a corner coupled to the top end of the leg tube, and a slider slidably coupled to the leg tube such that the slider is disposed proximate to the corner when the foldable playard is in the unfolded configuration. The foldable playard further includes a plurality of X-frame assemblies positioned at respective side faces of the interior space between adjacent leg support assemblies where each X-frame assembly of the plurality of X-frame assemblies forms a top rail between adjacent leg support assemblies. Additionally, the sliders in the plurality of leg support assemblies are identical, the corners in the plurality of leg support assemblies are identical, and respective pairs of leg support assemblies are only coupled together via at least one X-frame assembly of the plurality of X-frame assemblies. The leg tube may also have an oval-shaped cross-section.

**[0087]** In another example, a foldable playard defining an interior space when in an unfolded configuration includes a plurality of leg support assemblies where each leg support assembly includes a leg tube disposed along a side edge of the interior space having a top end disposed at a top vertex of the interior space, a corner coupled to the top end of the leg tube, and a slider slidably coupled to the leg tube such that the slider is disposed proximate to the corner when the foldable playard is in the unfolded configuration. The foldable playard further includes a plurality of X-frame assemblies positioned at respective side faces of the interior space between adjacent leg support assemblies of the plurality of leg support assemblies where each X-frame assembly of the plurality of X-frame assemblies forms a top rail between the adjacent leg support assemblies. The foldable playard further includes a single latch coupled to one leg support assembly of the plurality of leg support assemblies to maintain the foldable playard in the unfolded configuration when the latch is in a locked configuration. Additionally, respective pairs of adjacent leg support assemblies are only coupled together via one X-frame assembly of the plurality of X-frame assemblies. The leg tube may also have an oval-shaped cross-section.

**[0088]** In another example, a foldable playard defining an interior space when in an unfolded configuration includes a plurality of leg support assemblies where each leg support assembly includes a leg tube disposed along a side edge of the interior space having a top end disposed at a top vertex of the interior space, a corner disposed on the top end of the leg tube, and a slider slidably coupled to the leg tube such that the slider is disposed proximate to the corner when the foldable playard is in the unfolded configuration. The foldable playard further includes a plurality of X-frame assemblies positioned at respective side faces of the interior space where each X-frame assembly of the plurality of X-frame assemblies is coupled to adjacent leg support assemblies of the plurality of leg support assemblies. The foldable playard further includes a latch that directly couples together the corner of one leg support assembly of the plurality of leg support assemblies and a X-frame tube of one X-frame assembly of the plurality of X-frame assemblies when the latch is in a locked configuration where the latch provides the only mechanism to maintain the foldable playard in the unfolded configuration. Additionally, respective pairs of leg support assemblies are only coupled together via at least one X-frame assembly of the plurality of X-frame assemblies. The leg tube may also have an oval-shaped cross-section.

**[0089]** In another example, a foldable playard defining an interior space when in an unfolded configuration includes a plurality of leg support assemblies where each leg support assembly

includes a leg tube disposed along a side edge of the interior space having a top end disposed at a top vertex of the interior space, a corner coupled to the top end of the leg tube, and a slider slidably coupled to the leg tube such that the slider is disposed proximate to the corner when the foldable playard is in the unfolded configuration. The foldable playard further includes a plurality of X-frame assemblies positioned at respective side faces of the interior space where each X-frame assembly of the plurality of X-frame assemblies is coupled to adjacent leg support assemblies. The foldable playard further includes a plurality of canopy support assemblies disposed, in part, above the interior space where each canopy support assembly includes a canopy bow disposed, in part, above the interior space and a canopy clip disposed outside the interior space proximate to a first leg support assembly of the plurality of leg support assemblies. The canopy clip includes one or more snap features directly coupled to the leg tube of the first leg support assembly and a canopy bow opening to receive a portion of the canopy bow to couple the canopy bow to the canopy clip. The foldable playard also includes a canopy cover supported by respective canopy bows of the plurality of canopy support assemblies to cover at least a portion of the interior space.

**[0090]** In another example, a foldable playard includes a leg support assembly. The leg support includes a leg tube having a top end, a corner disposed on the top end of the leg tube, and a slider slidably coupled to the leg tube. The foldable playard further includes a X-frame assembly coupled to the leg support assembly where the X-frame assembly includes a first X-frame tube rotatably coupled to the corner of the leg support assembly and a second X-frame tube rotatably coupled to the slider of the leg support assembly and the first X-frame tube. The foldable playard further includes a latch coupled to the leg support assembly and the X-frame assembly to maintain the foldable playard in an unfolded configuration when in a locked configuration where the latch includes a latch boss coupled to the second X-frame tube and disposed proximate to the slider of the leg support assembly having an undercut portion and a latch member coupled to the corner of the leg support assembly having a latch opening and a tab disposed within the latch opening. The undercut portion of the latch boss retains the tab of the latch member when the latch is engaged thereby maintaining the foldable playard in the unfolded configuration.

**[0091]** In yet another example, a foldable playard defining an interior space with a cross-sectional shape, in a plane parallel to a ground, forming a regular hexagon when in an unfolded configuration, includes six leg support assemblies. Each leg support assembly includes a leg tube arranged such that a longitudinal axis associated with the leg tube intersects a respective corner of

the regular hexagon and further has a top end and a bottom end, a foot coupled to the bottom end of the leg tube to contact a ground to support the foldable playard, a corner coupled to the top end of the leg tube, and a slider slidably coupled to the leg tube and positioned between the foot and the corner where the slider is disposed proximate to the corner when the foldable playard is in the unfolded configuration and disposed proximate to the foot when the foldable playard is in a folded configuration. The foldable playard further includes six X-frame assemblies arranged such that each X-frame assembly is positioned along a side of the regular hexagon. Each X-frame assembly of the six X-frame assemblies forms a top rail between adjacent leg support assemblies. The six X-frame assemblies includes a first X-frame assembly disposed between and coupled to a first leg support assembly and a second leg support assembly of the six leg support assemblies where the first X-frame assembly includes a first X-frame tube having a first end rotatably coupled to the corner of the first leg support assembly and a second end rotatably coupled to the slider of the second leg support assembly and a second X-frame tube having a first end rotatably coupled to the corner of the second leg support assembly and a second end rotatably coupled to the slider of the first leg support assembly. The second X-frame tube is rotatably coupled to the first X-frame tube. The foldable playard further includes a latch coupled to only the first leg support assembly and only the first X-frame assembly to maintain the foldable playard in the unfolded configuration when in a locked configuration where the latch includes a latch boss coupled to one of the second X-frame tube and disposed proximate to the slider of the first leg support assembly having an undercut portion and a latch member having a first end coupled to the corner of the first leg support assembly, a latch opening disposed proximate to a pulling tab, and a tab disposed within the latch opening. The latch is changed to the locked configuration by moving the slider of the first leg support assembly towards the corner of the first leg support assembly until the latch member snaps onto the latch boss such that the tab of the latch member contacts the undercut portion of the latch boss and the central rib is disposed within the central slot. The latch is changed to an unlocked configuration by squeezing the first and second X-frame tubes together to release the tab of the latch member from the undercut portion of the latch boss and, while squeezing the first and second X-frame tubes together, pulling the latch member away from the latch boss. Additionally, respective pairs of leg support assemblies are only coupled together via at least one X-frame assembly of the plurality of X-frame assemblies, the sliders in the six leg support assemblies are identical, and the corners in the six leg support assemblies are identical.

**[0092]** It should be appreciated that all combinations of the foregoing concepts and additional concepts discussed in greater detail below (provided such concepts are not mutually inconsistent) are contemplated as being part of the inventive subject matter disclosed herein. In particular, all combinations of claimed subject matter appearing at the end of this disclosure are contemplated as being part of the inventive subject matter disclosed herein. It should also be appreciated that terminology explicitly employed herein that also may appear in any disclosure incorporated by reference should be accorded a meaning most consistent with the particular concepts disclosed herein.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0093]** The skilled artisan will understand that the drawings primarily are for illustrative purposes and are not intended to limit the scope of the inventive subject matter described herein. The drawings are not necessarily to scale; in some instances, various aspects of the inventive subject matter disclosed herein may be shown exaggerated or enlarged in the drawings to facilitate an understanding of different features. In the drawings, like reference characters generally refer to like features (e.g., functionally similar and/or structurally similar elements).

**[0094]** FIG. 1A shows a conventional outdoor playard with a pivot-only X-frame assembly and a canopy cover.

**[0095]** FIG. 1B shows another conventional outdoor playard with a pivot and slidable X-frame assembly.

**[0096]** FIG. 1C shows a conventional indoor playard.

**[0097]** FIG. 1D shows the indoor playard of FIG. 1C being folded for storage or transport.

**[0098]** FIG. 1E shows the assembly of a bassinet accessory for the indoor playard of FIG. 1C.

**[0099]** FIG. 1F shows a conventional outdoor playard with a canopy cover assembly where the canopy cover is pulled off the corner of the X-frame assembly by a child located within the playard.

**[0100]** FIG. 1G shows another conventional outdoor playard with a canopy cover assembly where the canopy cover is pulled inside the interior space of the playard by a child located within the playard.

[0101] FIG. 1H shows another conventional playard with a pivot and slidable X-frame assembly in a partially folded configuration.

[0102] FIG. 1I shows a magnified view of the test probe of FIG. 1J placed near the slider and between the X-frame tube and the leg tube in the playard of FIG. 1H.

[0103] FIG. 2A shows a top perspective view of an exemplary playard forming a hexagonal-shaped interior space. The playard is in an unfolded configuration.

[0104] FIG. 2B shows a front view of the playard of FIG. 2A.

[0105] FIG. 2C shows a top view of the playard of FIG. 2A.

[0106] FIG. 2D shows a top perspective view of the playard of FIG. 2A in a folded configuration.

[0107] FIG. 2E shows a front view of the playard of FIG. 2D.

[0108] FIG. 2F shows a top view of the playard of FIG. 2D.

[0109] FIG. 3A shows a top perspective view of a X-frame assembly in the playard of FIG. 2A.

[0110] FIG. 3B shows a top view of the X-frame assembly of FIG. 3A.

[0111] FIG. 3C shows a top perspective view of a corner and a slider of a leg support assembly in the playard of FIG. 2A.

[0112] FIG. 3D shows a bottom perspective view of the corner and the slider of FIG. 3C.

[0113] FIG. 3E shows a top perspective view of a leg tube and a foot in the leg support assembly of FIG. 3C.

[0114] FIG. 4A shows an exploded top perspective view of the X-frame assembly of FIG. 3A and the leg support assembly of FIG. 3C.

[0115] FIG. 4B shows a magnified top perspective view of the corner and the slider in the leg support assembly and the X-frame tubes in the X-frame assembly of FIG. 4A.

[0116] FIG. 4C shows a magnified top perspective view of the leg tube and the foot in the leg support assembly of FIG. 4A.

[0117] FIG. 5A shows a top perspective view of the playard of FIG. 2A with soft goods.

[0118] FIG. 5B shows a magnified view of top portion of the soft goods of FIG. 5A disposed over the corner of the leg support assembly in the playard of FIG. 2A.

[0119] FIG. 5C shows a magnified view of the top portion of FIG. 5B flipped upwards to show a tab and a snap-fit connector.

[0120] FIG. 6A shows a top perspective of a double-action latch in the playard of FIG. 2A.

[0121] FIG. 6B shows a top perspective of the double-action latch of FIG. 6A with the latch member removed.

[0122] FIG. 6C shows a magnified view of the latch member in the double-action latch of FIG. 6A.

[0123] FIG. 6D shows a magnified view of the latch boss in the double-action latch of FIG. 6A.

[0124] FIG. 6E shows an illustration for unlocking the double-action latch of FIG. 6A.

[0125] FIG. 7A shows a test being performed on the playard of FIG. 2A to evaluate the restraining force of the latch of FIG. 6A.

[0126] FIG. 7B shows a stability test being performed on the playard of FIG. 2A.

[0127] FIG. 8A shows a top perspective of the playard of FIG. 2A with soft goods and a flex lock latch with a latch opening. The playard is in an unfolded configuration.

[0128] FIG. 8B shows a magnified view of the flex lock latch of FIG. 8A.

[0129] FIG. 8C shows a perspective view of the flex lock latch of FIG. 8A with the soft goods removed and the flex lock latch in a locked configuration.

[0130] FIG. 8D shows a perspective view of the flex lock latch of FIG. 8C in an unlocked configuration.

[0131] FIG. 9A shows a top perspective view of the playard of FIG. 2A with soft goods and a flex lock latch with a latch member having a snap-fit connector. The playard is in an unfolded configuration.

[0132] FIG. 9B shows a magnified view of the flex lock latch of FIG. 9A.

[0133] FIG. 9C shows a top perspective view of the playard of FIG. 9A with the soft goods removed.

[0134] FIG. 9D shows a perspective view of the flex lock latch of FIG. 9C in a locked configuration.

[0135] FIG. 9E shows a perspective view of the flex lock latch of FIG. 9D in an unlocked configuration.

[0136] FIG. 9F shows a perspective view of the flex lock latch of FIG. 9E where the playard is partially folded after unlocking the flex lock latch.

[0137] FIG. 10 shows another flex lock latch with a latch member having a snap-fit connector where the latch member of the latch is coupled to a X-frame tube of an X-frame assembly.

[0138] FIG. 11A shows a top perspective view of the playard of FIG. 2A with soft goods and a flex lock latch with a hook structure. The playard is in an unfolded configuration.

[0139] FIG. 11B shows a magnified view of the flex lock latch of FIG. 11A.

[0140] FIG. 11C shows a perspective view of the flex lock latch of FIG. 11A with the soft goods removed and the flex lock latch in a locked configuration.

[0141] FIG. 11D shows a perspective view of the flex lock latch of FIG. 11C in an unlocked configuration.

[0142] FIG. 12A shows a top perspective view of the playard of FIG. 2A with a latch mounted to a slider and a corner of a leg support assembly. The playard is in an unfolded configuration.

[0143] FIG. 12B shows a magnified view of the latch of FIG. 12A.

[0144] FIG. 13A shows a top perspective view of the playard of FIG. 2A with a latch mounted to a pair of X-frame tubes in the X-frame assembly. The playard is in an unfolded configuration.

[0145] FIG. 13B shows a perspective view of the playard of FIG. 13A in a folded configuration.

[0146] FIG. 13C shows a perspective of the X-frame assembly with the latch of FIG. 13A.

[0147] FIG. 13D shows an exploded view of the X-frame assembly with the latch of FIG. 13C.

[0148] FIG. 13E shows a perspective view of the latch of FIG. 13A in a locked configuration.

[0149] FIG. 13F shows a perspective view of the latch of FIG. 13E in an unlocked configuration.

[0150] FIG. 13G shows a top view of the latch of FIG. 13E.

[0151] FIG. 13H shows a top view of the latch of FIG. 13F.

[0152] FIG. 14A shows a top perspective view of the playard of FIG. 2A with a latch that includes a spring-loaded pin disposed at one end of a X-frame tube to engage with a leg tube. The playard is in an unfolded configuration.

[0153] FIG. 14B shows a side view of the latch of FIG. 14A in a locked configuration.

[0154] FIG. 14C shows a side view of the latch of FIG. 14B in an unlocked configuration.

[0155] FIG. 14D shows a side view of the latch of FIG. 14C after the playard is folded.

[0156] FIG. 15A shows a top perspective view of the playard of FIG. 2A with a latch that includes a snap-fit connector disposed at one end of a X-frame tube. The playard is in an unfolded configuration.

[0157] FIG. 15B shows a perspective view of the playard of FIG. 15A in a folded configuration.

[0158] FIG. 15C shows a side view of the latch of FIG. 15A in a locked configuration.

[0159] FIG. 15D shows a side view of the latch of FIG. 15A in an unlocked configuration and the playard in a folded configuration.

[0160] FIG. 16A shows a top perspective view of the playard of FIG. 2A with the latches of FIGS. 13A and 14A installed. The playard is in an unfolded configuration.

[0161] FIG. 16B shows a perspective view of the playard of FIG. 16A in a folded configuration.

[0162] FIG. 17A shows a top perspective view of an exemplary playard forming a rectangular-shaped interior space with soft goods. The playard is in an unfolded configuration.

[0163] FIG. 17B shows another perspective view of the playard of FIG. 17A.

[0164] FIG. 17C shows a top perspective view of the playard of FIG. 17A in a folded configuration.

[0165] FIG. 17D shows a top perspective view of the playard of FIG. 17A in a partially unfolded configuration.

[0166] FIG. 18A shows a top perspective view of the playard of FIG. 17A with the soft goods removed.

[0167] FIG. 18B shows a magnified view of a corner and a slider of a leg support assembly in the playard of FIG. 18A.

[0168] FIG. 19A shows a top perspective view of the playard of FIG. 17C with the soft goods removed.

[0169] FIG. 19B shows a magnified view of the slider and a foot in the leg support assembly of FIG. 19A.

[0170] FIG. 20A shows a top perspective view of the playard of FIG. 17D with the soft goods removed.

[0171] FIG. 20B shows a top, side perspective view of the playard of FIG. 20A.

[0172] FIG. 20C shows a top, front perspective view of the playard of FIG. 20A.

[0173] FIG. 20D shows a magnified view of the corner in the leg support assembly of FIG. 20A.

[0174] FIG. 20E shows a magnified view of the slider in the leg support assembly of FIG. 20A.

[0175] FIG. 21A shows a perspective view of the playard of FIG. 17D with the soft goods partially removed from the leg support assembly.

[0176] FIG. 21B shows a perspective view of the foot of the leg support assembly attached to the soft goods of FIG. 21A.

[0177] FIG. 22 shows a stability test being performed on the playard of FIG. 17A.

[0178] FIG. 23A shows a top, front perspective view of another exemplary playard forming a rectangular, convex-shaped interior space with soft goods. The rectangular playard is also shown with the bassinet accessory of FIG. 50A. The playard is in an unfolded configuration.

[0179] FIG. 23B shows a top perspective view of the playard of FIG. 23A.

[0180] FIG. 23C shows a front view of the playard of FIG. 23B.

[0181] FIG. 23D shows a top perspective view of the playard of FIG. 23B where the soft goods are shown as being transparent.

[0182] FIG. 23E shows a front view of the playard of FIG. 23D.

[0183] FIG. 24 shows a top perspective view of the playard of FIG. 23B with the soft goods removed.

[0184] FIG. 25A shows an exploded perspective view of a leg assembly having a wheel in the playard of FIG. 23A.

[0185] FIG. 25B shows an exploded perspective view of a leg assembly having a foot in the playard of FIG. 23A.

[0186] FIG. 26A shows a perspective view of the playard of FIG. 23A in a partially unfolded configuration.

[0187] FIG. 26B shows a cross-sectional view of a slider of a leg support assembly in the playard corresponding to the plane A-A of FIG. 26A.

[0188] FIG. 27A shows a magnified view of the slider and a corner of the leg support assembly in the playard of FIG. 23A.

[0189] FIG. 27B shows the soft goods attached to the corner of FIG. 27A.

[0190] FIG. 27C shows the soft goods removed from the corner of FIG. 27A.

[0191] FIG. 28A shows a top perspective view of the playard of FIG. 23A with a snap-fit latch disposed over the soft goods.

[0192] FIG. 28B shows a magnified view of the latch member of the latch of FIG. 28A.

[0193] FIG. 28C shows a perspective of a latch member in the latch of FIG. 28A.

[0194] FIG. 29A shows a top rail to corner post attachment test being performed on the playard of FIG. 23A.

[0195] FIG. 29B shows a testing apparatus mounted to the double X-frame assembly in the playard of FIG. 23A.

[0196] FIG. 29C shows the playard after conducting the test of FIG. 29A.

[0197] FIG. 29D shows the testing apparatus mounted to the double X-frame assembly in the playard of FIG. 23A.

[0198] FIG. 30A shows a strength test being applied to the double X-frame assembly in the playard of FIG. 23A.

[0199] FIG. 30B shows the playard of FIG. 30A after the strength test.

[0200] FIG. 30C shows the playard of FIG. 30B with the soft goods partially removed from the X-frame assembly.

[0201] FIG. 31 shows a stability test being performed on the playard of FIG. 23A.

[0202] FIG. 32A shows a top perspective view of an exemplary playard forming a hexagonal-shaped interior space with elongated sliders and corners. The playard is shown in a folded configuration.

[0203] FIG. 32B shows a bottom perspective view of the playard of FIG. 32A.

[0204] FIG. 32C shows a magnified perspective view of a top portion of the playard of FIG. 32A.

[0205] FIG. 32D shows a magnified perspective view of a bottom portion of the playard of FIG. 32A.

[0206] FIG. 32E shows a top view of the playard of FIG. 32A.

[0207] FIG. 33A a top perspective view of another exemplary playard forming a hexagonal-shaped interior space with elongated sliders and corners where the respective arms of the sliders and corners are asymmetrically offset. The playard is shown in a partially unfolded configuration (i.e., neither fully unfolded for use nor fully folded for storage). The playard may also be viewed as being partially folded.

[0208] FIG. 33B shows a top view of the playard of FIG. 33A.

[0209] FIG. 33C shows a top view of two leg support assemblies and a X-frame assembly in the playard of FIG. 33A.

[0210] FIG. 33D shows a magnified view of one of the leg support assemblies of FIG. 33C.

[0211] FIG. 33E shows a top perspective view of the leg support assemblies and the X-frame assembly of FIG. 33C.

[0212] FIG. 33F shows a magnified view of one of the leg support assemblies of FIG. 33E.

[0213] FIG. 34A shows a side perspective view of the playard of FIG. 33A in a folded configuration.

[0214] FIG. 34B shows a magnified view of a bottom portion of the playard of FIG. 34A.

[0215] FIG. 34C shows a top perspective view of the playard of FIG. 34A.

[0216] FIG. 34D shows a top view of the playard of FIG. 34A.

[0217] FIG. 35A shows a side perspective view of the playard of FIG. 33A where the playard is partially unfolded. The playard may also be viewed as being partially folded.

[0218] FIG. 35B shows a magnified view of the playard of FIG. 35A where a test probe is placed onto a slider.

[0219] FIG. 36A shows a perspective view of another exemplary playard forming a hexagonal-shaped interior space with elongated sliders and corners where the respective arms of the sliders and corners are symmetrically offset. The playard is shown in a folded configuration.

[0220] FIG. 36B shows a magnified perspective view of a top portion of the playard of FIG. 36A.

[0221] FIG. 36C shows a magnified perspective view of a bottom portion of the playard of FIG. 36A.

[0222] FIG. 37A shows an exemplary storage latch with a push button disposed on a leg tube of a leg support assembly in the playard of FIG. 40A.

[0223] FIG. 37B shows a cross-sectional view of the storage latch of FIG. 37A where the push button is engaged to a slider of the leg support assembly. The cross-section plane bisects the storage latch.

[0224] FIG. 37C shows a cross-sectional view of the storage latch of FIG. 37A where the storage latch is separated from the playard frame. The cross-section plane bisects the storage latch.

[0225] FIG. 38A shows a perspective view of another exemplary storage latch with a compliant latch member separate from a foot of a leg support assembly in the playard of FIG. 33A.

[0226] FIG. 38B shows a magnified view of the storage latch of FIG. 38A.

[0227] FIG. 38C shows a cross-sectional view of the storage latch of FIG. 38A where the latch member is engaged to a slider of the leg support assembly. The cross-section plane bisects the storage latch.

[0228] FIG. 39A shows a cross-sectional view of another exemplary storage latch with a compliant latch member integrally formed together with a foot of a leg support assembly in the playard of FIG. 33A. The cross-section plane bisects the storage latch.

[0229] FIG. 39B shows a perspective view of the storage latch of FIG. 39A.

[0230] FIG. 40A shows a top perspective view of another exemplary playard with a secondary latch. The playard is shown in a partially unfolded configuration. The playard may also be viewed as being partially folded.

[0231] FIG. 40B shows a cross-sectional view of an exemplary secondary latch with a push button mechanism. The cross-section plane bisects the storage latch.

[0232] FIG. 40C shows a cross-sectional view of another exemplary secondary latch with a push button mechanism. The cross-section plane bisects the storage latch.

[0233] FIG. 40D shows a cross-sectional view of an exemplary secondary latch with a push button mechanism and a compression spring. The cross-section plane bisects the storage latch.

[0234] FIG. 41A shows a top perspective view of the playard of FIG. 2A with an exemplary canopy cover assembly that covers the entire interior space of the playard. The canopy cover is not shown.

[0235] FIG. 41B shows a front view of the playard and the canopy cover assembly of FIG. 41A.

[0236] FIG. 41C shows a top view of the playard and the canopy cover assembly of FIG. 41A.

[0237] FIG. 41D shows a magnified view of a canopy clip of a canopy support assembly in the canopy cover assembly of FIG. 41A coupled to the leg support assembly of the playard.

[0238] FIG. 41E shows a magnified view of the canopy clip of FIG. 41D.

[0239] FIG. 41F shows a perspective view of the canopy clip of FIG. 41D.

[0240] FIG. 42A shows a top view of the canopy clip of FIG. 41D being pressed onto the leg tube.

[0241] FIG. 42B shows a perspective view of the canopy clip of FIG. 41D where one lead-in feature is hooked onto the leg tube first and the canopy clip is rotated such that the other lead-in feature contacts the leg tube.

[0242] FIG. 43A shows a top perspective view of a hub in the canopy cover assembly of FIG. 41A.

[0243] FIG. 43B shows a bottom perspective view of the hub of FIG. 43A.

[0244] FIG. 44A shows a top, front perspective view of the playard of FIG. 2A with an exemplary canopy cover assembly that covers half the interior space of the playard and does not include a hub.

[0245] FIG. 44B shows a top, side perspective view of the playard and the canopy cover assembly of FIG. 44A.

[0246] FIG. 45A shows a top perspective view of the playard and the canopy cover assembly of FIG. 44A with the canopy cover removed.

[0247] FIG. 45B shows a front view of the playard and the canopy cover assembly of FIG. 45A.

[0248] FIG. 45C shows a top view of the playard and the canopy cover assembly of FIG. 45A.

[0249] FIG. 45D shows a perspective view of the canopy clip of the canopy support assembly in the canopy cover assembly of FIG. 45A.

[0250] FIG. 45E shows another perspective view of the canopy clip of FIG. 45D.

[0251] FIG. 46A shows a top, front perspective view of the playard of FIG. 2A with an exemplary canopy cover assembly that covers half interior space of the playard and includes a hub.

[0252] FIG. 46B shows a front view of the playard and the canopy cover assembly of FIG. 46A.

[0253] FIG. 46C shows a top view of the playard and the canopy cover assembly of FIG. 46A.

[0254] FIG. 47A shows a top perspective view of the hub of FIG. 46A.

[0255] FIG. 47B shows a bottom perspective view of the hub of FIG. 47A.

[0256] FIG. 48A shows a top perspective view of another hub that allows each canopy bow to pivot about a horizontal axis relative to the hub.

[0257] FIG. 48B shows a bottom perspective view of the hub of FIG. 48A.

[0258] FIG. 49A shows a top perspective view of another hub that allows each canopy bow to pivot about a vertical axis relative to the hub.

[0259] FIG. 49B shows a bottom perspective view of the hub of FIG. 49A.

[0260] FIG. 50A shows a top perspective view of the playard of FIG. 17A and an exemplary bassinet accessory installed on the playard with a hub that moves downwards when folding the

playard and the bassinet accessory. The playard and the bassinet accessory are shown in an unfolded configuration.

**[0261]** FIG. 50B shows another top perspective view of the playard and the bassinet accessory of FIG. 50A in the unfolded configuration.

**[0262]** FIG. 50C shows a front side view of the playard of FIG. 23A with the bassinet accessory of FIG. 50A.

**[0263]** FIG. 51A shows a top perspective view of a mattress in the bassinet accessory of FIG. 50A that is partially folded and disposed in a partially enclosed space of the bassinet accessory.

**[0264]** FIG. 51B shows a top perspective view of the playard of FIG. 50A with the bassinet accessory removed and the mattress of FIG. 51A partially folded and disposed in a partially enclosed space defined by soft goods of the playard.

**[0265]** FIG. 52 shows a top perspective view of the playard and the bassinet accessory of FIG. 50A without the mattress revealing a hub and multiple support tubes of the bassinet accessory. The playard and the bassinet accessory are shown in the unfolded configuration.

**[0266]** FIG. 53A shows a magnified view of bassinet soft goods in the bassinet accessory corresponding to Inset A of FIG. 50B where the bassinet soft goods are coupled to soft goods in the playard via a zipper mechanism.

**[0267]** FIG. 53B shows a top perspective view of the bassinet accessory of FIG. 50A removed from the playard of FIG. 50A.

**[0268]** FIG. 54A shows a top perspective view of the playard and the bassinet accessory of FIG. 52 where the playard and the bassinet accessory are in the folded configuration.

**[0269]** FIG. 54B shows a top perspective view of the playard and the bassinet accessory of FIG. 52 where the playard and the bassinet accessory are partially unfolded and beginning to transition from the folded configuration to the unfolded configuration. The playard and the bassinet accessory may also be viewed as being partially folded and approaching the folded configuration.

**[0270]** FIG. 54C shows a top perspective view of the playard and the bassinet accessory of FIG. 52 where the playard and the bassinet accessory are partially unfolded and approaching the

unfolded configuration. The playard and the bassinet accessory may also be viewed as being partially folded and beginning to transition to the folded configuration.

**[0271]** FIG. 55A shows a top perspective view of the hub with the hub latch and the support tubes of FIG. 52. The hub latch is shown in a locked state where rotational movement of the support tubes relative to the hub latch is constrained.

**[0272]** FIG. 55B shows a bottom perspective view of the hub, the hub latch, and the support tubes of FIG. 55A.

**[0273]** FIG. 56A shows a top perspective view of the hub with the hub latch and the support tubes of FIG. 52. The hub latch is shown in an unlocked state where rotational movement of the support tubes relative to the hub latch is permitted.

**[0274]** FIG. 56B shows a bottom perspective view of the hub, the hub latch, and the support tubes of FIG. 56A. Several support tubes are rotated to the folded configuration.

**[0275]** FIG. 57 shows a top perspective view of the playard of FIG. 17A and another exemplary bassinet accessory installed on the playard with a hub that moves upwards when folding the playard and the bassinet accessory. The playard and the bassinet accessory are shown in an unfolded configuration.

**[0276]** FIG. 58A shows a top perspective view of a user's hand reaching through respective openings of a hub and bassinet soft goods in the bassinet accessory of FIG. 57 to access a bottom portion of playard disposed below the bassinet accessory.

**[0277]** FIG. 58B shows a side view of the user's hand grasping a strap disposed on a bottom portion of soft goods in the playard of FIG. 57 to initiate folding of the playard and the bassinet accessory.

**[0278]** FIG. 58C shows a top perspective view of the user pulling the strap of FIG. 58B up and through the respective openings of the hub and the bassinet soft goods to fold the playard and the bassinet accessory.

**[0279]** FIG. 58D shows a top perspective view of the playard and the bassinet accessory of FIG. 58C where the playard and the bassinet accessory are in a folded configuration.

[0280] FIG. 59A shows a top view of the bassinet accessory of FIG. 57 in the unfolded configuration.

[0281] FIG. 59B shows a bottom view of the bassinet accessory of FIG. 59A in the unfolded configuration.

[0282] FIG. 59C shows a side view of the bassinet accessory of FIG. 59A in the folded configuration.

[0283] FIG. 60A shows a top view of a telescoping support tube in the bassinet accessory of FIG. 57 coupled to the hub and the bassinet soft goods where the support tube is in an extended state in the unfolded configuration.

[0284] FIG. 60B shows a bottom view of the bassinet soft goods of FIG. 60A with the support tubes attached to the bassinet soft goods.

[0285] FIG. 61 shows a perspective view of the hub and the support tubes of FIG. 57 installed on the playard of FIG. 23A. The playard is shown in the folded configuration and the support tubes are in a contracted state.

#### DETAILED DESCRIPTION

[0286] Following below are more detailed descriptions of various concepts related to, and implementations of, foldable playards that include; 1) a mechanically-sound rigid frame with a simpler construction compared to conventional playards that is easier to operate and provides desired clearances in accordance to various consumer safety standards; 2) soft goods attached to the frame to provide a partially enclosed space for the child; optionally 3) a canopy cover assembly mounted to the frame to provide shade for the child; and optionally 4) a bassinet accessory coupled to the frame and/or the soft goods to provide an elevated surface to support the child. It should be appreciated that various concepts introduced above and discussed in greater detail below may be implemented in multiple ways. Examples of specific implementations and applications are provided primarily for illustrative purposes so as to enable those skilled in the art to practice the implementations and alternatives apparent to those skilled in the art.

[0287] The figures and example implementations described below are not meant to limit the scope of the present implementations to a single embodiment. Other implementations are possible by way of interchange of some or all of the described or illustrated elements. Moreover, where certain

elements of the disclosed example implementations may be partially or fully implemented using known components, in some instances only those portions of such known components that are necessary for an understanding of the present implementations are described, and detailed descriptions of other portions of such known components are omitted so as not to obscure the present implementations.

**[0288]** In the discussion below, various examples of inventive foldable playards are provided, wherein a given example or set of examples showcases one or more particular features of a frame, a X-frame assembly, a leg support assembly, a latch, soft goods, a canopy cover assembly, and a bassinet accessory. It should be appreciated that one or more features discussed in connection with a given example of a foldable playard may be employed in other examples of foldable playards according to the present disclosure, such that the various features disclosed herein may be readily combined in a given foldable playard according to the present disclosure (provided that respective features are not mutually inconsistent).

**[0289]** Certain dimensions and features of the foldable playard are described herein using the terms “approximately,” “about,” “substantially,” and/or “similar.” As used herein, the terms “approximately,” “about,” “substantially,” and/or “similar” indicates that each of the described dimensions or features is not a strict boundary or parameter and does not exclude functionally similar variations therefrom. Unless context or the description indicates otherwise, the use of the terms “approximately,” “about,” “substantially,” and/or “similar” in connection with a numerical parameter indicates that the numerical parameter includes variations that, using mathematical and industrial principles accepted in the art (e.g., rounding, measurement or other systematic errors, manufacturing tolerances, etc.), would not vary the least significant digit.

#### **An Exemplary Foldable Playard with X-Frame Assemblies**

**[0290]** FIGS. 2A-2C show an exemplary frame 100a for a foldable playard in an unfolded configuration. As shown, the frame 100a may include multiple leg support assemblies 110a and multiple X-frame assemblies 140a that are arranged to outline and define an interior space 102. In particular, each leg support assembly 110a may be coupled to another adjacent leg support assembly 110a via a X-frame assembly 140a to form a closed frame structure (e.g., a frame that surrounds and separates the interior space 102 from the surrounding environment). As discussed further below in connection with FIG. 5A, in addition to the frame 100a, a foldable playard 1000a

also includes soft goods 300 that are partially disposed within the interior space 102 to provide a padded, partially enclosed space 301 to contain a child 50. The soft goods 300 will be described in more detail below.

**[0291]** With reference again to FIG. 2A, the leg support assemblies 110a of the frame 100a may provide vertical or nearly vertical support stands that define the spatial extent of the interior space 102 in the unfolded configuration. In other words, the leg support assemblies 110a may define and/or otherwise be disposed along side edges 104 of the interior space 102. The X-frame assemblies 140a may provide the structural support to position and orient the leg support assemblies 110a as desired, as well as provide a mechanism to facilitate folding and/or unfolding of the frame 100a. As shown in FIG. 2A, each X-frame assembly 140a may define and/or otherwise be disposed on a side face 106 of the interior space 102 between adjacent side edges 104.

**[0292]** For the frame 100a shown in FIGS. 2A-2C, the interior space 102 has a horizontal cross-section (i.e., a cross-section in a plane parallel to a ground 90 supporting the frame 100a) shaped as a regular hexagon. However, it should be appreciated that in other implementations disclosed herein and discussed in further detail below, the number of leg support assemblies 110a and/or X-frame assemblies 140a may be adjusted to form interior spaces 102 with different horizontal cross-sectional shapes including, but not limited to a square, a rectangle, a pentagon, a hexagon, an octagon, a regular polygon, and an irregular polygon (i.e., the sides have different dimensions).

**[0293]** In some implementations, the interior space 102 may further form a three-dimensional volume shaped as a right prism. Said in another way, the leg support assemblies 110a may be vertically oriented such that the horizontal cross-section of the interior space 102 is identical or substantially identical in shape and dimensions at any vertical position along the length of the leg support assemblies 110a. In other implementations, the interior space 102 may form a three-dimensional volume shaped as a truncated pyramid where a bottom portion of the interior space 102 near the ground 90 is larger than a top portion of the interior space 102. Said in another way, the leg support assemblies 110a may be tilted when the frame 100a is deployed such that the top portions of the leg support assemblies 110a are positioned closer together than a bottom portion of the leg support assemblies 110a so that the area of the horizontal cross-section of the interior space 102 decreases from the bottom portion to the top portion of the leg support assemblies 110a if the leg support assemblies 110a are substantially straight in shape. In one aspect, a frame 100a forming

a truncated pyramidal interior space 102 may be preferable for enhancing mechanical stability. The manner in which this geometry is achieved will be discussed in more detail below.

**[0294]** In the frame 100a shown in FIG. 2A, each leg support assembly 110a may include a leg tube 112 having a top end 113a and a bottom end 113b (see, for example, FIG. 4A), a foot 114 coupled to the bottom end 113b to support the frame 100a on the ground 90, a corner 130 coupled to the top end 113a of the leg tube 112, and a slider 120 that is slidably coupled to the leg tube 112 and positioned between the foot 114 and the corner 130. The top end 113a of the leg tube 112 and/or the corner 130 may coincide with a top vertex 105 of the interior space 102 and the bottom end 113b of the leg tube 112 and/or the foot 114 may coincide with a bottom vertex 107 of the interior space 102.

**[0295]** In this implementation, each X-frame assembly 140a may include a pair of X-frame tubes 142a and 142b (also referred to as X-tubes 142a and 142b) that are arranged to cross one another to form a single X-shaped structure. It should be appreciated the term X-frame tube refers to a tube that forms part of the X-frame assembly and is not intended to limit the tube to a particular geometry or shape. The X-frame tubes 142a and 142b may be rotatably coupled to each other and to respective corners 130 and sliders 120 of adjacent leg support assemblies 110a. Thus, the X-frame assemblies 140a are pivot and slidable X-frame assemblies where the X-frame tubes 142a and 142b rotate relative to each other and the leg support assemblies 110a and translate relative to the leg tubes 112 via movement of the sliders 120. This enables the frame 100a to be folded into a more compact structure that occupies less volume and/or allows for a larger interior space 102 compared to, for example, conventional playards with pivot-only X-frame assemblies.

**[0296]** In some implementations, the manner in which the multiple X-frame assemblies 140a and the leg support assemblies 110a are coupled to each other may enable a caregiver to fold and/or unfold the frame 100a in a single step. For example, the caregiver may unfold the frame 100a by moving the slider 120 in one leg support assembly 110a towards the corner 130. The motion of the slider 120, in turn, causes the adjoining X-frame assemblies 140a to rotate and translate. The motion of the adjoining X-frame assemblies 140a, in turn, causes the sliders 120 in the adjacent leg support assemblies 110a to move in a similar manner. This process may occur simultaneously for all X-frame assemblies 140a and all sliders 120 resulting in the frame 100a being unfolded as the caregiver moves the slider 120 for the one leg support assembly 110a. Once the frame 100a is

unfolded, a latch 200a, which will be described in more detail below, may be actuated to lock the frame 100a in the unfolded configuration (e.g., the latch 200a prevents the sliders 120 from sliding back down the respective leg tubes 112 towards the feet 114).

**[0297]** In some implementations, the frame 100a may be folded and/or unfolded with the feet 114 of the leg support assemblies 110a remaining in contact with the ground 90. The leg tubes 112 may also remain vertically upright or nearly vertically upright (e.g., leg tubes 112 may intentionally be tilted when the frame 100a is unfolded to improve stability) as the frame 100a is folded and/or unfolded. In this manner, the process of folding and/or unfolding the frame 100a may be made easier for the caregiver. For example, the caregiver would not have to balance the frame 100a from tipping over while setting up and/or tearing down the playard 1000a.

**[0298]** With reference to FIG. 2B, in some implementations, the X-frame tubes 142a and 142b of each X-frame assembly 140a may be positioned within a top portion 108 of the frame 100a and/or the interior space 102 when the frame 100a is unfolded. Said in another way, the X-frame assemblies 140a may form a perimeter structure around the top portion 108 of the frame 100a that outlines the horizontal cross section of the top opening of the interior space 102. For example, FIG. 2C shows the X-frame assemblies 140a form a top perimeter structure 109 that outlines a regular hexagon corresponding to the shape of the interior space 102.

**[0299]** Positioning the X-frame tubes 142a and 142b in the top portion 108 of the frame when the frame is in the unfolded configuration provides several benefits to the frame 100a and, in turn, to a foldable playard comprising the frame 100a.

**[0300]** First, each X-frame assembly 140a in the frame 100a may function as a top rail that couples together two adjacent leg support assemblies 110a and provides mechanical rigidity and stability to the frame 100a. Said in another way, the X-frame assembly 140a may be unfolded to such an extent that the X-frame tubes 142a and 142b form a shallow X-frame structure in the top portion 108 of the frame that effectively functions as a rigid top rail. For example, in the limit where the respective sliders 120 are positioned proximate to the respective corners 130 in adjacent leg support assemblies 110a, the X-frame tubes 142a and 142b may be in near parallel alignment with one another when viewing the frame 100a from the side or the front. Thus, each X-frame tube 142a and 142b may separately function as a top rail.

**[0301]** In some implementations, the leg support assemblies 110a may only be coupled to one another via the X-frame assemblies 140a. In other words, the frame 100a may exclude other support structures, such as a separate compliant and/or rigid top rail (e.g., the webbing 14 of the playards 10a and 10b shown in FIG. 1A and FIG. 1B, the rigid top rails 32 of the playard 10c shown in FIG. 1C) or a bottom support structure (e.g., the bottom support structure 34 of the playard 10c shown in FIG. 1C), which may appreciably reduce the number of parts for manufacture and assembly. For example, as shown in FIGS. 2A-2C, the portion of the leg tubes 112 located between the bottom end 113b and the slider 120 when the frame 100a is unfolded may not be coupled to another portion of the frame 100a (e.g., the bottom portions of the leg tubes 112 are mechanically unconstrained).

**[0302]** In some implementations, the frame 100a, comprising only leg support assemblies 110a and X-frame assemblies 140a to couple the leg support assemblies 110a together, may have sufficient mechanical rigidity, stability, and/or strength to meet the requirements set forth in various consumer safety standards (e.g., ASTM F406-19, 7.3.3, 7.11). For example, FIG. 7B shows the playard 1000a with the frame 100a unfolded and with soft goods 300 installed undergoing a stability test (e.g., ASTM F406-19, 5.12, 8.17). For this test, the playard 1000a was placed onto a flat piece of plywood and tilted at varying angles with a test weight disposed within the playard 1000a leaning against one side of the frame 100a. Based on this test, it was found the playard 1000a did not tip even when tilted at an angle of 20 degrees with at least three feet 114 remaining in contact with the plywood base. This result exceeds the requirements set forth in ASTM F406-19, 8.17, which require the playard to maintain three contact points with the plywood base when tilted to an angle of 10 degrees.

**[0303]** This may be accomplished, in part, by tailoring the materials and/or dimensions of the X-frame tubes 142a and 142b to provide the mechanical properties that ensure the frame 100a is mechanically rigid and stable when deployed. For example, the X-frame tubes 142a and 142b may be formed from steel tubing with an outer diameter of about 0.625 inches (5/8 inches) and a total length of about 24.5 inches. The term “about,” when used to describe the dimensions of the X-frame tubes 142a and 142b, are intended to cover manufacturing tolerances. For example, “about 0.625 inches” may correspond to the following dimensional ranges: 0.61875 to 0.63125 inches (+/- 1% tolerance), 0.62 to 0.63 inches (+/- 0.8% tolerance), 0.62125 to 0.62875 inches (+/- 0.6% tolerance), 0.6225 to 0.6275 inches (+/- 0.4% tolerance), 0.62375 to 0.62625 inches (+/- 0.2%

tolerance). Similar tolerances may be applied to describe the total length of the X-frame tubes 142a and 142b.

**[0304]** It should also be appreciated the X-frame tubes 142a and 142b may be formed from other materials including, but not limited to, aluminum and carbon fiber. The X-frame tubes 142 and 142b may also have different dimensions depending, in part, on the desired size of the frame 100a and/or the interior space 102 and the mechanical properties of the materials used to form the X-frame tubes 142a and 142b. In some implementations, the X-frame assemblies 140a may all have substantially identical or identical dimensions and/or shapes resulting in an interior space 102 with a horizontal cross-section shaped as a regular polygon. In some implementations, the frame 100a may include X-frame assemblies 140a having different dimensions and/or shapes resulting in an interior space 102 that is skewed in shape.

**[0305]** Additionally, with reference to FIG. 2B, the length  $L$  of the leg tubes 112, defined as the distance between the top end 113a and the bottom end 113b, may generally be kept relatively small where possible in order to reduce the likelihood of the frame 100a being tilted especially when a force is applied along the top portion 108 of the frame 100a. For example, the length  $L$  may be chosen to ensure certain constraints on the frame 100a are satisfied. These constraints include: (1) providing a desired height for the interior space 102; (2) providing sufficient overlap with the foot 114 and the corner 130 to couple the foot 114 and corner 130 to leg tube 112; and/or (3) providing sufficient room for the slider 120 to move between the foot 114 and the corner 130 to fold and/or unfold the frame 100a. It should be appreciated that the lateral and vertical dimensions of the interior space 102 are coupled due, in part, to the rotational and translational motion of the X-frame assemblies 140a (e.g., an increase in the lateral dimensions of the interior space 102 results in a corresponding increase in the vertical dimensions to ensure the X-frame assemblies 140a have sufficient room to slide vertically along the leg tubes and hence fold).

**[0306]** In some implementations, the length  $L$  of the leg tubes 112 may be about 26 inches. Similar to the dimensions of the X-frame tubes 142a and 142b, the term “about,” when used to describe the dimensions of the leg tube 112, are intended to cover manufacturing tolerances. The tolerance values may be the same as the X-frame tubes 142a and 142b. In some implementations, the leg tubes 112 in the leg support assemblies 110a may be substantially identical or identical. In some implementations, the leg tubes 112 may have different shapes and/or dimensions (e.g., some leg

tubes 112 may be vertically oriented while other leg tubes 112 may be tilted when the frame 100a is unfolded).

**[0307]** Second, another benefit provided by positioning the X-frame tubes 142a and 142b in the top portion 108 of the frame when the frame is in the unfolded configuration is that the X-frame assemblies 140a occupy a smaller portion of the side faces 106 of the interior space 102 as compared to conventional playards with X-frame assemblies. When the soft goods 300 includes transparent and/or see-through side portions, the placement of the X-frame assemblies 140a in the top portion 108 of the frame allows for greater visibility of the partially enclosed space 301 when the soft goods 300 are coupled to the frame 100a. Said in another way, the X-frame assemblies 140a do not appreciably visually obstruct and/or impede the caregiver from seeing their child when the child 50 is in the playard 1000a.

**[0308]** Additionally, the soft goods 300 may use less material to cover the X-frame assemblies 140a. In some implementations, the soft goods 300 may cover the corners 130 of the leg support assemblies 110a and partially cover the X-frame assemblies 140a such that the latch 200a, when disposed in the top portion 108 of the frame 100a, remains accessible to the caregiver. In some implementations, the soft goods 300 may fully cover the X-frame assemblies 140a as well as the corners 130 and the sliders 120 of the leg support assemblies 110a such that an observer may only see the leg tubes 112 and/or the feet 114 of the leg support assemblies 110a. In this manner, the foldable playard 1000a may be presented with a cleaner, more aesthetically desirable appearance to a consumer, in both indoor and outdoor settings.

**[0309]** As discussed above in connection with FIG. 2B, the top portion 108 may generally correspond to the portion of the frame 100a proximate to the top ends 113a of the leg tubes 112 and/or the corners 130 of each leg support assembly 110a. More specifically, the top portion 108 may be defined as the portion of the frame 100a located between a top horizontal plane 92 that intersects the top ends 113a of the leg tubes 112 and/or the corners 130, and a bottom horizontal plane 91 that is offset from the top horizontal plane 92 by an offset distance,  $x_l$ , along the length of the respective leg tubes 112. When the frame 100a is unfolded, the X-frame tubes 142a and 142b, the sliders 120, and the corners 130 are disposed within the top portion 108. The offset distance,  $x_l$ , may be defined as a fraction of the total length  $L$  of the leg tube 112 assuming the leg tubes 112 in the frame 100a have identical lengths. In some implementations, the offset distance,

$x_1$ , may be less than or equal to 30% of the total length,  $L$ , of the leg tubes 112 and, more preferably, less than or equal to 20% of the total length of the leg tubes 112.

**[0310]** FIG. 2B also shows the frame 100a may have an overall vertical height,  $H_1$ , defined as the distance from the ground 90 to the top horizontal plane 92 along a vertical axis (i.e., normal to the ground) in the unfolded configuration. FIG. 2E similarly shows the frame 100a may have an overall vertical height,  $H_2$ , defined as the distance from the ground 90 to a top horizontal plane 92A in the folded configuration. In some implementations, the height of the frame 100a may remain substantially constant or constant between the folded and unfolded configurations of the frame. In other words, the heights  $H_1$  and  $H_2$  may be equal or substantially similar and the planes 92 and 92A are coplanar or substantially coplanar. In some implementations, however, the height of the frame 100a may vary due, for example, to the leg support assemblies 110a flaring outwards when the frame 100a is unfolded as discussed in greater detail below. If the frame 100a flares outwards in the unfolded configuration, the height  $H_2$  may be somewhat greater than the height  $H_1$  (i.e., the plane 92A in the folded configuration may be disposed somewhat above the plane 92 in the unfolded configuration).

**[0311]** FIGS. 3A and 3B show additional views of the X-frame assembly 140a in the frame 100a. As shown, the X-frame tubes 142a and 142b may be rotatably coupled to each other via a pin joint 145. The X-frame tube 142a may have a first end 143a rotatably coupled to the corner 130 of one leg support assembly 110a via a pin joint 146a and a second end 143b rotatably coupled to the slider 120 of another leg support assembly 110a via a pin joint 146b. Similarly, the X-frame tube 142b may be rotatably coupled to the corner 130 of one leg support assembly 110a via a pin joint 146d and rotatably coupled to the slider 120 of another leg support assembly 110a via a pin joint 146c.

**[0312]** The pin joints 145 and 146a-146d may generally include a fastener (not shown) with a shaft inserted through openings 147 (see FIG. 4B) on the X-frame tubes 142a and 142b to allow rotational motion between the X-frame tubes 142a and 142b, the sliders 120, and the corners 130. The fastener may be various types of captive fasteners including, but not limited to, a rivet with a cap (e.g., a rolled rivet) and a bolt fastener with a nut.

**[0313]** Generally, the nominal dimensions and tolerances of the openings 147 and the shaft of the fastener affects the tightness or looseness of the pin joints 145 and 146a-146d. If the opening 147

is dimensioned to interfere with the fastener (e.g., the size of the opening 147 is smaller than the size of the shaft of the fastener), the caregiver may have to apply a greater force to rotate the X-frame tubes 142a and 142b. In some instances, the pin joints 145 and 146a-146d may be too tight such that the respective feet 114 of each leg support assembly 110a do not contact the ground 90 when the frame 100a is unfolded. For example, the caregiver may move the slider 120 of one leg support assembly 110a towards the corresponding corner 130, but the opposing sides of the frame 100a may only be partially unfolded. In contrast, if the size of the opening 147 is appreciably larger than the fastener shaft, the pin joints 145 and 146a-146d may allow the X-frame tubes 142a and 142b to rotate and/or translate along other unwanted axes of motion (e.g., the frame 100a may wobble), which may compromise the mechanical stability of the frame 100a. Thus, in some implementations, the nominal dimensions and tolerances of the opening 147 and the shaft of the fastener are particularly chosen to be sufficiently loose to ensure the feet 114 of the leg support assemblies 110a contact the ground 90 while still being sufficiently tight to limit unwanted rotational and/or translation motion between the X-frame tubes 142a and 142b and/or the sliders 120 or corners 130. For example, the tolerance (or clearance) between the shaft of the fastener and the edge of the opening 147 may be greater than or equal to about 0.010 inches and, more preferably, greater than or equal to about 0.015 inches.

**[0314]** As shown in FIG. 3A, the pin joint 145 may generally be located along the length of the respective X-frame tubes 142a and 142b. For example, the pin joint 145 may be positioned at an offset distance,  $z_1$ , from the first end 143a and an offset distance,  $z_2$ , from the second end 143b. In some implementations, the offset distances  $z_1$  and  $z_2$  may be equal, which causes the respective first and second ends 143a and 143b of the X-frame tubes 142a and 142b to follow the same circular path when the X-frame tubes 142a and 142b are rotated. This, in turn, causes the orientation of the leg support assemblies 110a to remain unchanged when the frame 100a is being folded and/or unfolded. For example, the leg tubes 112 of each leg support assembly 110a may remain vertically oriented for both folded and unfolded configurations.

**[0315]** In other implementations, however, the offset distances  $z_1$  and  $z_2$  may not be equal. For example, the offset distance  $z_2$  may be larger than the offset distance  $z_1$  causing the first end 143a of the X-frame tube 142a to follow a smaller circular path and the second 143b to follow larger circular path when the X-frame tube 142a is rotated. The respective first and second ends 143a and 143b of the X-frame tube 142b may similarly follow smaller and larger circular paths, respectively.

This, in turn, may cause the leg support assemblies 110a and, in particular, the leg tubes 112 to flare outwards when the frame 100a is unfolded. In other words, the leg tubes 112 of the leg support assemblies 110a may be tilted due to the rotational motion of the X-frame tubes 142a and 142b in the X-frame assemblies 140a such that the top ends 113a constitute the vertices of a smaller horizontal cross-section (parallel to the ground) than the bottom ends 113b (i.e., the top ends 113a are positioned closer to one another than the bottom ends 113b). In this manner, the frame 100a may define an interior space 102 with a truncated pyramidal interior shape as described above, which may be beneficial in improving the mechanical stability of the frame 100a (e.g., the frame 100a is less likely to be tilted over). With reference again to FIG. 2B, in some implementations the leg support assemblies 110a may be flared outwards such that respective longitudinal axes 111a associated with the leg tubes 110a are tilted at an angle,  $\theta$ , relative to the ground 90, wherein the angle ranges between 80 degrees and 88 degrees and, more preferably, between 83 degrees and 85 degrees.

**[0316]** Turning now to FIG. 3B, in some implementations the X-frame tubes 142a and 142b may also be bent in shape. For example, the first and second ends 143a and 143b of the X-frame tube 142a may be aligned along a first axis 141a while a central portion 144 of the X-frame tube 142a is aligned along a second axis 141b that is parallel to and offset from the axis 141a. The X-frame tube 142b may have a similar bent shape as the X-frame tube 142a. In some implementations, the offset between the first and second axes 141a and 141b may be chosen to provide sufficient clearance between the X-frame tubes 142a and 142b such that the respective first and second ends 143a and 143b of the X-frame tubes 142a and 142b lie on the same plane (e.g., the side face 106 of the interior space 102) as shown in FIG. 3B. This, in turn, allows the portions of the corners 130 and the sliders 120 to also lie on the same plane with the first and second ends 143a and 143b of the X-frame tubes 142a and 142b. In some implementations, aligning the corners 130 and sliders 120 in this manner may allow the frame 100a to fold more compactly.

**[0317]** FIGS. 3C-3E show additional views of the leg support assemblies 110a in the frame 100a. As shown, the leg tube 112 may be a substantially elongated, hollow tube that defines that path along which the slider 120 travels when the frame 100a is being folded and/or unfolded. In some implementations, the leg tube 112 may be substantially straight such that the slider 120 follows a straight path along the longitudinal axis 111a (see FIGS. 2A-2C). In some implementations, the longitudinal axis 111a may correspond to the centerline axis of the leg tube 112 (i.e., an axis that

intersects the center point of the leg tube 112). However, it should be appreciated the leg tube 112 may also be curved in other implementations to define a correspondingly curved path for the slider 120 to follow. Examples of curved leg tubes 112 will be discussed in further detail below. In some implementations, the leg tube 112 may have a cross-section that remains constant along the length,  $L$ , of the leg tube 112. In some implementations, the leg tube 112 may have various cross-sectional shapes including, but not limited to a circle, an oval, and an oblong shape. The leg tube 112 may also be formed from various materials including, but not limited to steel, aluminum, and carbon fiber.

**[0318]** The slider 120 may include a base 121 that defines a through hole opening 122 shaped and/or dimensioned to surround the leg tube 112, thus enabling the slider 120 to slidably move along the leg tube 112. In some implementations, the shape of the opening 122 may conform with the cross-sectional shape of the leg tube 112. The slider 120 may further include an extended portion 124 (also referred to herein as an arm 124) coupled to one side of the base 121 to couple the X-frame tube 142a of one X-frame assembly 140a to the slider 120 via a fastener inserted through an opening on the extended portion 124 aligned to the opening 147 of the X-frame tube 142a (see, for example, the exploded views of FIGS. 4A and 4B). The extended portion 124 may also include a recessed opening 124a to receive the end of the X-frame tube 142a that is coupled to the slider 120. The slider 120 may also include an extended portion 126 (also referred to herein as an arm 126) similar to the extended portion 124 that is disposed opposite from the extended portion 124 to couple the X-frame tube 142b of another X-frame assembly 140a to the slider 120 via another fastener inserted through an opening on the extended portion 126 aligned to the opening 147 of the X-frame tube 142b.

**[0319]** The extended portions 124 and 126 may generally be oriented at an angle relative to each other to align the respective X-frame tubes 142a and 142b from adjoining X-frame assemblies 140a along the desired geometry of the interior space 102. For example, the extended portions 124 and 126 may be rotated relative to one another by an obtuse angle of approximately 120 degrees corresponding to the angles between adjoining sides of a hexagon. In some implementations, the extended portions 124 and 126 may lie on the same horizontal plane. In some implementations, the extended portions 124 and 126 may be offset vertically from one another if the respective X-frame tubes 142a and 142b coupled to the slider 120 are not identical. In some implementations,

the sliders 120 of the leg support assemblies 110a may be identical with one another, thus reducing the number of unique parts for manufacture.

**[0320]** The corner 130 may include a base 131 that defines an opening 132 to receive the top end 113a of the leg tube 112. In some implementations, the shape of the opening 132 may conform with the cross-sectional shape of the leg tube 112. Similar to the slider 120, the corner 130 may include extended portions 134 and 136 (also referred to herein as an arm 134 and an arm 136) disposed on opposing sides of the base 131 to couple the X-frame tube 142b of one X-frame assembly 140a and the X-frame tube 142a of another X-frame assembly 140a to the corner 130 using a similar attachment mechanism as the slider 120, e.g., a fastener inserted through an opening aligned to the openings 147 of the X-frame tubes 142a and 142b (see, for example, the exploded views of FIGS. 4A and 4B). The extended portions 134 and 136 may each have recessed openings 134a and 136a, respectively, to receive respective ends of the X-frame tubes 142a and 142b.

**[0321]** The extended portions 134 and 136 may also be oriented at an angle relative to each other to align the respective X-frame tubes 142a and 142b from adjoining X-frame assemblies 140a along the desired geometry of the interior space 102. The extended portions 134 and 136 may also lie on the same horizontal plane and/or offset vertically from one another if the respective X-frame tubes 142a and 142b coupled to the corner 130 are not identical. In some implementations, the corners 130 of the leg support assemblies 110a may be identical with one another, thus reducing the number of unique parts for manufacture.

**[0322]** FIG. 3C further shows the corner 130 may include a tab portion 138 that extends downwards along the leg tube 112 to support a snap-fit connector 139 to attach the soft goods 300 to the frame 100a. In some implementations, the tab portion 138 may be shaped and/or dimensioned to position the snap-fit connector 139 at a desired location along the leg tube 112. For example, the snap-fit connector 139 may be offset from the top end 113a to ensure the soft goods 300 overlaps and wraps around the top portion 108 of the frame 100a. In some implementations, an opening formed in the tab portion 138 to attach the snap-fit connector 139 to the corner 130 may also be used to securely couple the corner 130 to the leg tube 112 using the same fastener.

**[0323]** FIG. 3E shows a magnified view of the foot 114 of the leg support assembly 110a. As described above, the foot 114 supports the frame 100a and the foldable playard 1000a on the

ground 90. As shown, the foot 114 may define an opening 115 to receive the bottom end 113b of the leg tube 112. In some implementations, the shape of the opening 115 may conform with the cross-sectional shape of the leg tube 112. The foot 114 may further include an opening 119 to securely couple the foot 114 to the leg tube 112 using, for example, a fastener (see, for example, FIG. 4C).

**[0324]** In some implementations, the foot 114 may also include a looped or ringed structure that extends from the base of the foot 114 to provide another attachment point to couple the soft goods 300 to the frame 100a. For example, FIG. 3C shows the foot 114 may include a D-ring 116 defining a D-shaped opening 117. The soft goods 300 may include a strap or a tether that is inserted through the D-shaped opening 117 and tied to the foot 114 to mechanically attach a bottom portion of the soft goods 300 to the frame 100a. As shown, the D-shaped opening 117 may be aligned such that a centerline axis 118 of the opening 117 is aligned substantially parallel with the longitudinal axis 111a of the leg tube 112. This orientation also allows the D-ring 116 to increase the area that the foot 114 contacts the ground 90, which may further improve the mechanical stability of the frame 100a. However, it should be appreciated the orientation and placement of the D-ring 116 may be varied in other implementations. For example, the D-ring 116 may be rotated 90 degrees relative to the ground such that the axis 118 of the opening 117 is perpendicular to the longitudinal axis 111a.

**[0325]** FIG. 5A shows the foldable playard 1000a with the soft goods 300 coupled to the frame 100a. As described above, the soft goods 300 defines a partially enclosed space 301 placed within the interior space 102 of the frame 100a to contain the child. In some implementations, the soft goods 300 may remain attached to the frame 100a as the frame 100a is folded and/or unfolded. As shown in FIG. 5A, the soft goods 300 may include a floor portion 304 that rests on the ground 90 when the playard 1000a is unfolded. The soft goods 300 may also include side portions 306 that define and surround the partially enclosed space 301. In some implementations, the side portions 306 may be transparent (e.g., a transparent plastic) or see-through (e.g., a mesh) so that a child in the playard is observable from outside the partially enclosed space 301. The soft goods 300 may also include one or more straps (e.g., a Velcro strap) and/or tethers to couple the soft goods 300 to each D-ring 116 of each foot 114 in the leg support assemblies 110a.

**[0326]** The soft goods 300 may also include a soft goods top portion 302 to wrap the soft goods 300 around the top portion 108 of the frame 100a. As shown in FIG. 5A, the soft goods top portion 302 may be formed from an opaque textile material with multiple layers of fabric to provide padding on the portions of the frame 100a that are covered. The soft goods 300 also may include integrated snap-fit connectors 312 that couple to the snap-fit receivers 139 of the corners 130. In some implementations, the soft goods 300 may include the same number of snap-fit connectors 312 such that the soft goods 300 attaches to each corner 130 of the frame 100a. In some implementations, the snap-fit connector 312 may be disposed on a tab 310 that is attached to an interior piece of the soft goods 300 along the soft goods top portion 302 as shown in FIG. 5C. The tab 310 may stiffen the interior piece of the soft goods top portion 302 to ensure the soft goods top portion 302 remains flush against the frame 100a (e.g., the soft goods top portion 302 does not curl upwards) when the snap-fit connector 312 is coupled to the snap-fit connector 139 on the corner 130 as shown in FIG. 5B. The tab 310 may be formed from a compliant material, such as polyethylene, and shaped to be stiffer than the surrounding textile material of the soft goods 300.

**[0327]** FIGS. 6A-6D show multiple views of the latch 200a disposed on the frame 100a. As described above, the latch 200a may lock the frame 100a in the unfolded configuration. In particular, the latch 200a may maintain the sliders 120 of the leg support assemblies 110a proximate to the corresponding corners 130 such that the X-frame assemblies 140a remain unfolded forming a shallow X-frame structure in the top portion 108 of the frame. Thus, the latch 200a may provide sufficient mechanical restraints to support the various forces and/or torques applied to one or more of the sliders 120 (e.g., the weight of the X-frame tubes 142a and 142b acting on the slider 120).

**[0328]** The latch 200a may generally be coupled to and/or couple together various components of the frame 100a including, but not limited to the slider 120, the corner 130, and the X-frame tubes 142a or 142b. Furthermore, the latch 200a may be disposed, at least in part, within the top portion 108 of the frame 100a. This may enable the latch 200a to be at least partially covered by the soft goods 300. For example, the latch 200a may directly couple the corner 130 of one leg support assembly 110a to a X-frame tube 142a or 142b of an adjoining X-frame assembly 140a as shown in FIG. 6A.

**[0329]** The frame 100a may generally include one or more latches disposed on one or more leg support assemblies 110a and/or the X-frame assemblies 140a. For example, the frame 100a may include latches disposed on opposing sides of the frame 100a to ensure the frame 100a, when unfolded, maintains an even, unfolded shape (e.g., one side of the frame 100a does not sag downwards relative to another side). However, in other implementations, a single latch is sufficient to lock the frame 100a in the unfolded configuration while keeping the various leg support assemblies 110a and X-frame assemblies 140a unfolded evenly. For example, with reference again to FIGS. 2A-2C, these figures show that the frame 100a includes a single latch 200a disposed, in part, on one leg support assembly 110a and one X-frame assembly 140a. In some implementations, the latch 200a may be configured to withstand a load greater than or equal to 10 lbs. before being disengaged or unlocked.

**[0330]** FIG. 6A shows the latch 200a may include a latch member 210 (also referred to herein as a “flex lock”) with a top end 211a coupled to the corner 130 of one leg support assembly 110a and a latch boss 230 coupled to the X-frame tube 142a of one X-frame assembly 140a. The latch member 210 may include an opening 212 disposed at the first end 211a that aligns with the opening on the corner 130 used to couple to the X-frame tube 142b. In this manner, a single fastener may couple the latch member 210, the corner 130, and the X-frame tube 142b together and the corner 130 may remain unmodified. In other words, the latch member 210 may be coupled to any one of the corners 130 in the leg support assemblies 110a of the frame 100a provided the latch boss 230 is coupled to one of the X-frame tubes 142a and 142b adjoining the leg support assembly 110a. In some implementations, the latch member 210 may be coupled to the corner 130 via a pin joint connection or a rigid connection (e.g., in which the latch member 210 cannot be rotated relative to the corner 130). The latch boss 230 may include an opening that is shaped and/or dimensioned to conform with the X-frame tube 142a, thus enabling the latch boss 230 is slid onto the X-frame tube 142a for assembly. FIG. 6B shows the latch boss 230 may then be coupled to the X-frame tube 142a using, for example, a fastener inserted through respective openings (not shown) on the latch boss 230 and the X-frame tube 142a.

**[0331]** With reference again to FIG. 6A, the latch member 210 may include a latch opening 214 disposed at a second end 211b of the latch member 210 located opposite from the first end 211a. The latch opening 214 may be shaped and/or dimensioned to receive the latch boss 230. In other words, the latch opening 214 may function as a latch catch. In this manner, the latch member 210

may directly couple the corner 130 to the X-frame tube 142b by engaging with the latch boss 230, thus holding the slider 120 in the top portion 108 of the frame 100a near the corner 130.

**[0332]** The latch member 210 may also include a tab 220 disposed at the second end 211b. Generally, the latch member 210 may be a mechanically compliant component that bends when the caregiver pulls on the tab 220 to disengage the latch member 210 from the latch boss 230. The latch member 210 may also have sufficient mechanical rigidity such that a restoring force is generated when bent by the caregiver. When the caregiver releases the tab 220, the restoring force may return the latch member 210 back to its original shape. In some implementations, the latch member 210 may be formed from a plastic material. The latch member 210 may further have a sufficient thickness and/or be reinforced with integral rib structures to provide the desired mechanical rigidity.

**[0333]** In some implementations, the latch 200a may be a double-action latch (e.g., the caregiver needs to perform two operations to unlock the latch). For example, FIG. 6C shows the latch opening 214 of the latch member 210 may include a tab 216 disposed within the latch opening 214. FIG. 6D shows the latch boss 230 may include an undercut portion 232 that forms a notch or a slot between the X-frame tube 142a and an end portion 236. Thus, when the latch member 210 is coupled to the latch boss 230, the tab 216 of the latch member 210 is disposed within the undercut portion 232 and retained by the end portion 236 of the latch boss 230. In some implementations, the tab 216 may further define a slot 218 as shown in FIG. 6C, and the latch boss 230 may further include a rib 234 partially disposed within the undercut portion 232 as shown in FIG. 6D, that together facilitate alignment of the tab 216 to the undercut portion 232 to ensure the latch member 210 is properly engaged with the latch boss 230.

**[0334]** To setup the frame 100a and, by extension the playard 1000a, the caregiver may initially move the slider 120 of one leg support assembly 110a towards the corresponding corner 130 to partially unfold the frame 100a. As the frame 100a is being unfolded, the latch boss 230 disposed on the X-frame tube 142a is displaced towards the latch member 210 coupled to the corner 130. Once the latch boss 230 reaches the latch member 210 and, in particular, the tab 216, further movement of the slider 120 along the leg tube 112 results in contact between the latch boss 230 and the tab 216, which causes the latch member 210 to be deflected outwards. In some implementations, the latch member 210 may include a lead-in feature on the tab 216 (not shown),

such as a sloped or a ramped wall. The lead-in feature may allow the latch member 210 to be deflected more effectively as the latch boss 230 slides against the latch member 210 by orienting the contact force between the latch member 210 and the latch boss 230 along a direction that increases the magnitude of the torque applied to bend the latch member 210 (note that the pivot point of the latch member 210 is located at the mounting opening 212 as shown in FIG. 6A).

**[0335]** As the latch member 210 is deflected with further movement of the slider 120 along the leg tube 112, an internal restoring force is generated within the latch member 210, which is applied against the latch boss 230. As the caregiver continues to move the slider 120 towards the corner 130, the latch member 210 is deflected further outwards resulting in a higher magnitude restoring force being applied against the latch boss 230. When the slider 120 is moved sufficiently close to the corner 130, the latch boss 230 passes through the latch opening 214 and the restoring force causes the latch member 210 to snap back to its original position such that the latch boss 230 protrudes through the latch opening 214. Once the caregiver releases the slider 120, the slider 120 may move slightly downwards along the leg tube 112 due to gravity, causing the undercut portion 232 of the latch boss 230 to rest onto the tab 216 of the latch member 210.

**[0336]** FIG. 6E illustrates how a caregiver may transition the frame 100a and the playard 1000a to a folded configuration from the unfolded configuration by disengaging the double-action latch 200a. As shown in FIG. 6E, the caregiver may first squeeze the X-frame tubes 142a and 142b (as shown by the upward and downward arrows in FIG. 6E), which causes the slider 120 to move upwards along the leg tube 112, thus disengaging the tab 216 of the latch member 210 from the undercut portion 232 of the latch boss 230. While the caregiver is squeezing the X-frame tubes 142a and 142b together with one hand, the caregiver may then pull on the tab 220 of the latch member 210 with another hand to release the latch boss 230 from the latch opening 214 (as shown by the curved arrow in FIG. 6E). The “double-action” of the latch 200a is thus “squeeze-and-pull.” While holding the latch member 210, the caregiver may then release the X-frame tubes 142a and 142b and the slider 120 may then fall downwards along the leg tube 112 due, in part, to the weight of the X-frame assemblies 140a. The caregiver may then move the slider 120 downwards towards the foot 114 of the leg support assembly 110a, thus folding the playard 1000a.

**[0337]** With reference again to FIG. 6D, in some implementations of the double-action latch 200a, the undercut portion 232 and the end portion 236 of the latch boss 230 and the tab 216 of the latch

member 210 may be shaped and/or dimensioned such that latch member 210 cannot be pulled off the latch boss 230 without applying an appreciably large force (e.g., a force greater than 20 lbs). For example, FIG. 7A shows a force test being applied to the double-action latch 200a, which shows the latch member 210 remains engaged to the latch boss 230 when a force greater than 24 lbs is applied to the tab 220.

**[0338]** It should be appreciated that, in other implementations, the playard 1000a and, in particular, the frame 100a may include other types of latching mechanisms. For example, FIGS. 8A-8D show a playard 1000a where the frame 100a includes a single-action latch 200b (e.g., the caregiver needs to perform only one operation to release the latch) instead of (or in addition to) the double-action latch 200a discussed immediately above.

**[0339]** Specifically, FIG. 8A shows the playard 1000a with the soft goods 300 installed onto the frame 100a, where the soft goods 300 covers the corners 130 of the leg support assemblies 110a and partially covers the X-frame assemblies 140a. In this manner, a portion of the single-action latch 200b is left exposed to provide access to the caregiver (see, for example, FIG. 8B). As shown in FIGS. 8C and 8D, the single-action latch 200b may also include a latch member 210 that is coupled at one end to the corner 130 via a fastener inserted through an opening 212 on the latch member 210. The latch member 210 may once again include a latch opening 214 to receive a latch boss 230. In this implementation, the latch boss 230 is shown coupled to the X-frame tube 142b of the X-frame assembly 140a.

**[0340]** The single-action latch 200b may be locked in a similar manner as the double-action latch 200a. Specifically, the slider 120 is moved towards the corner 130, which causes the latch boss 230 to initially deflect the latch member 210 until the latch boss 230 reaches the latch opening 214. At this point, the restoring force generated within the latch member 210 causes the latch member 210 to return to its original position with the latch boss 230 protruding through the latch opening 214. In this manner, the single-action latch 200b may hold the frame 100a in the unfolded configuration.

**[0341]** To unlock the single-action latch 200b and fold the frame 100a, the caregiver may pull on the tab 220 to deflect and/or bend the latching member 210 outwards, thus releasing the latch member 210 from the latch boss 230. As before, while the caregiver holds the latch member 210, the slider 120 may then move downwards along the leg tube 112 via a combination of gravity and

the caregiver moving the slider 120 towards the foot 114 of the leg support assembly 110a as shown in FIG. 8D. In this manner, the playard 1000a may be folded.

**[0342]** FIGS. 9A-9F show another exemplary latch 200c installed on the frame 100a of the playard 1000a. FIG. 9A shows the frame 100a once again covered with soft goods 300. FIG. 9B shows the soft goods 300 only partially covers the X-frame assemblies 140a such that a bottom portion of the latch 200c is exposed. FIG. 9C shows the frame 100a without soft goods 300 attached. As shown, the latch 200c may be positioned on the frame 100a similar to the double-action latch 200a and the single-action latch 200b, i.e., the latch 200c is disposed in the top portion 108 of the frame 100a.

**[0343]** FIG. 9D shows the latch 200c may once again include a latch member 210 that is coupled to the corner 130 via a fastener inserted through an opening 212 at one end of the latch member 212. However, in this example, the latch member 210 may form a notch 240a that is shaped and/or dimensioned to form a snap-fit connection with the X-frame tube 142b. In this manner, the latch 200c may utilize fewer parts compared to the latches 200a and 200b (e.g., the latch 200c only includes the latch member 210 and a fastener to couple the latch member 210 to the corner 130). As shown, the notch 240a may be shaped to conform with the cross-sectional shape of the X-frame tube 142b. As before, the latch member 210 may be a mechanically compliant component that may be bent and/or deflected due to contact with the X-frame tube 142b (e.g., when unfolding the frame 100a) and/or by the caregiver pulling on the tab 220 disposed at the bottom end of the latch member 210 to release the latch member 210 from the X-frame tube 142b (e.g., when folding the frame 100a).

**[0344]** In the implementation shown in FIGS. 9A-9D, the frame 100a and, by extension, the playard 1000a may be setup once again by having the caregiver move the slider 120 of one leg support assembly 110a towards the corresponding corner 130. When the X-frame tube 142b contacts the latch member 210 and, specifically, the tab 220, the latch member 210 may be deflected outwards. The latch member 210 may further include a lead-in feature 222 (e.g., a sloped wall) to deflect the latch member 210 as the latch member 210 contacts the X-frame tube 142b. The caregiver may then continue to move the slider 120 towards the corner 130 until the notch 240a aligns with the X-frame tube 142b.

**[0345]** In some implementations, the latch member 210 may be sufficiently compliant such that deflection of the latch member 210 does not produce an appreciable restoring force. Thus, the caregiver needs to press the latch member 210 to snap-fit the latch member 210 onto the X-frame tube 142b. In other implementations, however, the latch member 210 may instead generate an internal restoring force when bent and/or deflected (e.g., the latch member 210 includes rib structures to increase the mechanical rigidity of the latch member 210). The restoring force may be of sufficient magnitude to cause the notch 240a to at least partially engage the X-frame tube 142b. In some instances, the caregiver may still press the latch member 210 onto the X-frame tube 142b, albeit with less force due to the restoring force generated in the latch member 210, to ensure the latch member 210 is properly engaged to the X-frame tube 142b. In yet other implementations, the restoring force may instead be sufficiently large to snap-fit connect the latch member 210 to the X-frame tube 142b without any additional action by the caregiver.

**[0346]** Turning now to FIG. 9E, to unlock the latch 200c the caregiver may pull on the tab 220 with sufficient force to disengage the notch 240a from the X-frame tube 142b. In implementations where the latch member 210 does not generate an appreciable restoring force, the caregiver may release the latch member 210, and the slider 120 may then move downwards along the leg tube 112 via gravity and/or the caregiver actively moving the slider 120 as shown in FIG. 9F. In implementations where the latch member 210 generates an appreciable restoring force, the caregiver may hold the latch member 210 with one hand until the slider 120 moves a sufficient distance along the leg tube 112 such that the X-frame tube 142b is no longer aligned with the notch 240a.

**[0347]** Additionally, FIGS. 9D-9F show the corner 130, in some implementations, may further include a hook 133 that protrudes outwards from the frame 100a. The hook 133 may be used, in part, to pull the soft goods 300 taut around the frame 100a and/or to function as a secondary restraining feature to prevent the soft goods 300 from prematurely detaching from the frame 100a. In some implementations, the hook 133 may also be used as a locating feature to facilitate installation of the soft goods 300 onto the frame 100a. FIGS. 9D-9F further show that, in some implementations, the corner 130 may not include the snap-fit connector 139 as before. Instead, a snap-fit connector 190 may be mounted directly onto the leg tube 112.

**[0348]** FIG. 10 shows another exemplary latch 200d coupled to the frame 100a. The latch 200d is a variant of the latch 200c with the primary difference being the latch member 210 is coupled to the X-frame tube 142a instead of the corner 130 via a fastener inserted through the opening 212 and an opening on the X-frame tube 142a. The latch 200d may be locked and/or unlocked in the same manner as the latch 200c. In some implementations, the latch member 210 of the latch 200d may be dimensioned to be shorter in length due to the smaller separation distance between the X-frame tubes 142a and 142b compared to the latch member 210 of the latch 200c.

**[0349]** FIGS. 11A-11D show another exemplary latch 200e installed on the frame 100a of the playard 1000a. FIG. 11A shows the frame 100a once again covered with soft goods 300. FIG. 11B shows the soft goods 300 again partially covering the X-frame assemblies 140a such that a bottom portion of the latch 200e is exposed similar to the latches 200a-200d.

**[0350]** FIG. 11C shows the latch 200e may again include a latch member 210 coupled to the corner 130 of one leg support assembly 110a via a fastener inserted through the opening 212 at one end of the latch member 210. In this example, the latch member 210 may include a hook structure 240b near the tab 220. As shown, the hook structure 240b may provide a contoured surface upon which the X-frame tube 142b may rest when the frame 100a is unfolded. As before, the latch member 210 may be a mechanically compliant component that may be deflected and/or bent due to contact with the X-frame tube 142b and/or the caregiver pulling on the tab 220 disposed at the bottom end of the latch member 210.

**[0351]** The latch 200e may lock the frame 100a in the unfolded configuration in a similar manner to the latches 200a-200d. When the caregiver moves the slider 120 towards the corner 130, the X-frame tube 142b may contact the latch member 210 and deflect outwards. The latch member 210 may include a lead-in feature 222 formed between the hook structure 240b and the bottom end of the latch member 210 to guide the X-frame tube 142b moving against the latch member 210 and to deflect the latch member 210 outwards. Once the X-frame tube 142b is disposed above the hook structure 240b, the caregiver may release the slider 120 and the slider 120 may then move downwards along the leg tube 112 until the X-frame tube 142b comes to rest on the hook structure 240b.

**[0352]** In some implementations, the hook structure 240b may be shaped such that the caregiver may release the latch 240b by pulling on the tab 220 with sufficient force. In some

implementations, the hook structure 240b may be shaped to cradle the X-frame tube 142b and/or the latch member 210 may be sufficiently rigid such that the latch member 210 acts as a double-action latch where the caregiver would have to apply an appreciably large force to disengage the latch member 210 from the X-frame tube 142b. Instead, the caregiver may raise the slider 120 and/or squeeze the X-frame tubes 142a and 142b such that the X-frame tube 142b is released from the hook structure 240b. While the caregiver holds the X-frame tube 142b above the hook structure 240b with one hand, the caregiver may then pull the latch member 210 outwards to allow the X-frame tube 142b to fall below the hook structure 240b as shown in FIG. 11D.

**[0353]** FIGS. 12A and 12B show another exemplary latch 200f that directly couples the slider 120 to the corner 130 in the frame 100a of the foldable playard 1000a. As shown in FIG. 12A, the frame 100a may only include one latch 200f coupled to one leg support assembly 110a to support the multiple sliders 120 and/or X-frame assemblies 140a when the frame 100a is unfolded.

**[0354]** FIG. 12B shows the latch 200f may include a latch member 243 disposed on the slider 120 of one leg support assembly 110a and a latch hook 242 disposed on the corresponding corner 130. The latch member 243 may be integrally formed onto the slider 120 to form one single component or fabricated as a separate component that is then coupled to the slider 120 using, for example, a fastener or a snap-fit connection. In some implementations, the latch member 243, when formed as a separate component, may be coupled to the openings of the slider 120 formed on the extended portions 124 and 126 to couple to the X-frame tubes 142a and/or 142b such that a single fastener couples the latch member 243, the slider 120, and one or more X-frame tubes 142a and/or 142b together. In this manner, the slider 120 may remain identical with the other sliders 120 in the frame 100a.

**[0355]** The latch hook 242 may similarly be integrally formed onto the corner 130 to form one single component or fabricated as a separate component that is then coupled to the slider 120. Similarly, the latch hook 242, when formed as a separate component, may be coupled to the openings of the corner 130 formed on the extended portions 134 and 136 in a manner similar to the latch member 210 of the latch 200a where the corner 130 remains unchanged and/or identical with the other corners 130 in the frame 100a.

**[0356]** The latch member 243 may include a first end 241a coupled to the slider 120 and a latch opening 244 disposed near a second end 241b opposite from the first end 241a. The latch opening

244 may be shaped to receive the latch hook 242 on the corner 130. In some implementations, the latch hook 242 may have a contoured surface such that the portion of the latch member 243 forming the top side of the opening 244 rests upon the latch hook 242 when the latch 200f is locked. In this manner, the latch 200f may directly couple the slider 120 and the corner 130 together to hold the frame 100a in the unfolded configuration. In some implementations, the latch opening 244 and the latch hook 242 may also be shaped to reduce or, in some instances, eliminate relative translational and/or rotational motion between the slider 120 and the corner 130 along axes of motion other than the longitudinal axis 111a.

**[0357]** The latch member 243 may be a mechanically compliant component with a tab 220 disposed at the second end 241b similar to the latch member 210 of the latch 200a. Although the latch member 243 is disposed on the slider 120, the latch member 243 may engage the latch hook 242 in a manner similar to the latches 200a-200e. As before, the caregiver may move the slider 120 towards the corner 130. Once the tab 220 of the latch member 243 contacts the bottom surface of the latch hook 242, the latch member 243 may be deflected outwards. As shown in FIG. 12B, the bottom surface of the latch hook 242 may form a lead-in feature (e.g., a sloped surface) to guide the latch member 243 as it is deflected outwards. The latch member 243 may be sufficiently rigid to generate an internal restoring force when the latch member 243 is bent. Thus, once the slider 120 is moved sufficiently close to the corner 130 that the latch hook 242 is aligned with the latch opening 242, the restoring force may cause the latch member 243 to snap back to its original form and the latch hook 242 may then protrude through the latch opening 242.

**[0358]** Similar to the latch 200e, the latch 200f may be a single-action latch where the caregiver may release the latch member 243 from the latch hook 242 by pulling the tab 220 with sufficient force. In some implementations, the latch 200f may be a double-action latch where the latch hook 242 may be sufficiently rigid and/or includes a sufficiently deep undercut portion such that the latch member 243 cannot be released by pulling the tab 220 without applying excessive force (e.g., a force greater than 20 lbf). The caregiver should instead raise the slider 120 such that the portion of the latch member 243 forming the top side of the opening 244 is released from the latch hook 242. While holding the slider 120 in the raised position, the caregiver may then pull the latch member 243 outwards so that the slider 120 may move downwards along the leg tube 112.

**[0359]** FIGS. 13A-13H show another exemplary latch 200g that is mounted to the X-frame tubes 142a and 142b of one X-frame assembly 140a. As shown in FIG. 13A, the frame 100a may include a single latch 200g mounted to one X-frame assembly 140a to support the frame 100a in the unfolded configuration. In some implementations, the latch 200g may be shaped and/or dimensioned to have the same or similar thickness as the X-frame assembly 140a so that the latch 200g does not protrude appreciably outwards from the frame 100a particularly when the frame 100a is in the folded configuration as shown in FIG. 13B. In other words, the thickness of the latch 200g may be the same or similar as the distance separating the outer exterior edge of the central portion 144 of the X-frame tube 142a and the interior exterior edge of the central portion 144 of the X-frame tube 142b in FIG. 3B.

**[0360]** FIG. 13C shows the latch 200g may replace the pin joint 145 and, hence, may rotatably couple the X-frame tube 142a to the X-frame tube 142b such that the X-frame tubes 142a and 142b rotate about a rotation axis 252. FIG. 13D shows the latch 200g may include a first housing 250a disposed on an exterior portion of the frame 100a and rigidly coupled to the X-frame tube 142b. In particular, the first housing 250a may include a notch 251a and the X-frame tube 142b may be formed with a flat section 148 within the central portion 144 that fits into the notch 251a. Thus, the first housing 250a may rotate together with the X-frame tube 142b.

**[0361]** The latch 200g may further include a second housing 250b disposed within the interior space 102 of the frame 100a and rigidly coupled to the X-frame tube 142a. The second housing 250b may also include a notch 251b and the X-frame tube 142a may also have a flat section 148 that fits into the notch 251b so that the second housing 250b rotates together with the X-frame tube 142a. The first housing 250a may be rotatably coupled to the second housing 250b via a shaft or pin (not shown) inserted through respective openings in the first housing 250a, the second housing 250b, and the X-frame tubes 142a and 142b along the rotation axis 252 as shown in FIG. 13D.

**[0362]** The first and second housings 250a and 250b may form a cavity to contain a locking gear 254, which may translate along the rotation axis 252 relative to the first and second housings 250a and 250b to lock and/or unlock the latch 200g. The cavity may further contain a return spring 253 disposed between the locking gear 254 and the second housing 250b to impart a spring-bias force onto the locking gear 254 to maintain the latch 200g in a locked configuration by default. The locking gear 254 may include a pair of latch key sections 256 that have interior sidewalls 257a that

define a channel 257c shaped to restrict and lock the X-frame tubes 142a and 142b when the frame 100a is unfolded (e.g., the X-frame tubes 142a and 142b are arranged to form a shallow X-frame structure). Said in another way, when the latch 200g is locked, the flat sections 148 of the X-frame tubes 142a and 142b may be disposed within the channel 257c where the sidewalls 257a abut opposing sides of each of flat sections 148 to prevent rotation of the X-frame tubes 142a and 142b.

**[0363]** When the playard 1000a is in the folded configuration, the locking gear 254 may be primarily disposed within the second housing 250b and the return spring 253 may be compressed due to the respective flat sections 148 of the X-frame tubes 142a and/or 142b contacting and/or pressing against the front portions 257b of the locking gear 254. To deploy the playard 1000a, the caregiver may once again move the slider 120 of at least one leg support assembly 110a and/or squeeze the X-frame tubes 142a and 142b of one X-frame assembly 140a together to unfold the frame 100a. As the X-frame tubes 142a and 142b are rotated, the respective flat sections 148 of the X-frame tubes 142a and 142b may slide along the front portions 257b of the locking gear 254, thus maintaining compression of the return spring 253. Once the X-frame tubes 142a and 142b are sufficiently rotated such that the respective flat sections 148 of the X-frame tubes 142a and 142b are aligned to match the geometry of the channel 257c, the spring 253 may then push the locking gear 254 outwards towards the first housing 250a such that the flat sections 144 are disposed within the channel 257c and constrained by the latch key sections 256 (see FIGS. 13E and 13G).

**[0364]** FIG. 13D further shows the latch 200g may include a release button 260 disposed, in part, within a recessed opening 259 formed along the front of the first housing 250a. The recessed opening 259 of the first housing 250a may be separated from the cavity formed between the first and second housings 250a and 250b by a recessed front surface of the first housing 250a. The release button 260 may be slidably coupled to the first housing 250a via the slot guides 258 and may include one or more tabs 262 that protrude through the recessed surface of the first housing 250a to contact front portions 257b of the latch key sections 256 on the locking gear 254.

**[0365]** To unlock the latch 200g, the caregiver may push the release button 260 into the recessed opening 259 causing the tabs 262 to press against the latch key sections 256 of the locking gear 254. The locking gear 254, in turn, is then displaced towards the second housing 250b along the rotation axis 252 resulting in compression of the return spring 253. Once the locking gear 254 is sufficiently displaced where the respective flat sections 148 of the X-frame tubes 142a and 142b

are no longer disposed within the channel 257c, the caregiver may then rotate the X-frame tubes 142a and 142b and/or move the slider 120 of at least one leg support assembly 110a to fold the frame 100a (see FIGS. 13F and 13H). In some implementations, the depth of the recessed opening 259 and/or the length of the tabs 262 of the release button 260 may be tailored to ensure sufficient travel distance for the release button 260 to disengage the locking gear 254 from the X-frame tubes 142a and 142b. In some implementations, the release button 260 may remain disposed within the recessed opening 259 until the playard 1000a is unfolded.

**[0366]** FIGS. 14A-14D show another exemplary latch 200h integrated into the X-frame tube 142b of one X-frame assembly 140a to engage the slider 120 of one leg support assembly 110a in the frame 100a of the playard 1000a. FIG. 14A once again shows the frame 100a may only include a single latch 200h to support the frame 100a in the unfolded configuration.

**[0367]** FIG. 14B shows the latch 200h may include a latch 270 that is slidably coupled to the X-frame tube 142b and rotatably coupled to the slider 120 of one leg support assembly 110a. A return spring 272 may be disposed, at least in part, within an interior cavity of the X-frame tube 142b to impart a spring-bias force that pushes the latch 270 towards the leg tube 112. The leg tube 112 may include a latch opening 273 shaped and/or dimensioned to receive at least a portion of the latch 270 (e.g., the tip of the latch 270).

**[0368]** When the frame 100a is sufficiently unfolded such that the slider 120 is positioned along the leg tube 112 to overlap the latch opening 273, the return spring 272 may push the latch 270 into the latch opening 272, thus locking the slider 120 and, by extension, the X-frame tube 142b in place. Since the X-frame tube 142b is movably coupled to the X-frame tube 142a, the corners 130 and sliders 120 of other leg support assemblies 110a, and the other X-frame assemblies 140a (via the other leg support assemblies 110a) in the frame 100a, the constraints applied to the slider 120 and the X-frame tube 142b by the latch 200h may maintain the frame 100a in the unfolded configuration.

**[0369]** FIG. 14B further shows the latch 200h may include a collar 271 coupled to the latch 270 to provide an actuator for the caregiver to move when unlocking the latch 200h. In some implementations, the latch 270 may be directly coupled to the collar 271 using, for example, a fastener inserted through an opening 276 on the collar and an opening (not shown) on the latch 270. The collar 271, in turn, may be slidably coupled to the second end 143b of the X-frame tube

142b. For example, the collar 271 may include a recessed opening (not shown) shaped to receive the second end 143b with sufficient depth to enable the collar 271 and, by extension, the latch 270 to slide along the X-frame tube 142b. To compensate for the respective lengths of the latch 270 and the collar 271, the X-frame tube 142b supporting the latch 270 and the collar 271 may be shorter in length compared to other X-frame tubes 142b in other X-frame assemblies 140a.

**[0370]** The latch 270 may be rotatably coupled directly to the slider 120 via a pin 274 inserted through the opening on the slider 120 (previously used to couple to the X-frame tube 142b in other X-frame assemblies 140a) and an opening 275 formed along the latch 270. In some implementations, the opening 275 may be a slot that is shaped and/or dimensioned to allow the latch 270 to slidably move relative to the slider 120 to facilitate insertion of the latch 270 into the latch opening 273.

**[0371]** In some implementations, the latch 270 may instead be disposed within the interior cavity of the X-frame tube 142b such that the overall length of the X-frame tube 142b remains the same as other X-frame tubes 142b in other X-frame assemblies 140a. The second end 143b of the X-frame tube 142b, however, may have an opening through which the latch 270 may pass through when engaging and/or disengaging the latch opening 273 on the leg tube 112. The collar 271 may be disposed outside the X-frame tube 142b and configured to slide together with the latch 270 along the length of the X-frame tube 142b. As before, the latch 270 may be coupled to the collar 271 via a fastener inserted through the opening 276 on the collar 271 and another opening (not shown) on the latch 270. The fastener may pass through the X-frame tube 142b via a slotted opening (not shown) that is shaped and/or dimensioned to be similar to the opening 275 on the latch 270.

**[0372]** The latch 270 and the X-frame tube 142b may be rotatably coupled to the slider 120. For example, the pin 274 may pass through the openings on the slider 120, the opening 275 on the latch 270, and the opening 147 on the X-frame tube 142b. The latch 270 may still have a slotted opening 275 to allow the latch 270 to slidably move relative to the slider 120 to engage and/or disengage the latch opening 273.

**[0373]** To unlock the latch 200h, the caregiver may move the collar 271 along the X-frame tube 142b to release the latch 270 from the latch opening 273 as shown in FIG. 14C. This causes the return spring 272 to be compressed, thus generating and/or increasing a spring-bias force applied

to the latch 270. While holding the collar 271, the slider 120 may then move downwards along the leg tube 112, thus folding the X-frame assembly 140a. Once the latch 270 is no longer aligned to the latch opening 273, the caregiver may release the collar 271 and continue folding the frame 100a. The spring-bias force applied to the latch 270 may cause the latch 270 to press against the exterior surfaces of the leg tube 112 as the slider 120 is moved towards the foot 114 and/or the surfaces of the slider 120 once the X-frame tube 142b is sufficiently rotated as shown in FIG. 14D. In some implementations, the end of the latch 270 may be shaped (e.g., curved or contoured) to allow the X-frame tube 142b to rotate smoothly when pressing against the leg tube 112 and/or the slider 120 as the frame 100a is being folded and/or unfolded.

**[0374]** FIGS. 15A-15D show yet another exemplary latch 200i mounted onto the frame 100a of the playard 1000a. Specifically, the latch 200i may be mounted to one end of the X-frame tube 142b (or 142a) of one X-frame assembly 140a to engage the slider 120 of one leg support assembly 110a. FIG. 15A once again shows the frame 100a may only include a single latch 200i to support the frame 100a in the unfolded configuration. The latch 200i may be shaped and/or dimensioned such that the latch 200i fits within the recessed opening of the extended section 126 (or 124) of the slider 120 together with the second end 143b of the X-frame tube 142b. In this manner, the latch 200i may not protrude outwards from the frame 100a even when the frame 100a is folded (see FIG. 15B), thus preserving the compact shape of the folded frame 100a.

**[0375]** FIG. 15C shows the latch 200i may include a latch base 280 coupled to the second end 143b of the X-frame tube 142b and rotatably coupled to the slider 120. In some implementations, a single fastener may couple the slider 120, the latch base 280, and the X-frame tube 142b together. As shown, the latch base 280 may include a latch member 284 that extends from the latch base 280. The latch member 284 may be a mechanically compliant component that is deformable and may have sufficient mechanical rigidity to generate a restoring force when deformed.

**[0376]** In some implementations, the latch base 280 may have a cylindrical shape and the latch member 284 may extend from the periphery of the latch base 280. The latch member 284 may have a curved and/or contoured shape as shown in FIGS. 15C and 15D. The latch member 284 may include an integrally formed latch catch 281 that is shaped to engage a latch opening 283 formed on a bottom surface 127 of the slider 120. The latch member 284 may further include a tab

282 disposed at the end of the latch member 284, which may be pulled to bend the latch member 282, thus releasing the latch catch 281 from the latch opening 283.

**[0377]** FIG. 15D shows the latch member 284 may be disposed between the sliders 120 from adjacent leg support assemblies 110a when the frame 100a is unfolded. When unfolding the frame 100a, the latch body 280 together with the latch member 284 may rotate with the X-frame tube 142b about the pin joint 146c relative to the slider 120 as the slider 120 moves up along the leg tube 112 towards the corner 130. As the latch body 280 rotates, the latch member 284 and, in particular, the latch catch 281, may initially contact the exterior portions of the slider 120, thus bending and/or deflecting the latch member 284. In some implementations, the latch catch 281 may include a lead-in feature to facilitate the deflection of the latch member 284 as the frame 100a is unfolded.

**[0378]** Once the slider 120 is positioned sufficiently close to the corner 130 and/or the X-frame tube 142b is sufficiently rotated such that the latch catch 281 aligns with the latch opening 283, the restoring force generated by the deflection of the latch member 284 may insert the latch catch 281 into the latch opening 283. The latch catch 281 and the latch opening 283 may thus prevent further rotation of the X-frame tube 142b relative to the slider 120 and, hence, further movement of the slider 120 along the leg tube 112 to hold the frame 100a in the unfolded configuration.

**[0379]** To unlock the latch 200i, the caregiver may pull on the tab 282 with sufficient force to release the latch catch 281 from the latch opening 283. While holding the tab 282, the slider 120 may then move downwards along the leg tube 112 towards the foot 114, which causes the X-frame tube 142b and the latch body 280 to rotate relative to the slider 120. Once the latch catch 281 is no longer aligned with the latch opening 283, the caregiver may release the tab 282 and proceed with folding the frame 100a.

**[0380]** As described above, the frame 100a may generally include at least one latch to maintain the frame 100a and, by extension, the playard 1000a in the unfolded configuration. In some implementations, the frame 100a may include a single latch (e.g., one of the latches 200a-200i) to lock the unfolded frame 100a, which may simplify the frame 100a by reducing the number of parts for manufacture. However, in other implementations, the frame 100a may include multiple latching mechanisms to ensure the various components of the frame 100a are kept evenly unfolded.

Thus, it should be appreciated that in other implementations, the frame 100a may include combinations of one or more of the latches 200a-200i described above.

**[0381]** FIGS. 16A and 16B show one example of a frame 100a that includes the latch 200g coupled to one X-frame assembly 140a and the latch 200h coupled to the X-frame tube of another X-frame assembly 140a and the slider 120 of one leg support assembly 110a. FIG. 16A shows the latches 200g and 200i being used to maintain the frame 100a in the unfolded configuration. FIG. 16B shows the latches 200g and 200i do not appreciably extend outwards from the frame 100a when the frame 100a is in the folded configuration.

**[0382]** As described above, the foldable playard may generally include a frame that outlines an interior space. The frame may include multiple leg support assemblies and X-frame assemblies that together define and/or align with the outer boundaries of the interior space. For example, the playard 1000a includes a frame 100a defining an interior space 102 with a horizontal cross-section shaped as a hexagon. It should be appreciated that the various implementations of the foldable playard described herein may define interior spaces having other geometries based, in part, on the number of leg support assemblies and/or the X-frame assemblies used for construction.

**[0383]** For example, the playard may outline an interior space with a square horizontal cross-section. The frame of the playard may include four identical leg support assemblies, which may be connected together using four identical X-frame assemblies where each X-frame assembly forms a single (or double) X-frame structure. As before, each X-frame assembly may couple adjacent leg support assemblies together.

**[0384]** In another example, FIGS. 17A-17D show an exemplary playard 1000b with a frame 100b that outlines an interior space 102 with a horizontal cross-section shaped as a rectangle. The frame 100a may include multiple leg support assemblies 110b defining and/or aligning with the respective side edges 104 of the interior space 102 when the frame 100b is unfolded to support the playard 1000b on the ground 90 (see, for example, FIG. 18A). The frame 100a may include a pair of X-frame assemblies 140a disposed on the smaller side faces 106 of the interior space 102 to couple together adjacent leg support assemblies 110b located on the shorter sides of the rectangular horizontal cross-section of the interior space 102. The frame 100 may further include a pair of X-frame assemblies 140b disposed on the larger side faces 106 of the interior space 102 to couple together adjacent leg support assemblies 110b located on the longer sides of the rectangular

horizontal cross-section of the interior space 102. Thus, each leg support assembly 110b may couple to one X-frame assembly 140a and one X-frame assembly 140b.

**[0385]** To form the rectangular-shaped interior space 102, each X-frame assembly 140a may form a single X-frame structure, as described above, and each X-frame assembly 140b may form a double X-frame structure (i.e., two pairs of crossing X-frame tubes where each pair of X-frame tubes couples to one leg support assembly). The combination of the single and double X-frame structures allows the frame 100b to define an interior space 102 where the sides of the horizontal cross-section have different dimensions while enabling the X-frame assemblies 140a and 140b to couple to the same components of the leg support assembly 110b (e.g., the same slider 120 and corner 130) so that the leg support assemblies 110b, the X-frame assemblies 140a, and the X-frame assemblies 140b may fold and/or unfold together (see FIG. 17C). Furthermore, the double X-frame structure of the X-frame assembly 140b may also enable the leg support assemblies 110b and, in particular, the length of the leg tube 112 to be shorter compared to a single X-frame structure that spans the same length as the X-frame assembly 140b when deployed. Thus, the frame 100b may be more compact, particularly, when folded.

**[0386]** Similar to the frame 100a, the frame 100b may be unfolded with the feet 114 of the leg support assemblies 110b remaining in contact with the ground 90. Additionally, the leg tubes 112 may remain vertically upright or nearly vertically upright (e.g., leg tubes 112 may intentionally be tilted when the frame 100b is unfolded to improve stability) while the frame 100b is being folded and/or unfolded to make the process of setting up and/or tearing down the playard 1000b easier for the caregiver (see FIG. 17D).

**[0387]** Additionally, the X-frame assemblies 140a and 140b in the frame 100b may be disposed in the top portion 108 of the frame 100a to form a top perimeter structure along the interior space 102 (see FIG. 18A). As before, this may enable the respective X-frame tubes of the X-frame assemblies 140a and 140b to function as top rails to provide mechanical stability and rigidity to the frame 100b. In some implementations, the frame 100b may not include a separate compliant or rigid top rail and/or a bottom support structure.

**[0388]** In some implementations, the frame 100b with only X-frame assemblies 140a and 140b coupling the leg support assemblies 110b together may provide sufficient mechanical rigidity, stability, and/or strength to satisfy various consumer safety standards (e.g., ASTM F406-19). For

example, FIG. 22 shows the playard 1000b subjected to a stability test. Similar to the playard 1000a, the playard 1000b was demonstrated to remain sufficiently stable (i.e., at least three feet 114 remained in contact with the underlying platform) when the playard 1000b was tilted more than 10 degrees.

**[0389]** FIGS. 17A and 17B further show the playard 1000b may include soft goods 300 coupled to the frame 100b and forming a partially enclosed space 301 disposed within the interior space 102 to contain the child 50. As before, the soft goods 300 may be readily folded together with the frame 100b as shown in FIG. 17C. The soft goods 300 may include a floor portion 306 that rests on the ground 90 supporting the playard 1000b and side portions 304 that together define and surround the partially enclosed space 301. The floor portion 306 may include a removable mat to provide padding on the ground 90. The side portions 304 may be formed from transparent and/or see-through materials to allow the caregiver to monitor their child 50 when the child 50 is placed into the partially enclosed space 301. The soft goods 300 may include tethers and/or straps to attach the floor portion 306 to the bottom portions of the leg support assemblies 110b.

**[0390]** The soft goods 300 may further include a top portion 302, formed from an opaque textile material, to attach the soft goods 300 to the top portions of the leg support assemblies 110b as well as cover the top portion of the frame 100b. In particular, the soft goods 300 in the playard 1000b may fully cover one or more of the X-frame assemblies 140a and 140b, the corners 130 of the leg support assemblies 110b, and/or the sliders 120 of the leg support assemblies 110b. In some implementations, the soft goods 300 may fully cover the X-frame assemblies 140a and 140b as well as the sliders 120 and the corners 130 of the leg support assemblies 110b such that only the leg tubes 112 and/or the feet 114 are observable as shown in FIGS. 17A and 17B. As before, positioning the X-frame assemblies 140a and 140b in the top portion 108 of the frame 100b when the frame 100b is unfolded may also increase the visibility of the child 50 due to the larger visually unobstructed portions of the side faces 106.

**[0391]** As described above, conventional playards and especially, indoor playards, typically have to compromise between ease of use, visibility of the child, and/or the appearance of the playard (see, for example, playard 10c). In comparison, the playard 1000b may simultaneously improve ease of use, visibility of the child, and the overall appearance. First, the playard 1000b includes X-frame assemblies 140a and 140b that allow the frame 100b to be folded and/or unfolded in one

step. For instance, the caregiver may move one slider 120 of one leg support assembly 110b to fold and/or unfold the frame 100b. Second, the X-frame assemblies 140a and 140b are positioned in the top portion 108 of the frame 100b when the playard 1000b is deployed, which allows for greater visibility of the child in the partially enclosed space 301 through the sides of the frame 100b. Third, aesthetically undesirable components, such as the X-frame tubes, the sliders 120, the corners 130, may be readily hidden by the top portion 302 of the soft goods 300 to provide a cleaner, more aesthetically desirable appearance.

**[0392]** FIG. 18A shows the frame 100b without the soft goods 300 attached in the unfolded configuration. As shown, each leg support assembly 110b may be similar to leg support assemblies 110a used in the frame 100a. For instance, the leg support assembly 110b includes a leg tube 112 with a top end 113a and a bottom end 113b, a corner 130 coupled to the top end 113a, a foot 114 coupled to the bottom end 113b, and a slider 120 that is slidably coupled to the leg tube 112 and disposed between the foot 114 and the corner 130. The top end 113a of the leg tube 112 and/or the corner 130 may align with a top vertex 105 of the interior space 102 and generally define a top horizontal plane 92 of the frame and hence a height  $H_1$  of the frame between the ground surface 90 and the top horizontal plane 92. The bottom end 113b of the leg tube 112 and/or the foot 114 may align with a bottom vertex 107 of the interior space 102.

**[0393]** FIG. 18B further shows the leg tubes 112 may have a circular cross-sectional shape. The leg tubes 112 may also remain vertical or nearly vertical for both the folded and unfolded configurations. Thus, the interior space 102 may be shaped as right prism with rectangular base. The slider 120 may once again include a base 121 that defines a through hole opening 122 that surrounds the leg tube 112. The slider 120 may include extended portions 124 and 126 disposed on opposing sides of the base 121 to couple respective X-frame tubes (e.g., X-frame tubes 142a and 142d in FIG. 18B) of the X-frame assemblies 140a and 140b to the slider 120. The corner 130 may include a base 131 with a recessed opening (not shown) to receive the top end 113a of the leg tube 112. The corner 130 may further include a snap-fit connector 139 coupled to the base 131 instead of a tab 138 extending from the base 131 as in the leg support assembly 110a. Once again, the corner 130 may include extended portions 134 and 136 disposed on opposing sides of the base 131 to couple respective X-frame tubes (e.g., X-frame tubes 142b and 142c in FIG. 18D) of the X-frame assemblies 140a and 140b to the corner 130.

[0394] FIG. 19A shows the frame 100b in the folded configuration. FIG. 19B shows the slider 120 may be disposed proximate to the foot 114 when the frame 100b is folded. As described above and shown in FIGS. 18B and 19B, the X-frame assemblies 140a and 140b may couple to the same corner 130 and slider 120 of one leg support assembly 110b. Furthermore, the pin joints that connect the respective X-frame tubes of the X-frame assemblies 140a and 140b to the slider 120 or the corner 130 may be located along the same horizontal plane. Thus, the respective ends of the X-frame tubes of the X-frame assemblies 140a and 140b that couple to the leg support assembly 110b may travel the same distance along the leg tube 112 to fold and/or unfold both the X-frame assemblies 140a and 140b. This enables the slider 120 and the corner 130 to be thinner in size and, in turn, reduces the overall length,  $L$ , of the leg tube 112 such that the leg tube 112 only provides sufficient overlap to couple the foot 114 and the corner 130 to the leg tube 112 and sufficient clearance for the slider 120 to move a sufficient distance to fold and/or unfold the X-frame assemblies 140a and 140b. As shown in FIGS. 18B and 19B, the slider 120 may be disposed proximate to the corner 130 when the frame 100b is in the unfolded configuration and proximate to the foot 114 when the frame 100b is in the folded configuration. FIG. 19A also shows that, in the folded configuration, the frame has a height  $H_2$  between the ground surface 90 and a top horizontal plane 92A defined by the frame. As noted above in connection with FIG. 2B and 2E, the height of the frame 100b may remain substantially constant or constant between the folded and unfolded configurations of the frame. In other words, the heights  $H_1$  and  $H_2$  may be equal or substantially similar and the planes 92 and 92A are coplanar or substantially coplanar. In some implementations, however, the height of the frame 100b may vary (e.g., the height  $H_2$  may be somewhat greater than the height  $H_1$  and the plane 92A in the folded configuration may be disposed somewhat above the plane 92 in the unfolded configuration).

[0395] FIGS. 20A-20E show several views of the frame 100b in a partially unfolded/folded state. In particular, FIG. 20B shows the X-frame assembly 140a may once again include X-frame tubes 142a and 142b that are rotatably coupled to one another via a pin joint (e.g., a rolled rivet joint). As shown, the X-frame tube 142a may be rotatably coupled to the corner 130 of one leg support assembly 112b via a pin joint 146a and the slider 120 of another leg support assembly 112b via a pin joint 146b. Similarly, the X-frame tube 142b may be rotatably coupled to the slider 130 of the one leg support assembly 112b via a pin joint 146c and the corner 130 of the other leg support

assembly 112b via a pin joint 146d. Thus, the X-frame assembly 140a may operate in a similar or same manner as the X-frame assemblies 140a in the frame 100a.

**[0396]** FIG. 20C shows the X-frame assembly 140b may include two pairs of X-frame tubes, i.e., the X-frame tubes 142c and 142d as well as the X-frame tubes 142e and 142f. The X-frame tubes 142c and 142d may be rotatably coupled to each other via a pin joint 145 similar to the X-frame tubes 142a and 142b in the X-frame assembly 140a. Similarly, the X-frame tubes 142e and 142f may be rotatably coupled to each via another pin joint 145. Each pair of X-frame tubes 142c and 142d (or 142e and 142f) may be coupled to one leg support assembly 110b and to the other remaining pair of X-frame tubes. As shown, the X-frame tube 142c may be rotatably coupled to the corner 130 of one leg support assembly 110a via a pin joint 146e and the X-frame tube 142e via a pin joint 146f. The X-frame tube 142d may be rotatably coupled to the slider 120 of the one leg support assembly 110a via a pin joint 146g and to the X-frame tube 142e via a pin joint 146h. The X-frame tube 142e may be further rotatably coupled to the corner 130 of another leg support assembly 110b via a pin joint 146i. The X-frame tube 142f may be further rotatably coupled to the slider 120 of the other leg support assembly 110b via a pin joint 146j.

**[0397]** In some implementations, the shape and/or dimensions of the X-frame tubes 142c-142f may be substantially identical or identical with each other. The shape and/or dimensions of the X-frame tubes 142a and 142b of the X-frame assembly 140a may be different from the X-frame tubes 142c-142f of the X-frame assembly 140b depending, in part, on the desired dimensions of the rectangular-shaped interior space 102. However, in some implementations, the shape and/or dimensions of the X-frame tubes 142c-142f may also be substantially identical or identical with the X-frame tubes 142a and 142b of the X-frame assembly 140a.

**[0398]** FIG. 20C further shows the pair of pin joints 145 may be offset from the respective center points of the X-frame tubes 142c-142f. In particular, the pin joint 145 coupling the X-frame tubes 142c and 142d together may be positioned closer to the pin joints 146h and 146f than the pin joints 146e and 146g. Similarly, the pin joint 145 coupling the X-frame tubes 142e and 142f together may also be positioned closer to the pin joints 146h and 146f than the pin joints 146i and 146j. The position of the pin joints 145 along the X-frame tubes 142c-142f may be tailored to ensure the respective ends of the X-frame tubes 142c-142f align with the ends of the X-frame tubes 142a and 142b when coupled to the same corner 130 or slider 120.

**[0399]** For example, FIG. 20D shows the pin joint 146d coupling the X-frame tube 142b to the corner 130 and the pin joint 146e coupling the X-frame tube 142c to the same corner 130 lie on the same horizontal plane 150a. FIG. 20E similarly shows the pin joint 146b coupling the X-frame tube 142a to the slider 120 and the pin joint 146g coupling the X-frame tube 142d to the same slider 120 may also lie on the same horizontal plane 150b. As described above, aligning the pin joints in this manner may allow for a thinner slider 120 and corner 130, which, in turn, may reduce the overall length of the leg tube 112. However, it should be appreciated that in some implementations, the pin joints may not be aligned to the same horizontal plane. For example, FIG. 20E shows the extended portion 126 of the slider 120 and the pin joint 146g may be vertically raised (i.e., see extended portion 126-1 and pin joint 146g) above the extended portion 124 and the pin joint 146b.

**[0400]** FIGS. 21A and 21B show the soft goods 300 may attach to the frame 100b in a similar manner as in the frame 100a. Specifically, FIG. 21A shows the soft goods 300 may include a snap-fit connector 312 disposed on an interior portion of the top portion 302 to couple with the snap-fit connector 139 on the corner 130. FIG. 21B shows the foot 114 of each leg support assembly 110b may include a D-ring 116 that provides an opening to tie a tether 320 of the soft goods 300 to the bottom portion of the leg support assemblies 110b. As shown, the tether 320 may form a closed loop via the snap-fit connector 322 coupled to another snap-fit connector (not shown) disposed at the base of the strap 320.

**[0401]** In yet another example, FIGS. 23A-23E show a playard 1000c with a frame 100c that also outlines an interior space 102 with a horizontal cross-section shaped as a rectangle. However, the frame 100c may include curved leg support assemblies 110c resulting in the interior space 102 having a convex shape. In other words, the leg support assemblies 110c curve outwards from the interior space 102 such that the size of the horizontal cross-section is larger at the mid-point of the leg support assemblies 110c than the top or bottom portions of the leg support assemblies 110c. In some implementations, a convex-shaped interior space 102 may provide the child 50 a larger volume to play and/or sleep compared to an interior space with straight leg support assemblies and the same footprint. Additionally, a convex-shaped interior space 102 may also provide a more aesthetically pleasing design.

**[0402]** As shown in FIG. 23A, the playard 1000c may also include soft goods 300 that define a partially enclosed space 301 disposed within the interior space 102 of the frame 100c for the child 50 to play and/or sleep. Similar to the playard 1000b, the soft goods 300 in the playard 1000c may include a floor portion 304 and side portions 306 that define and surround the partially enclosed space 301 as well as a top portion 302 that covers the top portion 108 of the frame 100c. The soft goods 300 may include a removable mat placed onto the floor portion 304 to provide padding on the ground 90 supporting the playard 1000c. The side portions 306 may also be formed from a transparent or see-through material. As before, the soft goods 300 may further include a removable mat that is placed onto the floor portion 304 to provide padding.

**[0403]** As shown in FIGS. 23D and 23E, the frame 100c may include multiple leg support assemblies 110c that each include at least a leg tube 112, a slider 120, and a corner 130. Compared to the leg support assemblies 110a and 110b, the leg tube 112 may be curved along an axis 111b such that the slider 120 moves along a curved path when the frame 100c is folded and/or unfolded. The leg support assemblies 110c may define and/or align with respective side edges 104 of the interior space 102 (see FIG. 24).

**[0404]** The leg support assemblies 110c may further include either a foot 114 to support the playard 1000c on the ground 90 or a wheel assembly 151 to more easily move and/or reorient the playard 1000c after being unfolded. For example, FIG. 23D shows the leg support assemblies 110c at one end of the interior space 102 may both include wheel assemblies 151. Thus, the caregiver may pick up the playard 1000c from the opposing end and pull the playard 1000c with the wheel assemblies 151 rolling along the ground 90 to reposition the playard 1000c as desired. In a manner similar to that illustrated in FIG. 18A, FIG. 23E shows that the frame 100c has a height  $H_1$  between the ground surface 90 and a top horizontal plane 92.

**[0405]** FIG. 25A shows an exploded view of the leg support assembly 110c with the wheel assembly 151. As shown, the leg tube 112 may once again have a first end 113a and a second end 113b. The corner 130 may be coupled to the top end 113a of the leg tube 112. The wheel assembly 151 may include a base 152 that couples to the bottom end 113b of the leg tube 112. The wheel assembly 151 may further include a wheel 153 that is rotatably coupled to the base 152 via a wheel cover 154. The slider 120 may thus be slidably coupled to the leg tube 112 such that the slider 120 is located between the base 152 of the wheel assembly 151 and the corner 130. FIG. 25A also

shows the frame 100c may include a latch 200j that directly couples the slider 120 to the corner 130, which will be described in more detail below.

**[0406]** FIG. 25B shows an exploded view of the leg support assembly 110c with the foot 114. As shown, the leg tube 112, the slider 120, the corner 130, and the foot 114 may be assembled in a similar manner to the leg support assemblies 110a and 110b as described above.

**[0407]** The frame 100c may further include X-frame assemblies 140a, disposed on the smaller curved side faces 106 of the interior space 102, to couple adjacent leg support assemblies 110c along the shorter sides of the rectangular cross-section of the interior space 102 (see FIG. 24). The frame 100c may also include X-frame assemblies 140b, disposed on the larger curved side faces 106 of the interior space 102, to couple adjacent leg support assemblies 110c along the longer sides of the rectangular cross-section of the interior space 102 (see FIG. 24). As before, the X-frame assemblies 140a may form a single X-frame structure with one pair of X-frame tubes and the X-frame assemblies 140b may form a double X-frame structure with two pairs of X-frame tubes.

**[0408]** The shape and/or dimensions of the respective X-frame tubes in the X-frame assemblies 140a and 140b and/or the location of the pin joints that rotatably couple each X-frame tube to another X-frame tube, the slider 120, and/or the corner 130 may be tailored based, in part, on the desired dimensions of the interior space 102 similar to the frame 100b. Additionally, in some implementations, the X-frame tubes of the X-frame assemblies 140a and 140b may be arranged such that the pin joints that couple the X-frame tubes to the same slider 120 or corner 130 of the leg support assembly 110c are aligned along the same horizontal plane.

**[0409]** The X-frame assemblies 140a and 140b may once again be disposed within a top portion 108 of the frame 100c and/or the interior space 102. This enables the X-frame assemblies 140a and 140b to function as top rails to mechanically reinforce the frame 100c while also eliminating other support structures, such as a separate top rail and/or a bottom support structure. The placement of the X-frame assemblies 140a and 140b may also provide a larger window for the caregiver to view their child 50 through the sides of the frame 100c.

**[0410]** In some implementations, the soft goods 300 in the playard 1000c may be divided into separate components, in part, to better conform with the geometry of the interior space 102. For example, the side portions 306 and the floor portion 304 may be installed separately from the top portion 302. To better conform with the shape of the interior space 102, the side portions 306 may

be mounted along an interior side of the leg tube 112 to reduce or, in some instances, prevent gaps from forming between the side portions 306 and the leg support assemblies 110c (see, for example, FIG. 26A) when the playard 1000c is unfolded. Said in another way, the side portions 306 of the soft goods 300 may be attached to the leg support assemblies 110c to provide a seamless appearance with the leg tubes 112, the feet 114, and/or the wheel assemblies 151 being exposed along the exterior portion of the playard 1000c as shown in FIGS. 23A-23C. Once the side portions 306 and the floor portion 304 of the soft goods 300 are installed, the top portion 302 may then be attached to the side portions 306 using, for example, a zipper connection (not shown), and subsequently coupled to the frame 100c to complete assembly.

**[0411]** This may be accomplished, in part, by incorporating a stiffener 330 into the side portions 306 of the soft goods 300, which may then be routed through a channel 171 formed along the leg tube 112. The stiffener 330 may be a compliant component, such as an extruded plastic rod that is inserted through a pocket formed along the respective corners of the side portions 306 located near the side edges 104 of the interior space 102. FIG. 26B shows the leg tube 112 may have an oblong cross-sectional shape with a curved side 172 that forms a recess along the interior side of the leg tube 112 facing the interior space 102. The channel 171 may be formed on the curved side 172 and may span a portion of or, in some instances, the entire length of the leg tube 112. As shown in FIG. 26B, the stiffener 330 may be inserted through the channel 171, thus holding the side portions 306 of the soft goods 300 against the leg tube 112.

**[0412]** The slider 120 in the leg support assembly 110c may still be allowed to move along the leg tube 112 even with the side portions 306 of the soft goods 300 installed onto the leg tube 112. For example, FIG. 26B shows the slider 120 may include a base 121 that defines a through hole opening 122 that only partially surrounds the leg tube 112 to guide the movement of the slider 120 along the leg tube 112. As shown, a slotted opening 128 may be formed along an interior side of the base 121 to allow the side portions 306 attached to the leg tube 112 to pass through the base 121 of the slider 120. In this manner, the slider 120 may move along the leg tube 112 unimpeded by the side portions 306 when the playard 1000c is folded and/or unfolded.

**[0413]** FIG. 26B further shows the slider 120 may once again include extended portions 124 and 126 disposed on opposing sides of the base 121 to couple to respective X-frame tubes of the X-frame assemblies 140a and 140b (e.g., X-frame tubes 142f and 142b).

**[0414]** FIG. 27A shows the corner 130 may once again include a base 131 with extended portions 134 and 136 disposed on opposing sides of the base 131 to couple to respective X-frame tubes of the X-frame assemblies 140a and 140b (e.g., X-frame tubes 142e and 142a). The corner 130 may further include a tab 138 that extends downwards along the leg tube 112 and outwards from the frame 100c to form an overhang portion. As shown in FIG. 27A, the slider 120 may be positioned underneath the overhang portion formed by the tab 138 and, hence, disposed between the leg tube 112 and the tab 138 of the corner 130 when the frame 100c is unfolded.

**[0415]** The corner 130 may be shaped in this manner to provide a hook structure for the top portion 302 of the soft goods 300 to wrap around, thus ensuring the corners 130 and the X-frame assemblies 140a and 140b are covered. In some implementations, the top portion 302 of the soft goods 300 may further include a pocket 331 to aid the caregiver in wrapping the soft goods 300 around the corners 130. Additionally, the soft goods 300 may primarily contact only the exterior surfaces of the corner 130, which may allow the corners of the playard 1000c to have a softer, gentler appearance. For example, the base 131 and the tab 138 of the corner 130 may have a smooth rounded shape for the top portion 302 of the soft goods 300 to wrap around. The top portion 302 of the soft goods 300 may include a snap-fit connector 312 disposed along an interior portion of the top portion 302 that couples to a corresponding snap-fit connector 139 on the corner 130 as shown in FIGS. 27B and 27C.

**[0416]** In some implementations, the slider 120 may also include a rounded bottom section 170 positioned underneath the overhang portion of the tab 138 when the frame 100c is unfolded. As shown in FIGS. 26B and 27A, the rounded bottom section 170 may extend further outwards from the frame 100c than the tab 138 of the corner 130 to provide a lead-off feature to reduce or, in some instances, prevent a string or another tethered object from becoming entangled with the overhang portion of the corner 130.

**[0417]** As described above, the frame 100c may include the latch 200j to lock the frame 100c in the unfolded configuration by engaging the slider 120 of one leg support assembly 110c to the corresponding corner 130. Generally, the frame 100c may include one or more of the latches 200j. For example, FIG. 28A shows the playard 1000c may include a single latch 200j coupled to one leg support assembly 110c. However, in other implementations, the playard 1000c may include

another latch 200j coupled to another leg support assembly 110c on an opposite corner of the playard 1000c to ensure the frame 100c is evenly unfolded.

**[0418]** FIG. 28B shows the latch 200j may include a latch member 210 with a mounting base 224 at one end that is rigidly coupled to the slider 120 and a latch opening 214 disposed at an opposing end (see FIG. 28C) to receive a latch catch 291 disposed on the corner 130. The latch member 210 may be a mechanically compliant component with sufficient mechanical rigidity such that a restoring force is generated when the latch member 210 is bent and/or deflected. The latch member 210 may further include a tab 220, which may be pulled to bend the latch member 210 outwards from the frame 100c to release the latch member 210 from the latch catch 291. Additionally, the latch member 210 may include a lead-in portion 222 to facilitate engagement of the latch member 210 to the latch catch 291 when unfolding the playard 1000c.

**[0419]** FIG. 28B further show the latch 200j may be locked and/or unlocked with the soft goods 300 and, in particular, the top portion 302 covering the top portion 108 of the frame 100c. As shown, the latch catch 291 may protrude through an opening formed on the top portion 302 of the soft goods 300. The latch member 210 may be disposed over the top portion 302 when engaging with the latch catch 291. Thus, the latch member 210 may be left exposed. Furthermore, the internal restoring force generated by the latch member 210 may also cause at least a portion of the latch member 210 (e.g., the tab 220, the lead-in feature 222) to press onto the top portion 302 of the soft goods 300, thus further restraining the soft goods 300 against the corner 130. In other words, the latch member 210 may function as an integral escutcheon when engaged with the latch catch 291.

**[0420]** Similar to the playards 1000a and 1000b, the frame 100c of the playard 1000c may only include the leg support assemblies 110c and the X-frame assemblies 140a and 140b. In some implementations, the frame 100c may exhibit sufficient mechanical rigidity, stability, and strength to satisfy various consumer safety standards (e.g., ASTM F406-19). For example, FIGS. 29A-29D show the playard 1000c being subjected to a Top Rail to Corner Post Attachment test as set defined under ASTM F406-19, 7.11 and 8.30. As shown in FIGS. 29A and 29B, a torque is applied to one of the X-frame assemblies 140b by clamping a 24 inch long rod to the X-frame tubes of the X-frame assembly 140b and hanging a 15-20 lb weight onto the end of the rod. FIGS. 29C and 29D show that after applying the torque load for at least 10 seconds, the X-frame tubes of the X-frame

assembly 140b were deformed, but the sliders 120 and the corners 130 coupled to the X-frame tubes did not crack and/or otherwise break, thus satisfying the requirements under ASTM F406-19, 7.11.

**[0421]** FIGS. 30A-30C show the playard 1000c being subjected to another test to evaluate the mechanical strength and robustness of the X-frame assembly 140b under ASTM F406-19, 7.3.3 and 8.11.2.4. As shown in FIG. 30A, a 100 lbf force was applied to the center of the X-frame assembly 140b at a 45 degree angle relative to the floor for at least 15 seconds. FIGS. 30B and 30C show the X-frame tubes of the X-frame assembly 140b were deformed and the rolled rivet joints connecting the X-frame tubes together were bent. However, the X-frame tubes, the rolled rivet joints, and the corners and sliders of the leg support assemblies did not crack and/or otherwise break, thus satisfying the requirements under ASTM F406-19, 7.3.3.

**[0422]** FIG. 31 further shows the playard 1000c being subjected to a stability test where the playard 1000c was placed onto playform and a load was applied to one side of the playard 1000c from within the partially enclosed space 301. Similar to the playards 1000a and 1000b, it was found at least three of the feet 114 and/or the wheels 151 of the playard 1000c maintained contact with the underlying platform when the playard 1000c was rotated more than 10 degrees, thus satisfying the requirements under ASTM F406-19 for stability.

**[0423]** In some implementations, the frame of the foldable playard may also be configured to include clearances (i.e., gaps) between the various rigid components of the frame (e.g., the X-frame tubes, the leg tubes) based, in part, on various consumer safety standards. For example, ASTM F1004-09 specifies the width of a partially bounded opening (e.g., a V-shaped opening or a diamond-shaped opening) should be greater than or equal to 1.5 inches (38 millimeters), otherwise the risks of neck entrapment are considered unacceptable. Furthermore, ASTM F406-19 8.29.1.4 further notes that a probe having a 1.5 inch by 1.5 inch square face should pass through freely between the various rigid components of the frame, particularly in areas where a hinge is located (e.g., the area where the slider couples an X-frame tube to the leg tube).

**[0424]** Therefore, in some implementations, the rigid components of the frame that define openings sufficiently large enough to fit a child's head in at least one configuration of the playard (e.g., the unfolded configuration) may be separated by gaps greater than or equal to 1.5 inches. In other words, a probe having a 1.5 inch by 1.5 inch square face may readily pass through these

openings without being clamped by the rigid components as the configuration of the playard is changed (e.g., between the folded and unfolded configurations). For example, the X-frame tubes of the X-frame assemblies may be coupled to the leg tubes of the leg support assemblies such that no portion of a X-frame tube is separated from a leg tube by a gap less than 1.5 inches. More specifically, the bottom portion of a X-frame tube that is coupled to a leg tube via a slider (e.g., the portion of the X-frame tube 142a or 142b below the pin joint 145) may be separated from the leg tube by a gap less than 1.5 inches.

**[0425]** In some implementations, the frame may maintain the desired clearances independent of whether the frame is in the folded configuration, the unfolded configuration, or between the folded and unfolded configurations (i.e., the frame is partially folded or unfolded). For example, the X-frame tubes may remain offset from the leg tubes by a gap greater than or equal to 1.5 inches as the frame is transitioning between the folded and unfolded configurations. It should be appreciated the 1.5 inch clearance dimension is exemplary and that the foldable playard may generally conform with other consumer safety standards that specify different clearance dimensions to reduce the risk of neck entrapment.

**[0426]** FIGS. 32A-32E show an exemplary frame 100d for the foldable playard 1000a that includes sliders 120 and corners 130 with elongated arms 124, 126, 134, and 136 to provide the desired clearances described above. As shown, the frame 100d may include multiple leg support assemblies 110d and multiple X-frame assemblies 140a that define an interior space 102 with a hexagonal cross-sectional shape. However, it should be appreciated the various components of the frame 100d may also be adapted for a playard having an interior space 102 with a rectangular or square cross-sectional shape. Each X-frame assembly 140a may include the X-frame tubes 142a and 142b. Each leg support assembly 110d may include a leg tube 112, the corner 130, the slider 120, and a foot 114 as described above. Additionally, the frame 100d may also include the latch 200a to maintain the frame 100d in the unfolded configuration. It should be appreciated, however, the other latches disclosed above may also be used in the frame 100d.

**[0427]** The arms 124 and 126 of the slider 120 may each have a length,  $l_{sr}$ , defined as the distance between the base 121 of the slider 120 and the pin joint 146b or the pin joint 146c where the X-frame tubes 142a and 142b, respectively, are rotatably coupled to the slider 120. The exposed portions of the X-frame tubes 142a and 142b located nearest the sliders 120 and, hence, nearest

the leg tube 112 are thus separated from the leg tube 112 by a distance greater than or equal to the length,  $l_{sr}$ , of the arms 124 and 126. The arms 134 and 136 of the corner 130 may also each have a length,  $l_{cr}$ , defined as the distance between the base 131 of the corner 130 and the pin joint 146a or the pin joint 146d where the X-frame tubes 142a and 142b, respectively, are rotatably coupled to the corner 130. Similar to the slider 120, the arms 134 and 136 of the corner 130 may also separate the exposed portions of the X-frame tubes 142a and 142b nearest the corner 130 from the leg tube 112 by a distance greater than or equal to the length,  $l_{cr}$ , of the arms 134 and 136.

**[0428]** It should be appreciated the pin joints 146a-146d are not co-located with the first and second ends 143a and 143b of the X-frame tubes 142a and 142b. Thus, the first and second ends 143a and 143b of the X-frame tubes 142a and 142b may be separated from the leg tube 112 by a distance less than the respective lengths  $l_{sr}$  and  $l_{cr}$  of the slider 120 and the corner 130. However, the first and second ends 143a and 143b may remain disposed within the recessed openings 124a and 126a of the slider 120 and 134a and 136a of the corner 130 (see, for example, FIGS. 3C and 3D) when the frame 100d is in the folded configuration, the unfolded configuration, or between the folded and unfolded configurations (i.e., partially folded or partially unfolded). Therefore, the exposed portions of the X-frame tubes 142a and 142b referenced above refer to the portions of the X-frame tubes 142a and 142b located outside the recessed openings 124a, 126a, 134a, and 136a.

**[0429]** Since the X-frame tubes 142a and 142b only rotate relative to the slider 120 and the corner 130 about the pin joints 146a-146d, the gap between the exposed portions of the X-frame tubes 142a and 142b and the leg tube 112 may remain greater than or equal to the lesser of the lengths  $l_{sr}$  and  $l_{cr}$  when the frame 100d is fully folded, fully unfolded, or partially folded or unfolded. Therefore, in some implementations, at least one of the lengths  $l_{sr}$  and  $l_{cr}$  may be greater than or equal to 1.5 inches to comply with, for example, ASTM F406-19 and ASTM F1004-09.

**[0430]** In some implementations, the lengths  $l_{sr}$  and  $l_{cr}$  of the arms 124, 126 and 134, 136, respectively, may be equal. For example, sliders 120 and corners 130 with equal length arms may simplify manufacture and assembly of the frame 100e. However, it should be appreciated that, in some implementations, the lengths  $l_{sr}$  and  $l_{cr}$  of the arms 124, 126 and 134, 136, respectively, may not be equal. If the lengths  $l_{sr}$  and  $l_{cr}$  are not equal, the greater of the lengths  $l_{sr}$  and  $l_{cr}$  may limit the overall size of the frame 100d especially in the folded configuration. For example, the length

$l_{sr}$  of the arms 124 and 126 may be tailored to be greater than the length  $l_{cr}$  of the arms 134 and 136 in order to flare out the leg support assemblies 110d when the frame 100d is unfolded.

**[0431]** FIG. 32E further shows the respective arms 134 or 136 of the corner 130 in one leg support assembly 110d may be colinearly aligned (also referred to herein as being “in-line”) with the arms 136 or 134, respectively, of the corner 130 in an adjacent leg support assembly 110d. Said in another way, an end 135a of the arm 134 in one leg support assembly 110d may be concentrically aligned with an end 135b of the arm 136 in another leg support assembly 110d sharing the same side face 106 as shown in FIGS. 32C and 32E. In some implementations, the ends 135a and 135b may be disposed proximate to one another or, in some instances, may physically contact each another when the frame 100d is folded.

**[0432]** The arms 134 and 136 of the corner 130 may be further aligned to the leg tubes 112 and, in particular, a plane 103 defined by the longitudinal axes 111a of each leg tube 112 in adjacent leg support assemblies 110d. For example, FIG. 32E shows the arm 134 of one corner 130 and the arm 136 of another adjacent corner 130 may be aligned to the plane 103 such that the plane 103 intersects the end 135a of the arm 134 and the end 135b of the arm 136. In some implementations, the plane 103 may bisect the respective arms 134 and 136 of the corners 130 that are aligned to the plane 103. Generally, a different plane 103 may be defined for each pair of adjacent leg support assemblies 110d in the frame 100d and the respective arms of the sliders 120 and the corners 130 may be disposed along corresponding planes 103. Additionally, the longitudinal axes 111a may correspond to the centerline axes of the leg tubes 112 and/or the side edges 104 of the interior space 102. The plane 103, in turn, may correspond to the side face 106 of the interior space 102.

**[0433]** The respective arms 124 or 126 of the slider 120 may also be colinearly aligned with the arms 126 or 124, respectively, of the slider 120 in an adjacent leg support assembly 110d. For instance, the respective ends 125a and 125b of the arms 124 and 126 in adjacent sliders 120 may also be disposed proximate to one another as shown in FIG. 32D. In some implementations, the ends 125a and 125b may physically contact one another in the folded configuration. Furthermore, the arms 124 and 126 of the sliders 120 may be aligned to the plane 103 similar to the arms 134 and 136 of the corners 130. For example, the plane 103 may bisect the respective arms 124 and 126 of the sliders 120 that are aligned to the plane 103.

**[0434]** The colinear alignment between the respective arms 134 and 136 of the corners 130 and/or the respective arms 124 and 126 of the sliders 120 may increase the overall size of the frame 100d especially in the folded configuration. For example, FIG. 32 shows a length,  $l_f$ , of one side of the frame 100d in the folded configuration may be defined as the distance between the respective longitudinal axes 111a of two adjacent leg support assemblies 110d. As shown, the length  $l_f$  may be at least twice the length of the respective arms 134 and 136 or  $2l_{cr}$  assuming the arms 134 and 136 are identical in size and shape. Thus, an increase to the length of the arms 134 and 136 of the corners 130 would approximately double the length of the sides of the frame 100d. In other words, tailoring the dimensions of the corners 130 for the purposes of providing greater clearances may generally increase the size of the frame 100d. In implementations where the lengths  $l_{sr}$  and  $l_{cr}$  are not equal, the length  $l_f$  of the frame 100d may scale according to the greater of the lengths  $l_{sr}$  and  $l_{cr}$ .

**[0435]** In some implementations, the scaling factor between the length  $l_f$  of the frame and the respective lengths  $l_{sr}$  and  $l_{cr}$  of the sliders 120 and the corners 130 may be reduced by modifying the geometry of the sliders 120 and the corners 130 so that the arms 124 and 126 of the sliders 120 and the arms 134 and 136 of the corners 130 are not colinearly aligned with one another. For example, the arm 124 of one slider 120 and the arm 126 of an adjacent slider 120 may be offset from the plane 103 such that the respective arms 124 and 126 overlap one another in the folded configuration. In this manner, the foldable playard frame may provide the desired clearances while maintaining a compact size particularly in the folded configuration.

**[0436]** In one example, FIGS. 33A-33F show a frame 100e for the foldable playard 1000a in the unfolded configuration where the respective arms 124 and 126 of the sliders 120 and the respective arms 134 and 136 of the corners 130 are offset in an asymmetric manner. Similar to the frames 100a and 100d, the frame 100e may include multiple leg support assemblies 110e and multiple X-frame assemblies 140c that define an interior space 102 with a hexagonal cross-sectional shape. However, it should be appreciated the various components of the frame 100e may also be adapted for a playard having an interior space 102 with a rectangular or square cross-sectional shape. Each leg support assembly 110e may include a leg tube 112, a slider 120, a corner 130, and a foot 114. Each X-frame assembly 140c may include a pair of X-frame tubes 142a and 142b that are rotatably coupled to each other via the pin joint 145 and rotatably coupled to the sliders 120 and the corners 130 of the leg support assemblies 110e. Furthermore, the frame 100e may include the latch 200a

to maintain the frame 100e in the unfolded configuration. It should again be appreciated that any of the other latches described above may also be used in the frame 100e.

**[0437]** As shown in FIG. 33C, the arms 134 and 136 of the corner 130 shown on the left side of FIG. 33C are coupled to a base 131 and offset from the planes 103b and 103a, respectively, which correspond to adjacent sides of the frame 100e that intersect the same longitudinal axis 111a of the leg tube 112. In particular, the arm 134 is offset horizontally from the plane 103b in an outwards direction (i.e., away from the interior space 102) while the arm 136 is offset horizontally from the plane 103a in an inwards direction (i.e., towards the interior space 102). In other words, the arms 134 and 136 are offset in opposite directions from the corresponding planes 103 along which the arms 134 and 136 are disposed, hence, resulting in an asymmetric offset. The arms 124 and 126 of the slider 120 shown on the left side of FIG. 33C are similarly offset from the planes 103b and 103a, respectively, where the arm 124 is offset horizontally from the plane 103b towards the interior space 102 while the arm 126 is offset horizontally from the plane 103a away from the interior space 102.

**[0438]** The offsets between the respective arms 124 and 126 of each slider 120 and the offsets between the respective arms 134 and 136 of each corner 130 may be the same for each leg support assembly 110e in the frame 100e. For example, FIG. 33B shows a portion of the frame 100e where three successive sides of the frame 100e each have a plane 103 (e.g., planes 103a, 103b, and 103c). The two leg support assemblies 110e shown in FIG. 33B may each have sliders 120 and corners 130 with arms offset in a similar manner from the respective planes 103a-103c. In some implementations, the asymmetric offset between the arms 124 and 126 of the sliders 120 and the arms 134 and 136 of the corners 130 may allow the same slider 120 and corner 130 to be used in each leg support assembly 110e.

**[0439]** FIG. 33D further shows the arm 134 may be offset from the plane 103b by an offset distance,  $w_1$ , which is defined as the distance between the plane 103b and a centerline axis 141a-1 of the arm 134. The arm 136 may be offset from the plane 103a by an offset distance,  $w_2$ , which is defined as the distance between the plane 103a and a centerline axis 141a-2 of the arm 136. The centerline axes 141a-1 and 141a-2 may correspond to the first axes 141 of the X-frame tubes 142a and 142b, respectively. In other words, the respective ends 143a and 143b of the X-frame tubes 142a and 142b in the X-frame assembly 140c may not lie on the same plane compared to the X-

frame tubes 142a and 142b in the X-frame assembly 140a, which may simplify the geometry of the X-frame tubes 142a and 142b as described below.

**[0440]** Generally, the offset distances  $w_1$  and  $w_2$  are chosen to provide sufficient space for the arm 134 of one corner 130 to align side-by-side with the arm 136 of an adjacent corner 130 when the frame 100e is folded. The arms 124 and 126 of the slider 120 may also be offset from the planes 103b and 103a, respectively, in a manner similar to the corner 130. In some implementations, the arm 124 may be offset from the plane 103b by the offset distance  $w_2$  while the arm 126 may be offset from the plane 103a by the offset distance  $w_1$ . By tailoring the offset distances  $w_1$  and  $w_2$  in this manner, the respective arms 134 and 136 of adjacent corners 130 may overlap one another along the plane 103 and, similarly, the respective arms 124 and 126 of adjacent sliders 120 may overlap one another along the plane 103.

**[0441]** The overlap between the sliders 120 and the corners 130 reduces the overall size of the frame 100e especially in the folded configuration. For instance, FIGS. 34A-34D show the frame 100e in the folded configuration. In particular, FIGS. 34A and 34B show a portion of the arm 124 of each slider 120 is aligned side by side with a portion of the arm 126 of an adjacent slider 120. Similarly, FIGS. 34C and 34D show a portion of the arm 134 of each corner 130 is aligned side by side with a portion of the arm 136 of an adjacent corner 130. By configuring the sliders 120 and the corners 130 to overlap one another, the respective lengths of the arms 124, 126, 134, and 136 may be increased (e.g., to provide larger clearances) without appreciably increasing the overall size of the frame 100e. In other words, the length  $l_f$  of each side of the frame 100e may be less than twice the length of the respective arms 134 and 136 as shown in FIG. 34D. In some implementations, the length  $l_f$  may scale according to the length  $l_{cr}$  of one of the arms 134 and 136.

**[0442]** Generally, the offset distance  $w_1$  may be greater than or equal to the greater of half the exterior width,  $w_{c1}$ , of the arm 134 or half the exterior width,  $w_{s2}$ , of the arm 126. Similarly, the offset distance  $w_2$  may be greater than or equal to the greater of half the exterior width,  $w_{c2}$ , of the arm 136 or half the exterior width,  $w_{s1}$ , of the arm 124. In some implementations, the offset distances  $w_1$  and  $w_2$  may be chosen, in part, to accommodate the latch 200a, which may have a larger width than the arms 124, 126, 134, or 136. In some implementations, the exterior widths  $w_{c1}$  and  $w_{s2}$  may be equal. Similarly, the exterior widths  $w_{c2}$  and  $w_{s1}$  may also be equal. In some implementations, the exterior widths  $w_{c1}$  and  $w_{c2}$  may further be equal. Thus, the offset distances

$w_1$  and  $w_2$  may be equal as well. However, it should be appreciated that, in some implementations, the exterior widths  $w_{c1}$ ,  $w_{c2}$ ,  $w_{s1}$ , and  $w_{s2}$  may be different from one another. Additionally, the offset distances for the arms 124, 126, 134, and 136 may be different from one another.

**[0443]** The arms 124 and 126 of the slider 120 may also be offset in an opposite manner to the arms 134 and 136 of the corner 130. Specifically, FIG. 33C shows the arms 124 and 134 are offset from the plane 103b in opposite directions while the arms 126 and 136 are offset from the plane 103a in opposite directions. This arrangement results in the arms 124 and 136 being aligned to one another along the centerline axis 141a-1 and, similarly, the arms 126 and 134 being aligned to one another along the centerline axis 141a-2.

**[0444]** Thus, the recessed openings 124a, 126a, 134a, and 136a of the sliders 120 and corners 130 are not coplanar with respect to one another in the frame 100e. This, in turn, means the X-frame tubes 142a and 142b of the X-frame assemblies 140c may be coupled to the respective sliders 120 and corners 130 without having multiple bends to provide clearances between the X-frame tubes 142a and 142b. For example, FIGS. 33B and 33D show the X-frame tubes 142a and 142b may each be a straight tube with a constant cross-section. In some implementations, the X-frame tubes 142a and 142b may be separated by a lateral offset,  $w_x$ , equal to the sum of the offset distances  $w_1$  and  $w_2$ . The lateral offset  $w_x$  may be chosen to provide sufficient spacing for the respective arms 124, 126, 134, and 136 of the sliders 120 and corners 130 to overlap one another as described above while being sufficiently small to prevent the child from inserting their head laterally between the X-frame tubes 142a and 142b. For example, the lateral offset,  $w_x$ , may range between 0.625 inches (e.g., the exterior diameter of the X-frame tubes 142a and 142b) and 1.5 inches.

**[0445]** FIGS. 35A and 35B show the frame 100e in a partially folded state (or, equivalently, a partially unfolded state). In particular, the frame 100e is shown with the probe 60 disposed on the slider 120. The probe 60, as described above, may be used to evaluate the clearances in the playard frame to ensure compliance with ASTM F406-19 and F1004-09. The probe 60 may generally be inserted through any portion of the openings in the frame 100e to evaluate the clearances of the frame 100e. As shown in FIG. 35B, the probe 60 may rest on the arm 124 of one slider 120 without being clamped by, for example, the X-frame tube 142b and the leg tube 112 as the frame 100e is folded.

**[0446]** FIGS. 36A-36C show another exemplary frame 100f for the foldable playard 1000a in the folded configuration where the respective arms (e.g., arms 124a, 126a, 124b, 126b) of the sliders and the respective arms (e.g., arms 134a, 136a, 134b, 136b) of the corners are symmetrically offset. As shown, the frame 100f may include multiple X-frame assemblies 140c and multiple leg support assemblies 110f and 110g that define an interior space 102 with a hexagonal cross-sectional shape. However, it should be appreciated the various components of the frame 100f may also be adapted for a playard having an interior space 102 with a rectangular or square cross-sectional shape. The frame 100f may further include a latch 200a coupled to one leg support assembly 110g. However, it should be appreciated any of the latches described above may be used in the frame 100f. Furthermore, the latch may be coupled to either of the leg support assemblies 110f or 110g.

**[0447]** In this implementation, the respective arms and of each slider may be offset from the respective planes 103 in the same direction (e.g., towards the interior space 102 or away from the interior space 102). Similarly, the respective arms and of each corner may be offset from the respective planes 103 in the same direction (e.g., towards the interior space 102 or away from the interior space 102). In order for adjacent sliders and/or corners to overlap one another, the leg support assemblies 100f and 100g may include different sliders and corners with arms that are offset in different directions.

**[0448]** For example, FIG. 36B shows the leg support assemblies 110f may include corners 130a with arms 134a and 136a that are both offset from the respective planes 103 towards the interior space 102. The leg support assemblies 110g may include corners 130b with arms 134b and 136b that are both offset from the respective planes 103 away from the interior space 102. The leg support assemblies 110f and 110g may thus alternate in successive fashion around the frame 100f such that each leg support assembly 110f is adjacent to two leg support assemblies 110g and each leg support assembly 110g is adjacent to two leg support assemblies 110f. In this manner, the arms 134a and 136a of the corners 130a may overlap with the arms 136b and 134b, respectively, of the corners 130b.

**[0449]** FIG. 36C further shows the leg support assemblies 110f may include sliders 120a with arms 124a and 126a that are both offset from the respective planes 103 away from the interior space 102. Likewise, the leg support assemblies 110g may include sliders 120b with arms 124b and 126b that are both offset from the respective planes 103 towards the interior space 102. Similar

to the corners 130a and 130b, the alternating manner in which the leg support assemblies 110f and 110g are arranged in the frame 100f ensures the arms 124a and 126a of the sliders 120a overlap with the arms 126b and 124b, respectively, of the sliders 120b.

**[0450]** Similar to the frame 100e, the sliders 120a and 120b may have arms that are offset in an opposite manner to the corners 130a and 130b to align respective arms of the sliders 120a and 120b and the corners 130a and 130b along the first axes 141 of each X-frame tube 142a or 142b. For example, the arm 134a may be aligned to the arm 126b, the arm 136a may be aligned to the arm 124b, the arm 134b may be aligned to the arm 126a, and the arm 136b may be aligned to the arm 124a. This allows straight X-frame tubes 142a and 142b with constant cross-sections to be used to couple the leg support assemblies 110f and 110g together.

**[0451]** The various dimensions described above with respect to the frame 100e may also be the same for the frame 100f. These dimensions include, but are not limited to, the exterior widths of the respective arms of the sliders 120a and 120b and corners 130a and 130b (e.g., the widths  $w_{s1}$ ,  $w_{s2}$ ,  $w_{c1}$ , and  $w_{c2}$ ), the offset distances from the respective planes 103 (e.g., the offset distances  $w_1$  and  $w_2$ ), the lengths of the respective arms, (e.g., the lengths  $l_{sr}$  and  $l_{cr}$ ), and the total length of the sides of the frame (e.g., the length  $l$ ). For brevity, these values are not repeated here.

**[0452]** In some implementations, the foldable playard frame may include a storage latch to lock and/or maintain the frame in the folded configuration. The storage latch may provide an additional safety feature to reduce the exposure of a child to a partially folded or partially unfolded frame (i.e., the frame is between the folded and unfolded configurations). For example, the storage latch may reduce the likelihood of or, in some instances, prevent the child from unfolding and, subsequently, refolding the frame.

**[0453]** Generally, the storage latch may be separate from the latches described above to lock and/or maintain the frame in the unfolded configuration. In some implementations, the foldable playard frame may include one or more storage latches disposed on one or more leg support assemblies. For example, the frame may include storage latches coupled to respective leg support assemblies disposed on opposing sides and/or corners of the frame. For instance, the pin joints that couple the various components of the leg support assemblies and the X-frame assemblies together may be sufficiently loose such that one portion of the frame can be partially unfolded to such an extent that a child can insert their head through an opening formed in the partially unfolded portion

of the frame without appreciably unfolding other portions of the frame. The inclusion of multiple storage latches may thus prevent any one portion of the frame from being partially unfolded in the manner described above.

**[0454]** However, in other implementations, a single latch may be sufficient to lock the frame in the folded configuration. For example, FIGS. 34B and 34C show the frame 100e may include a single storage latch 600a coupled to one leg support assembly 110e to lock and/or maintain the frame 100e in the folded configuration. In some implementations, the single storage latch may be configured to withstand a load greater than or equal to 10 lbs. For example, a caregiver attempting to unlock the storage latch in an undesirable manner (e.g., by pulling on the slider 120, leg tube 112, or the X-frame tubes 142a or 142b) would have to apply a force greater than or equal to 10 lbs. to forcibly disengage the storage latch. The inclusion of a single latch may further simplify the assembly of the frame and reduce costs by reducing the number of parts in the frame.

**[0455]** In some implementations, the storage latch may allow the caregiver to fold and lock the playard in the folded configuration using a single hand. For example, the storage latch may be engaged and/or disengaged without the use of any tools. Instead, the storage latch may be actuated directly by the caregiver's hand. In another example, the storage latch may automatically engage when the caregiver folds the frame. For example, the caregiver may move the slider of one leg support assembly towards the foot during which the storage latch may automatically engage without the user having to separately actuate the storage latch. In this manner, the caregiver may only move the slider to fold and lock the frame. When unfolding the frame, the caregiver may actuate the storage latch and thereafter move the slider.

**[0456]** The storage latch may generally be coupled to the leg tube of the leg support assembly and disposed on or near the slider when the frame is in the folded configuration. For example, the slider may be disposed near a bottom end of the leg tube in the folded configuration. Thus, the storage latch may be rigidly coupled to the leg tube and disposed near the bottom end of the leg tube proximate to or, in some instances, abutting the foot of the leg support assembly such that the storage latch is near the slider in the folded configuration.

**[0457]** In some implementations, the storage latch, when engaged, provides a barrier that physically contacts the slider of the leg support assembly in order to prevent the slider from moving towards the corner and, hence, prevent the frame from being unfolded. When the storage latch is

actuated by the caregiver, the barrier is removed, thus allowing the caregiver to move the slider upwards along the leg tube to unfold the frame. In some implementations, the storage latch may be adapted to the shape and/or dimensions of the slider. In other words, the frame may not require a slider that is modified to accommodate the storage latch. Rather, the same slider may be used in the leg support assemblies independent of whether the leg support assembly includes the storage latch.

**[0458]** FIGS. 37A-37C show additional views of the storage latch 600a, which includes a push button mechanism. Specifically, the storage latch 600a may include a push button 610 at least partially disposed through an opening 113d formed on the leg tube 112 of the leg support assembly 110e. In some implementations, the frame 100e may only include one leg tube 112 with the opening 113d, in part, to simplify the manufacture of the frame 100e by eliminating a separate hole-forming process (e.g., drilling, punching) for the remaining leg tubes 112. The storage latch 600a may further include a spring element 620 disposed within a cavity 113c of the leg tube 112 and coupled to the push button 610 to impart a spring bias force onto the push button 610 that causes the push button 610 to protrude outwards through the opening 113d.

**[0459]** FIG. 37A shows the push button 610 and the opening 113d may be disposed proximate to the foot 114 of the leg support assembly 110e such that the push button 610 is positioned above the slider 120 when the frame 100e is in the folded configuration. The shape and/or dimensions of the push button 610 and the opening 113d may be similar to reduce or, in some instances, eliminate gaps formed between the push button 610 and the edges of the leg tube 112 forming the opening 113d. In some implementations, the push button 610 may have an exterior width corresponding to the average width of a human thumb (e.g., about 1 inch). The cross-section of the push button 610 and, by extension, the opening 113d may have various shapes including, but not limited to, a circle, an ellipse, a polygon (e.g., a square, a triangle), and any combinations of the foregoing.

**[0460]** FIG. 37B shows the push button 610 may include a bottom restraining surface 612 that may physically contact the top surface 129 of the slider 120 when the frame 100e is in the folded configuration. Thus, the push button 610 and, in particular, the restraining surface 612 provides a barrier that prevents the slider 120 from moving upwards along the leg tube 112, hence, maintaining the frame 100e in the folded configuration. The restraining surface 612 may be oriented such that the force applied to the push button 610 due to contact with the slider 120 is

oriented in a direction that does not cause the push button 610 to move inwards into the cavity 113c through the opening 113d. For example, FIG. 37B shows the restraining surface 612 may be a horizontally flat surface that abuts a corresponding portion of the top surface 129 of the slider 120. The horizontal orientation of the restraining surface 612 results in a vertically oriented contact force between the slider 120 and the push button 610, which is orthogonal to the horizontal axis along which the push button 610 moves through the opening 113d. In some implementations, the portion of the top surface 129 that contacts the restraining surface 612 may also be horizontal and flat.

**[0461]** The spring element 620 further ensures the push button 610 remains protruding outwards through the opening 113d of the leg tube 112 so that contact between the restraining surface 612 and the top surface 129 of the slider 120 is maintained. As shown, the push button 610 may also include a mechanical stop 614 disposed in the cavity 113c to limit the displacement of the push button 610 through the opening 113d. Thus, the combination of the spring element 620 and the mechanical stop 614 may limit the range of motion of the push button 610 through the opening 113d. In some implementations, the mechanical stop 614 may be a lip or a flange that extends at least partially around the periphery of the push button 610 to contact an interior surface of the leg tube 112 surrounding the opening 113d.

**[0462]** To unfold the frame 100e, the caregiver may press the push button 610 to displace the push button 610 inwards into the cavity 113c of the leg tube 112. When the push button 610 is sufficiently displaced (e.g., the restraining surface 612 is no longer in physical contact with the top surface 129 of the slider 120), the caregiver may then move the slider 120 upwards along the leg tube 112 and towards the corner 130 to unfold the frame 100e. When the slider 120 is moved upwards such that the top surface 129 is above the restraining surface 612, the interior surfaces of the slider 120 may contact the push button 610, thus keeping the push button 610 disposed in the cavity 113c. Once the slider 120 moves past the push button 610, the spring bias force generated by the spring element 620 moves the push button 610 back outwards through the opening 113d.

**[0463]** In some implementations, the push button 610 may also include a ramped surface 616 as a lead-in feature to automatically engage the storage latch 600a when folding the frame 100e. When the caregiver begins to fold the frame 100e, the slider 120 is initially disposed above the push button 610. As the slider 120 is moved downwards along the leg tube 112 by the caregiver, a

bottom surface 127 of the slider 120 physically contacts the ramped surface 616. The physical contact between the ramped surface 616 and the bottom surface 127 of the slider 120 causes the push button 610 to move inwards into the cavity 113c until the slider 120 is able to move past push button 610. Once the slider 120 is disposed below the push button 610 (i.e., the top surface 129 is below the restraining surface 612), the spring element 620 may move the push button 610 outwards through the opening 113d such that the restraining surface 612 is able to prevent the slider 120 from moving back upwards along the leg tube 112. In this manner, the ramped surface 610 may automatically engage the storage latch 600a when folding the frame 100e.

**[0464]** FIG. 37B shows the ramped surface 616 may be disposed along a top portion of the push button 610 opposite the restraining surface 612. The ramped surface 616 may be oriented such that the contact force applied to the push button 610 by the bottom surface 127 of the slider 120 has a force component oriented in along a direction that moves the push button 610 into the cavity 113c through the opening 113d. The ramped surface 616 may be further dimensioned to maintain contact with the bottom surface 127 of the slider 120 until the push button 610 is sufficiently disposed within the cavity 113c such that the slider 120 is able to move past the push button 610.

**[0465]** For example, the ramped surface 616 may be oriented at an angle less than 90 degrees from a horizontal plane. When contact is made between the ramped surface 610 and the bottom surface 127, the contact force applied to the ramped surface 610 includes a horizontal force component, which displaces the push button 610 through the opening 113d and into the cavity 113c when the horizontal force component is greater than the spring bias force generated by the spring element 620. In some implementations, the weight of the slider 120 and the X-frame tubes 142a and 142b in the X-frame assemblies 140c applied to the ramped surface 616 may be sufficiently large to overcome the spring force generated by the spring element 620 and, hence, to displace the push button 610 into the cavity 113c without the aid of another external force applied to the push button 610 (e.g., a force applied by the caregiver).

**[0466]** The spring element 620 may be various types of springs including, but not limited to, a compression spring (e.g., a coil spring) and a leaf spring. For example, FIG. 37B shows the spring element 620 as a Valco snap button that includes a base 622 that couples to the push button 610 and an arm 624 that extends from the base 622 to form a spring. As shown, the base 622 may be press-fit into a corresponding opening formed on the push button 610 to securely couple the spring

element 620 to the push button 610. It should be appreciated that other coupling mechanisms may be used to couple the spring element 620 to the push button 610 including, but not limited to, a snap fit mechanism, adhesives, and a fastener (e.g., a screw fastener, a bolt fastener).

**[0467]** The arm 624 may be bent in shape to form a spring (see FIG. 37C). When the spring element 620 is installed in the cavity 113c, the arm 624 is compressed, which ensures a spring bias force is applied to the push button 610 independent of the position of the push button 610 through the opening 113d. In other words, the arm 624 imparts a spring bias force onto the push button 610 even when the push button 610 is not pressed by the caregiver.

**[0468]** In some implementations, the spring element 620 may also act as an anchor to maintain the push button 610 at a desired orientation relative to the opening 113d. For example, the push button 610 and the opening 113d may each have a circular cross section, which allows the push button 610 to rotate relative to the opening 113d about a centerline axis of the opening 113d. However, FIG. 37B shows the spring element 620 and, in particular, the arm 624, may be fixed in orientation once installed in the leg tube 112 due to the constraints imposed by the interior surfaces of the leg tube 112. In other words, the arm 624, which is rigidly coupled to the push button 610 via the base 622, reduces or, in some instances, prevents rotation of the push button 610 relative to the opening 113d, thus ensuring the ramped surface 616 and the restraining surface 612 are oriented properly to contact the bottom surface 127 and the top surface 129, respectively, of the slider 120.

**[0469]** FIGS. 38A-38C show another exemplary storage latch 600b installed onto the frame 100e with a latch member 642 to lock the frame 100e in the folded configuration. As shown, the storage latch 600b may include a base 640 to support the latch member 642. In particular, the base 640 may be rigidly coupled to the leg tube 112 via, for example, a fastener inserted through a fastener opening 641 and a corresponding opening (not shown) on the leg tube 112. Generally, the base 640 may be disposed below the slider 120. For example, FIG. 38C shows the base 640 may be disposed proximate to or, in some instances, may abut the foot 114 of the leg support assembly 110e.

**[0470]** The latch member 642 may generally be a mechanically compliant component that can be readily bent, for example, by the caregiver to disengage the storage latch 600b. The latch member 642 may also generate an internal restoring force when the latch member 642 is bent to rotate the latch member 642 back towards its unbent form. The latch member 642 may generally be aligned

to the leg tube 112 and disposed near the slider 120 in the folded configuration. For example, FIGS. 38B and 38C show the latch member 642 may extend from the base 640 upwards along and to the side of the leg tube 112. In some implementations, the latch member 642 may be longitudinally aligned parallel to the longitudinal axis 111a of the leg tube 112. The latch member 642 may further extend along the leg tube 112 such that an end 643 of the latch member 642 is disposed above the slider 120 in the folded configuration.

**[0471]** Although the latch member 642 may protrude outwards from the frame 100e, the latch member 642 may be shaped and/or dimensioned to avoid appreciably increasing the overall size of the frame 100e particularly in the folded configuration. For example, the width of the latch member 642 may be less than or equal to the exterior width of the leg tube 112. In another example, the latch member 642 may be offset from the leg tube 112 such that the gap formed between the latch member 642 and the leg tube 112 is sufficiently large to only accommodate the slider 120. In other words, the gap formed between the latch member 642 and the leg tube 112 may be equal to the thickness of the portion of the base 121 disposed along the exterior portion of the frame 100e.

**[0472]** As shown in FIG. 38C, the latch member 642 may include a hook 644 disposed near the end 643 of the latch member 642 with a bottom surface 645 that physically contacts the top surface 129 of the slider 120. In some implementations, the hook 644 may be disposed proximate to or, in some instances, physically contacts the leg tube 112 when the latch member 642 is not bent. Similar to the restraining surface 612 of the storage latch 600a, the hook 644 of the latch member 642 may provide a barrier that prevents the slider 120 from moving upwards along the leg tube 112, hence, maintaining the frame 100e in the folded configuration.

**[0473]** The bottom surface 645 may be oriented such that the force applied to the hook 644 due to contact with the slider 120 is oriented in a direction that does not cause the latch member 642 to bend outwards. For example, the bottom surface 645 may align with a radial axis that intersects a rotation axis that the latch member 642 rotates about when bent. In other words, the contact force applied to the bottom surface 645 is oriented such that the resulting torque applied to the latch member 642 is not sufficient to bend the latch member 642. For example, the bottom surface 645 may be a horizontally flat surface. Thus, the contact force applied to the hook 644 via the bottom surface 645 may be oriented vertically. The latch member 642 may rotate about a rotation axis

oriented horizontally and located at the base of the latch member 642 such that the contact force is substantially aligned or aligned to a vertical axis intersecting the rotation axis. In some implementations, the portion of the top surface 129 that contacts the restraining surface 612 may also be horizontal and flat.

**[0474]** To unfold the frame 100e, the caregiver may pull on the end 642 of the latch member 642 to bend the latch member 642 in an outwards direction. When the latch member 642 is sufficiently bent, the caregiver may then move the slider 120 upwards along the leg tube 112 and towards the corner 130 to unfold the frame 100e. This may occur when the caregiver sufficiently bends the latch member 642 such that the hook 644 and, in particular, the bottom surface 645 no longer physically contacts the top surface 129 of the slider 120. As the slider 120 moves upwards along the leg tube 112, the exterior sides of the slider 120 may continue to contact the hook 644, thus maintaining the latch member 642 in a bent state without the aid of the caregiver. Once the slider 120 moves past the hook 644, the internal restoring force generated within the latch member 642 may rotate the latch member 642 back to the unbent state.

**[0475]** In some implementations, the latch member 642 and, in particular, the hook 644 may also include a ramped surface 646 as a lead-in feature to automatically engage the storage latch 600b when folding the frame 100e. As shown in FIG. 38C, the ramped surface 646 may correspond to a top surface of the hook 644 located opposite the bottom surface 645. Similar to the ramped surface 616 of the storage latch 600a, the ramped surface 646 be oriented to facilitate actuation of the storage latch 600b based on contact with the slider 120 as the frame 100e is being folded.

**[0476]** For example, as the slider 120 is moved downwards along the leg tube 112 by the caregiver, the bottom surface 127 of the slider 120 may physically contact the ramped surface 646. The ramped surface 646 may be oriented such that the contact force applied by the bottom surface 127 has a polar force component that generates a sufficiently large torque to bend the latch member 642 in a outwards direction. As the slider 120 moves downwards, the exterior surface of the slider 120 may remain in contact with the hook 644, thus keeping the latch member 642 in a bent state. Once the slider 120 moves past the hook 644, the internal restoring force generated by the latch member 642 may rotate the latch member 642 back to the unbent state where the hook 644 is disposed proximate to or, in some instances, contacts the leg tube 112. The ramped surface 646 may be oriented at an angle less than 90 degrees from a horizontal plane. The ramped surface 646

may be also dimensioned to maintain contact with the bottom surface 127 of the slider 120 until the latch member 642 is sufficiently bent such that the slider 120 is able to move past the hook 644.

**[0477]** The base 640 and the latch member 642 may be integrally formed as a single part. For example, the base 640 and the latch member 642 may be formed from a plastic material using, for example, injection molding.

**[0478]** In some implementations, the base 640 may also be integrally formed together with the foot 114 of the leg support assembly 110e. For example, FIGS. 36A, 36C, 39A, and 39B show a storage latch 600c that includes a base 640 and a latch member 642. As shown, the base 640 may also act as a foot to support the leg support assembly 100f on the ground. For instance, the base 640 may include an opening 647 to receive the leg tube 112 and a fastener opening 641 to couple the base 640 to the leg tube 112. Additionally, the base 640 may include a D-shaped opening 648 similar to the D-shaped opening 117 to couple the soft goods 300 to the frame 100e. The latch member 642 may once again extend from the base 640 along the leg tube 112 and may further include a hook 644 disposed near an end 643 to prevent the slider 120 from moving upwards along the leg tube 112.

**[0479]** In some implementations, the foldable playard frame may include a secondary latch that limits the extent the frame can be folded without further assistance or input from the caregiver. For example, the latch of the frame may be accidentally unlocked, for example, by the child. To reduce or, in some instances, prevent the child from being exposed to openings in the frame that fall outside the desired clearances set forth in ASTM F409-19 or ASTM F1004-09, the second latch may only allow the frame to fold to such an extent that the desired clearances between the various rigid components of the frame are preserved. Thus, in some implementations, the inclusion of a secondary latch may allow for a frame that does not maintain the desired clearances for all the configurations of the frame (e.g., the folded configuration, the unfolded configuration, between the folded and unfolded configurations).

**[0480]** Generally, the secondary latch may be separate from the latch and the storage latch described above. The frame may generally include one or more secondary latches disposed on one or more of the leg support assemblies or one or more of the X-frame assemblies. For example, at least one pair of secondary latches may be disposed on opposing sides of the frame to ensure

respective sides of the frame maintain the desired clearances. In another example, the frame may only include a single secondary latch, which is sufficient to maintain the frame in the partially folded state. The secondary latch may be actuated in a tool-less manner such that the caregiver can actuate the secondary latch using a single hand.

**[0481]** In one example, FIG. 40A shows an exemplary frame 100g for the foldable playard 1000a with a secondary latch 650 disposed on one leg support assembly 110e. As shown, the frame 100g may include several of the same features as the frame 100e, such as the leg support assemblies 110e and the X-frame assemblies 140c. The frame 100g may define an interior space 102 with a hexagonal cross-sectional shape. However, it should be appreciated the various components of the frame 100g may also be adapted for a playard having an interior space 102 with a rectangular or square cross-sectional shape.

**[0482]** In some implementations, the secondary latch 650, the storage latch 600b, and the latch 200a may be installed on the same leg support assembly 110e. However, in other implementations, the secondary latch 650, the storage latch 600b, and the latch 200a may each be installed on different leg support assemblies 110e. More generally, at least one of the secondary latch 650, the storage latch 600b, or the latch 200a may be installed on one leg support assembly 110e.

**[0483]** The secondary latch 650 may be generally disposed at an intermediate location along the leg tube 112 between a storage latch 600b and a latch 200a to support the frame 100g in a partially folded state. For example, the secondary latch 650 may be positioned above the slider 120 in the folded configuration and below the slider 120 in the unfolded configuration. In some implementations, the partially folded state may correspond to the frame 100g being folded to such an extent that the desired clearances between the various rigid components of the frame 100g are maintained. For example, gap separating the leg tube 112 and the X-frame tubes 142a or 142b may remain greater than or equal to 1.5 inches in the partially folded state. When the frame 100g is further folded, the gap between the leg tube 112 and the X-frame tubes 142a or 142b may decrease to less than 1.5 inches.

**[0484]** In some implementations, the secondary latch 650 may include a push button mechanism similar to the storage latch 600a. The push button may provide a barrier that prevents the slider 120 from moving further downwards along the leg tube 112 when the frame 100g is initially folded. The caregiver may press the push button into the cavity of the leg tube 112 to allow the

slider 120 to move further downwards the leg tube 112 in order to fully fold the frame 100g. In some implementations, the push button may include a ramped surface disposed on the bottom side of the push button to allow the slider to move upwards along the leg tube 112 without the caregiver having to separately actuate the secondary latch 650.

**[0485]** FIG. 40B shows an exemplary secondary latch 650a with a push button mechanism. As shown, the secondary latch 650a may include a push button 652 disposed through an opening 113e-1 of the leg tube 112. The push button 652 may be coupled to an arm 654 disposed within the cavity 113c of the leg tube 112. The arm 654 may act as a spring to return the push button 652 to an outward facing position when the push button 652 is pressed into the cavity 113c. The arm 654 may be coupled to a base 656 that physically contacts opposing interior sides of the leg tube 112 such that the base 656 remains stationary when the arm 654 is bent. The base 656 may further include a tab 657 inserted into an opening 113e-2 formed on the leg tube 112 to securely couple the secondary latch 650a to the leg tube 112.

**[0486]** The push button 652 may also be coupled to an arm 653 disposed above the arm 654 that provides a mechanical stop that limits the extent the push button 652 can be pressed into the cavity 113c. For example, the arm 653 may be oriented along the same direction that the push button 652 moves through the opening 113e-1 and, thus, may contact the interior surface of the leg tube 112 when the push button 652 is sufficiently displaced. In some implementations, the arm 653 may be dimensioned such that the exterior surface 658 of the push button 652 is disposed within the opening 113e-1 to allow the slider 120 to move past the push button 652.

**[0487]** It should be appreciated the secondary latch 650a is one exemplary implementation and that, more generally, the secondary latch may have different geometries, dimensions, and/or parts to adjust the overall size of secondary latch 650a, the spring constant of the arm 654, the amount of material used for manufacture, and/or the number of parts for manufacture without changing the operating principle.

**[0488]** For example, FIG. 40C shows another exemplary secondary latch 650b where the arm 654 has an inverted U-shaped geometry disposed above the arm 653. The arm 654 may be compressed when installed onto the leg tube 112, thus providing a spring bias force independent of the position of the push button 652. In this example, the arm 653 may act as a mechanical stop that limits the

extent the push button 652 is inserted into the cavity 113c or protrudes outwards from the opening 113e-1.

**[0489]** In another example, FIG. 40D shows an exemplary secondary latch 650c where the push button 652 is coupled to a separate compression spring 660. In some implementations, the spring 660 may be compressed when installed onto the leg tube 112 to provide a spring bias force independent of the position of the push button 652. In some implementations, the spring 660 may only generate a spring force when the push button 652 is pressed. FIG. 40D further shows spring 660 may be directly mounted to the leg tube 112 using, for example, a fastener or a snap-fit connection. The push button 652 may further include mechanical stops 658 to limit the extent the push button 652 protrudes outwards from the opening 113e-1.

**[0490]** In some implementations, the foldable playard, when deployed, may also provide a platform to support various accessories (also referred to herein as a “topper”) to augment the functionality of the playard. For example, FIG. 23D shows the frame 100c of the playard 1000c may include one or more topper supports 161 disposed on the respective X-frame tubes of the X-frame assemblies 140b. The combination of the topper supports 161 and the corners 130 of the leg support assemblies 110c may support one or more toppers 160 placed onto the top portion 108 of the frame 100c when the playard 1000c is in the unfolded configuration. The toppers 160 may be various accessories including, but not limited to a changing table, a bassinet, and a bouncer.

**[0491]** In another example, FIGS. 41A-41F show the frame 100a in the unfolded configuration with a canopy cover assembly 400a. The canopy cover assembly 400a may be coupled to the frame 100a and disposed, in part, above the interior space 102 of the frame 100a to support a canopy cover 440 (see, for example, FIG. 41E) that covers the interior space 102. The canopy cover 440 may be a compliant and/or flexible component formed from, for example, a textile material. For example, the playard 1000a may be deployed in an outdoor setting, thus the canopy cover 440 may provide shade for the child 50 when placed in the partially enclosed space 301 of the playard 1000a.

**[0492]** As shown in FIGS. 41A-41C, the canopy cover assembly 400a may include multiple canopy support assemblies 410 that couple to each leg support assembly 110a of the frame 100a. Thus, the canopy cover assembly 400a may fully cover the interior space 102 (i.e., the canopy cover assembly 400a is a full canopy cover). In some implementations, the canopy support

assemblies 410 may be substantially identical or identical with the other canopy support assemblies 410.

**[0493]** Each canopy support assembly 410 may include a canopy bow 412 partially disposed above the interior space 102 to support the canopy cover 440 and a canopy clip 420a to couple the canopy bow 412 to the frame 100a. For the canopy cover assembly 400a, the canopy bows 412 from each canopy support assembly 410 may be coupled together via a hub 450a disposed above the interior space 102 as shown in FIG. 41A. In some implementations, the hub 450a may be approximately aligned or aligned to the center of the interior space 102 when the canopy cover assembly 400a is mounted to the frame 100a, as shown in FIG. 41C. FIG. 41B further shows the respective canopy bows 412 of the canopy support assemblies 410 may form a frame or support structure where each canopy bow 412 is bent, in part, to define the desired shape of the canopy cover 440 when the canopy cover 440 is installed onto the canopy support assemblies 410.

**[0494]** FIG. 41D shows the canopy clip 420a may be disposed along an exterior portion of the frame 100a (i.e., outside the interior space 102 of the frame 100a) proximate to the slider 120 and the top portion 108 of the frame 100a when the canopy clip 420a is coupled to the leg support assembly 110a. FIGS. 41E and 41F show the canopy clip 420a may include a base 422 with snap-fit features 424 that form a snap-fit connector to directly couple the canopy clip 420a to the leg tube 112 of one leg support assembly 110a. Thus, the canopy cover assembly 400a may be mounted to the frame 100a without the use of any tools. Furthermore, the canopy cover assembly 400a may be coupled to the frame 100a without making any alterations or modifications to the frame 100a. In this manner, the canopy cover assembly 400a may not be limited for installation with only the frame 100a, but instead the canopy cover assembly 400a may be mounted onto the frames of other playards (e.g., other frames with six leg support assemblies). Said in another way, the canopy cover assembly 400a may be a universally compatible accessory that the caregiver may separately purchase and/or install onto their playard.

**[0495]** The snap-fit features 424 may generally be shaped to conform with the cross-sectional shape of the leg tube 112 to ensure the canopy clip 420a is securely coupled to the leg tube 112. For example, FIG. 42A shows the snap-fit features 424 may form an oval-shaped channel that matches the oval-shaped cross-section of the leg tube 112. In some implementations, the asymmetric cross-section of the leg tube 112 (e.g., the oval-shaped cross section) may ensure the

canopy clip 420a only couples to the leg tube 112 with a desired orientation and/or prevents unwanted rotation of the canopy clip 420a when coupled to the leg tube 112. In this manner, the canopy bow 4112 may be repeatedly and/or reliably positioned and/or oriented with respect to the frame 100a such that the canopy cover 440, when placed onto the canopy support assembly 410, provides the desired coverage and/or aesthetic appearance. However, it should be appreciated that in other implementations, the shape of the snap-fit features 424 may be tailored to match the shape of the leg tubes most commonly used in various playard products (e.g., a circular-shaped leg tube). The snap-fit features 424 may further include lead-in features 425 to align the canopy clip 420a to the leg tube 112 and/or to deflect the snap-fit features 424 outwards to facilitate engagement with the leg tube 112.

**[0496]** In some implementations, the caregiver may thus align and press the canopy clip 420a along the arrow shown in FIG. 42A to engage the snap-fit features 424 to the leg tube 112. In some implementations, the caregiver may instead hook one of the snap-fit features 424 (e.g., via the corresponding lead-in feature 425) onto the leg tube 112 and then rotate the opposing side of the canopy clip 420a such that the other snap-fit feature 424 engages the leg tube 112 (e.g., via the corresponding lead-in feature 425) as shown in FIG. 42B. Compared to conventional canopy cover assemblies, the canopy cover assembly 400a may be more securely and reliably coupled to the frame 100a by directly coupling the canopy clip 420a to the leg tube 112 instead of a portion of the frame covered by soft goods. Thus, the canopy cover assembly 400a may be less susceptible to being removed accidentally by, for example, wind or the child 50 when placed into the partially enclosed space 301.

**[0497]** FIGS. 41E and 41F further show the canopy clip 420a may include a canopy bow opening 426 (e.g., also referred to herein as a “canopy bow socket 426”) formed, in part, on the base 422 to receive a first end 413a of the canopy bow 412. Once the first end 413a of the canopy bow 412 is inserted into the canopy bow opening 426, a fastener may be inserted through the opening 432 disposed on the side of the base 422 to securely couple the canopy bow 412 to the canopy clip 420a. In some implementations, the canopy clip 420a may alternatively utilize an integral snap finger to couple the canopy bow 412 to the canopy clip 420a via a snap-fit connection.

**[0498]** In some implementations, a portion of the canopy bow 412 may be disposed outside the interior space 102 of the frame 102 and positioned proximate to the top portion 108 of the frame

100a when coupled to the canopy clip 420a. For example, FIG. 41D shows a portion of the canopy bow 412 may be in substantially parallel or parallel alignment with the leg tube 112 and positioned next to the corner 130. By positioning the canopy bow 412 to overlap with the top portion 108 of the frame 100a, the canopy bow 412 is less susceptible to being pulled into the partially enclosed space 301 of the playard 1000a by the child 50 compared to conventional playards with canopy cover assemblies. For example, the canopy bow 412 may be more difficult to reach since the child 50 has to extend their arms over the corners 130 of the frame 100a to grab the canopy bow 412. Additionally, even if the child 50 manages to grab onto the canopy bow 412, they have less leverage to pull the canopy cover assembly 400a into the playard 1000a due to the canopy bow 412 overlapping the top portion 108 of the frame 100a and the canopy clip 420a positioned on an exterior portion of the frame 100a.

**[0499]** The canopy clip 420a may further include an alignment rib 430 that protrudes outwards from the base 422 towards the frame 100a. The alignment rib 430 may be used, in part, as an alignment feature to position the canopy clip 420a onto the leg support assembly 110a. For example, FIGS. 41D-F show the alignment rib 430 may be disposed between the top surface of the slider 120 and the bottom surface of the corner 130 such that the snap-fit features 424 are disposed just below the slider 120 when the canopy clip 420a is coupled to the leg tube 112. In some implementations, the alignment rib 430 may also prevent the canopy clip 420a from sliding downwards along the leg tube 112. For example, FIG. 41E shows the alignment rib 430 may contact the top surface of the slider 120 if the canopy clip 420a moves down along the leg tube 112.

**[0500]** In some implementations, the canopy cover 440 may be laid directly over and onto the canopy support assemblies 410. The canopy cover 440 may include one or more tethers 442 to pull and/or hold the canopy cover 440 taut along the canopy bows 412 of the canopy support assemblies 410. For example, FIG. 41E shows each tether 442 may be looped around a hook 428 disposed at the bottom of the base 422 of the canopy clip 420a.

**[0501]** The canopy bow 412, the canopy clip 420a, and/or the hub 450a may be formed from various materials including, but not limited to plastic and fiberglass. In some implementations, the canopy bow 412 may be formed as a single, mechanically compliant component that may bent into the desired shape to couple the canopy bow 412 to the hub 450a and/or the canopy clip 420a. In

some implementations, the canopy bow 412 may be an assembly of components (e.g., tubes) coupled together via one or more shock cords or bungee cords. The tubes may be fitted to one another to form an assembly of tubes that mechanically function as a single, continuous rod. For example, FIG. 41E shows the canopy bow 412 may include an elastic cord 414 that passes through the canopy bow 412 to hold the various sections of the canopy bow 412 together. As shown, the elastic cord 414 may be terminated with a knot, which may be accessed by the caregiver through an opening 434 on the base 422 of the canopy clip 420a.

**[0502]** As described above, the canopy cover assembly 400a may include a hub 450a that couples the second ends 413b of each canopy bow 412 together to form a structure that covers the interior space 102 of the frame 100a. In some implementations, the canopy bows 412 may be coupled to the hub 450a prior to purchase by a consumer (e.g., the canopy cover assembly 400a may be assembled at a factory) or by a caregiver when installing the canopy cover assembly 400a onto the playard 1000a for the first time. In other words, the canopy bows 412 may remain coupled to the hub 450a for subsequent installations of the canopy cover assembly 400a such that the caregiver only needs to couple the respective canopy clips 420a to corresponding leg tubes 112 for setup.

**[0503]** In some implementations, the canopy bow 412 may be rigidly coupled to the hub 450a (i.e., the second 413b of the canopy bow 412 may not translate and/or rotate relative to the hub 450a). Thus, the canopy bows 412 of the canopy support assemblies 410 may be bent to facilitate attachment of the respective canopy clips 420a to the frame 100a. In some implementations, the second end 413b of the canopy bow 412 may be rotatably coupled to the hub 450a so that the canopy support assemblies 410 may be folded into a more compact structure for storage while remaining coupled to the hub 450a. For example, FIGS. 43A and 43B show the hub 450a may include a base 451 with multiple openings 452 to receive the second ends 413b of each canopy bow 412. The openings 452 may be aligned, in part, according to the relative locations of the leg support assemblies 110a of the frame 100a in the unfolded configuration. For example, the hub 450a may have six openings 452 disposed evenly around the periphery of the base 451 to align with the six leg support assemblies 110a, which may be arranged to form a hexagonal-shaped interior space 102.

**[0504]** Once the second end 413b of the canopy bow 412 is inserted into the opening 452, a pin 454 coupled to the second end 413b may be held in a corresponding slot 453 formed in the base

451 via, for example, a snap-fit connector. This allows the second end 413b of the canopy bow 412 to rotate relative to the base 451 via rotation of the pin 454 within the slot 453 about a rotation axis 460 as shown in FIG. 43B. In some implementations, the pin 454 may be integrally formed into the canopy bow 412. In some implementations, the pin 454 may be a separate component that is inserted through openings along the sides of the canopy bow 412 near the second end 413b.

**[0505]** The base 451 may further include a lip 457 to constrain the range of rotational motion of the canopy bow 412 relative to the hub 450a. For example, FIG. 43B shows the lip 457 may be disposed along the bottom side of the base 451, which causes the canopy bow 412 to bend when the canopy clip 420a attached to the first end 413a of the canopy bow 412 is positioned below the hub 450a. However, the canopy support assemblies 410 may be allowed to rotate such that the second end 413b of each canopy bow 412 is inserted through the opening 452 from the top side of the base 451 (i.e., the canopy clip 420a is positioned above the hub 450a). In this manner, the canopy cover assembly 400a may be folded for storage and/or transport separately or together with the playard 1000a.

**[0506]** FIGS. 44A and 44B show the playard 1000a with the frame 100a and soft goods 300 and another exemplary canopy cover assembly 400b with the canopy cover 440 installed onto the playard 1000a. In this example, the canopy cover assembly 400b may cover half the interior space 102 (i.e., the canopy cover assembly 400b is a half canopy cover).

**[0507]** FIGS. 45A-45E show the canopy cover assembly 400b may once again include multiple canopy support assemblies 410 coupled to the frame 100a to provide a support structure that defines the desired shape of the canopy cover 440 when mounted to the canopy support assemblies 410. Compared to the canopy cover assembly 400a, however, the canopy support assemblies 410 of the canopy cover assembly 400b may include a canopy bow 412 that is directly coupled to two canopy clips 420b mounted to different leg support assemblies 110a of the frame 100a instead of a central hub. For example, FIGS. 45A and 45C show the canopy cover assembly 400b may include two canopy support assemblies 410 where the canopy bow 412 of each canopy support assembly 410 is coupled to two non-adjacent leg support assemblies 110a. The canopy bows 412 may overlap and/or cross one another as shown in FIG. 45C.

**[0508]** In this example, the canopy bow 412 may include multiple bow sections 416 coupled together via connectors 415. The connector 415 may be a tubular-shaped component that receives

respective ends of two bow sections 416. In some implementations, each bow section 416 may be coupled to the connector 415 via a fastener inserted through a corresponding opening on the connectors 415 and/or an integral snap finger.

**[0509]** The canopy clip 420b may incorporate several of the same features as the canopy clip 420a described above. For example, FIGS. 45D and 45E show the canopy clip 420b may include a base 422 with snap-fit features 424, a canopy bow opening 426 to receive one end of the canopy bow 412, a mounting hole 432 to securely couple the canopy bow 412 to the canopy clip 420b, an opening 434 to access the elastic cord in the canopy bow 412, and a hook 428 to secure the tether 442 of the canopy cover 440 to the canopy clip 420. Compared to the canopy clip 420a, the canopy bow opening 426 of the canopy clip 420b may be tilted such that the portion of the canopy bow 412 coupled to the canopy clip 420b is oriented an angle relative to the leg tube 112 of the leg support assembly 110a to ensure the canopy bow 412 extends over a center portion of the interior space 102 as shown in FIG. 45C.

**[0510]** FIGS. 46A-46C show another exemplary canopy cover assembly 400c without the canopy cover 440 coupled to the frame 100a of the playard 1000a. The canopy cover assembly 400c may also cover half the interior space 102 similar to the canopy cover assembly 400b. However, the canopy support assemblies 410 of the canopy cover assembly 400c may be joined together by a hub 450b in the canopy cover assembly 400a. As shown, the canopy support assemblies 410 may include the canopy bows 412 and canopy clips 420a described above. In this example, the canopy support assemblies 410 may couple to enough leg support assemblies 110a to cover half the interior space 102 as shown in FIG. 46C.

**[0511]** FIGS. 47A and 47B show the hub 450b may once again include a base 451 with openings 452 to receive the second ends 413b of each canopy bow 412. As shown, the openings 452 may be formed as sockets that rigidly couple the second ends 413b to the hub 450a such that the second end 413b of each canopy bow 412 is translationally and rotationally constrained to the hub 450b. In some implementations, the second end 413b may be coupled to the hub 450b via a fastener and/or a snap-fit connection.

**[0512]** FIGS. 48A and 48B show another hub 450c for the canopy cover assembly 400c, which allows the second end 413b of the canopy bow 412 to be rotatable relative to the base 451 so that the canopy cover assembly 400c may be folded. The hub 450c may incorporate several of the same

features as the hub 450a described above. For example, the base 451 may include a slot 453 to receive a pin 454 mounted to the second end 413b of the canopy bow 412. The slot 453 and the pin 454 may allow the canopy bow 412 to rotate about the axis 460. The base 451 may further include a lip 457 disposed on a bottom side of the base 451 to limit the rotational motion of the canopy bow 412.

**[0513]** FIGS. 49A and 49B show yet another hub 450d for the canopy cover assembly 400c. As shown, the hub 450d may include a base 451 with an opening 456 that extends along the curved side of the base 451. The opening 456 may be shaped to receive the second ends 413b of multiple canopy bows 412 as shown in FIG. 49A. The base 451 may further include holes 455 on the top and bottom sides of the base 451 to couple the second end 413b of each canopy bow 412 to the base 451. In some implementations, a pin (not shown) may be inserted through the opening 455 and corresponding openings (not shown) on the canopy bow 412 such that the second end 413b of each canopy bow 412 may rotate about an axis 461 as shown in FIG. 49A. This, in turn, may enable the canopy cover assembly 400c to be folded by rotating each of the canopy bows 412 about a corresponding axis 461 to one side of the hub 451 such that the canopy bows 412 are approximately parallel or parallel with one another. In some implementations, a fastener may instead be inserted through the openings 455 to rigidly couple each canopy bow 412 to the hub 450d (i.e., the second end 413b of the canopy bow 412 does not rotate relative to the base 451).

**[0514]** The foldable playard may also include a bassinet accessory to provide an elevated surface to support a child in their first several months of life (e.g., an infant, a child weighing less than 15 lbs). Once the child outgrows the bassinet accessory, the bassinet accessory may be removed and the interior space of the foldable playard may be used to contain the child as described above. In this manner, the foldable playard may be reconfigured by the caregiver to adapt to the physical development of the child, thus extending the lifetime of the playard. When the bassinet accessory is installed on the playard, the playard may be considered as being in a “bassinet mode.” When the bassinet accessory is removed from the playard, the playard may be considered as being in a “playard mode.”

**[0515]** FIGS. 50A and 50B show the playard 1000b with an exemplary bassinet accessory 500a in the deployed unfolded configuration. As shown, the bassinet accessory 500a may be disposed within a top portion of the partially enclosed space 301 defined by the soft goods 300. The bassinet

accessory 500a may define a separate relatively smaller partially enclosed space 501 disposed within the partially enclosed space 301 to contain the child in the unfolded configuration. The bassinet accessory 500a may generally include a support structure 520 that physically defines the partially enclosed space 501. The support structure 520 may also facilitate folding and unfolding of the bassinet accessory 500a together with the frame 100b and the soft goods 300, thus simplifying setup and tear down of the playard 1000b (i.e., the caregiver is not required to remove the support structure of the bassinet to fold the playard or install the support structure each time the playard is deployed).

**[0516]** The support structure 520 may include bassinet soft goods 522 with side surfaces 524 and a bottom surface 526 that physically surround at least a portion of the partially enclosed space 501. The support structure 520 may further include a hub 550 and multiple support tubes 540 that together form a foldable structure. The hub 550 may be formed from a plastic material (e.g., via injection molding). The support tube 540 may be formed from various rigid materials including, but not limited to, aluminum and steel. In the unfolded configuration, the hub 550 and the support tubes 540 provide a rigid platform to support a mattress 510 (see, for example, FIG. 52). The mattress 510, in turn, may provide a cushioned surface 511 located above the ground surface 90 to support the child.

**[0517]** It should be appreciated the bassinet accessories disclosed herein may also be installed onto different playards (e.g., playards having frame shapes that are different than that shown in FIGS. 50A and 50B). For example, with reference again to FIG. 23A, the bassinet accessory 500a may also be installed on the foldable playard 1000c in the same manner as the playard 1000b.

**[0518]** The bassinet accessory 500a may be dimensioned and/or shaped such that the partially enclosed space 501 extends laterally to the boundaries of the partially enclosed space 301 of the soft goods 300 and, in some instances, the interior space 102 of the frame 100b when the soft goods 300 are disposed along the boundaries of the interior space 102. For example, FIGS. 50A and 50B show the bassinet soft goods 522 may extend to the side portions 306 of the soft goods 300. However, it should be appreciated that in other implementations, the bassinet accessory 500a may be shaped and/or dimensioned such that a gap is formed between the side portions 306 of the soft goods 300 and the bassinet soft goods 522. For example, with reference again to FIG. 23A,

this figure shows a gap is formed between the side portions 306 and the bassinet soft goods 522 due to the curved shape of the leg support assemblies 110c.

**[0519]** In some implementations, the bassinet accessory 500a may define a partially enclosed space 501 with a cross-sectional shape that conforms with the cross-sectional shape of the partially enclosed space 301 and, in some implementations, the interior space 102. For example, FIGS. 50A and 50B show the partially enclosed space 501 may have a rectangular cross-sectional shape that extends to the side portions 306 of the soft goods 300. In some implementations, the lateral dimensions of the partially enclosed space 501 may remain constant (or substantially constant as the bassinet soft goods 522 may be deformed by the soft goods 300) such that the three-dimensional volume of the partially enclosed space 501 is shaped as a right prism.

**[0520]** FIGS. 50A and 50B also show the bassinet soft goods 522 may be coupled to the top portion 302 of the soft goods 300 such that the bassinet soft goods 522 hang below the top portion 302. As a result, the bassinet accessory 500a may be positioned below the top side of the playard 1000b. For simplicity, the partially enclosed space 501 may include the space between the bottom surface 526 of bassinet soft goods 522 and the top side of the playard 1000b (e.g., the top horizontal plane 92). The presence of the bassinet accessory 500a may further divide the partially enclosed space 301 such that a bottom portion 301a of the partially enclosed space 300 is formed below the bassinet accessory 500a.

**[0521]** The bassinet accessory 500a may provide a relatively shallow partially enclosed space 501 to improve accessibility. This may enable the bassinet accessory 500a to reduce the physical strain experienced by the caregiver since the caregiver would not bend over as much when directly placing the child into the partially enclosed space 301 of the soft goods 300 (or taking the child out of the partially enclosed space 301). Additionally, the shallow bassinet accessory 500a may also provide greater visibility of the child particularly when the caregiver is viewing the playard 1000b from an elevated position (e.g., viewing the top of the playard 1000b).

**[0522]** The bassinet accessory 500a may be characterized by a height,  $h_{t,1}$ , defined as the distance from the respective bottom corner portions 537 of the bassinet soft goods 522 to the top horizontal plane 92 of the playard 1000b in the unfolded configuration as shown in FIG. 50B. The height,  $h_{t,1}$ , also corresponds to the height of the partially enclosed space 501. In some implementations, the height,  $h_{t,1}$ , may range between 7.5 inches and about 12 inches. In some implementations, the

bassinet accessory 500a may also be characterized by a height,  $h_m$ , defined as the distance from the top surface 511 of the mattress 510 to the top horizontal plane 92 of the playard 1000b. When the mattress 510 is not compressed (e.g., the child is not resting on the mattress 510), the height,  $h_m$ , may range between 7.5 inches and about 10 inches. The bottom portion 301a may also be characterized by a height,  $h_b$ , defined as the distance from the ground surface 90 to the bottom surface 526. In some implementations, the height,  $h_b$ , may be greater than or equal to about 18 inches.

**[0523]** The term “about,” when used to describe the height dimensions  $h_{t,l}$ ,  $h_b$ , and  $h_m$ , is intended to cover manufacturing tolerances and/or variations due to the deformation of the soft goods 300 and/or the bassinet soft goods 522. For example, “about 12 inches” may correspond to a height ranging between 11.75 inches and 12.25 inches or between 11.5 inches and 12.5 inches. In another example, “about 10 inches” may correspond to a height ranging between 9.75 inches and 10.25 inches or between 9.5 inches and 10.5 inches. In another example, “about 18 inches” may correspond to a height ranging between 17.75 inches and 18.25 inches or between 17.5 inches and 18.5 inches.

**[0524]** In some implementations, the height,  $h_{t,l}$ , of the bassinet accessory 500a and/or the height,  $h_b$ , of the bottom portion 301a may remain substantially unchanged between the folded and unfolded configurations. For example, the support tubes 540 and the hub 550 may only cause the bassinet accessory 500a to collapse along a lateral direction when folding the bassinet accessory 500a together with the playard 1000b (i.e., the lateral dimensions of the partially enclosed space 501 decrease while the height,  $h_{t,l}$ , remains substantially unchanged). Furthermore, the leg support assemblies 110a may remain upright between the folded and unfolded configurations as described above, thus the height,  $h_b$ , may also remain substantially unchanged.

**[0525]** In another example, the frame 100b may flare outwards when unfolded to improve, for example, the mechanical stability of the playard 1000b. Alternatively, as shown in the side view of FIG. 50C, a playard frame 100c with curved legs, similar to that shown in FIG. 23E, may be equipped with a bassinet accessory. In FIG. 50C, the bassinet soft goods are not shown so as to reveal a relative position of the hub 550 and the support tubes 540 as viewed from the side in an unfolded configuration. Although the bassinet soft goods are not explicitly shown in FIG. 50C, the figure nonetheless indicates that respective bottom corners 537 of the bassinet soft goods would

be located at respective distal ends of the support tubes 540. FIG. 50C also shows the overall height  $H_1$  of the frame 100c, and the respective heights  $h_{t,1}$  and  $h_b$  as discussed above.

**[0526]** Additionally, it should be appreciated that the bassinet accessory 500a and, in particular, the bassinet soft goods 522 may fold and/or crumple when folding the playard 1000b. These factors may contribute to small changes in the height,  $h_{t,1}$ , of the bassinet accessory 500a and/or the height,  $h_b$ , of the bottom portion 301a between the folded and unfolded configurations. For example, the height,  $h_{t,1}$ , in the unfolded configuration may change to the height,  $h_{t,2}$ , in the folded configuration (see, for example, FIG. 61). However, the variations in the heights  $h_{t,1}$  and  $h_b$  may be sufficiently small such that the support tubes 540 and the hub 550 remain disposed near to or within the interior space 102 of the playard 1000b. Said in another way, the dimensional relations between, for example, the length of the support tube 540 and the heights  $h_{t,1}$  and  $h_b$ , as described below, may remain substantially unaffected due to variations in the heights  $h_{t,1}$  and  $h_b$ . In some implementations, the heights  $h_{t,1}$  and  $h_b$  may increase or decrease by less than or equal to 1 inch.

**[0527]** In some implementations, the bassinet accessory 500a may satisfy various consumer safety standards (e.g., ASTM F2194). Thus, the combination of the playard 1000b and the bassinet accessory 500a may satisfy ASTM F406, as described above, and ASTM F2194 together. For example, the bassinet accessory 500a and, in particular, the hub 550 and the support tubes 540 may provide a sufficiently flat platform for the mattress 510 to rest upon such that the angle between neighboring segments 512 of the mattress 510 are less than 7 degrees. Additionally, the bassinet accessory 500a may have no openings with a diameter ranging between 0.210 inches and 0.375 inches to prevent finger entrapment. The bassinet accessory 500a may further have no components that undergo a scissoring or shearing motion. The bassinet accessory 500a and, by extension, the playard 1000b may support a static load of 54 lb or 3 times the manufacturer's recommended weight (whichever is greater) for at least 60 seconds. The bassinet accessory 500a may be dimensioned and/or shaped such that any gaps between the edges of the mattress 510 and the side surfaces 524 of the bassinet soft goods 522 is less than 0.5 inches. Additionally, the height,  $h_m$ , from the top surface 511 of the mattress 510 to the top side 92 of the playard 1000b may be greater than or equal to 7.5 inches.

**[0528]** FIGS. 51A and 51B show the mattress 510 may be removed from the bassinet accessory 500a and/or the playard 1000b for use in both the bassinet mode and the playard mode of the

foldable playard 1000b. Specifically, FIG. 51A shows the playard 1000b in the bassinet mode (i.e., the bassinet accessory 500a is installed on the playard 1000b) where the mattress 510 is disposed on top of the hub 550 and the support tubes 540. FIG. 51B shows the playard 1000b in the playard mode (i.e., the bassinet accessory 500a is removed from the playard 1000b) where the mattress 510 is disposed on the floor portion 304 of the soft goods 300 (e.g., the mattress 510 rests on the ground). The mattress 510 may be a foldable component that provides a flat cushioned surface 511 for the child to play and/or sleep when unfolded and a compact structure for storage with the other components of the playard 1000b when folded.

**[0529]** In some implementations, the mattress 510 may be a segmented mattress with multiple panels 512 that fold relative to each another along corresponding creases formed between adjoining panels 512. For example, FIGS. 51A and 51B show the mattress 510 may include four panels 512 with one panel 512 folded for demonstration. In addition to providing a flat cushioned surface 511 to support the child, the mattress 510 may also wrap around the frame 100b, the soft goods 300, and the support structure 520 when the playard 1000b is folded for storage (see, for example, FIG. 54A). In some implementations, the mattress 510 may include one or more straps 514 disposed on a bottom side opposite the cushioned surface 511 to securely couple opposing panels 512 of the mattress 510 together to restrain the frame 100b and thus, maintain the playard 1000b in the folded configuration. The mattress 510 may further include a handle 516 for the caregiver to carry the playard 1000b with the bassinet accessory 500a.

**[0530]** FIG. 52 shows the bassinet accessory 500a with the mattress 510 removed, thus exposing the hub 550, the support tubes 540, and the remaining portions of the bassinet soft goods 522. The side surfaces 524 and the bottom surface 526 of the bassinet soft goods 522 may be formed of a compliant material including, but not limited to, a fabric, a mesh, and plastic. In some implementations, at least a portion of the side surfaces 524 may be transparent and/or see-through. Furthermore, the transparent and/or see-through portions of the bassinet soft goods 522 may overlap with the transparent and/or see-through portions of the soft goods 300 to effectively provide the caregiver one or more windows to monitor their child in the partially enclosed space 501.

**[0531]** In some implementations, a top portion of the side surfaces 524 may be formed of a fabric material to attach the bassinet accessory 500a to the soft goods 300 while the bottom portion of

the side surfaces 524 may be formed of a transparent and/or see-through material. For the bassinet accessory 500a, the bottom surface 526 of the bassinet soft goods 522 may not include an opening sufficiently large for a user to insert their hand through and into the bottom portion 301a of the playard 1000b. Said in another way, the bassinet soft goods 522 in the bassinet accessory 500a may prevent the user from accessing the bottom portion 301a of the playard 1000b. However, it should be appreciated that in other implementations, the bottom surface 526 may include an opening, in part, to facilitate folding of the bassinet accessory and the playard together (see, for example, the bassinet accessory 500b).

**[0532]** The bassinet accessory 500a may generally be coupled to the soft goods 300 (or directly to the frame 100b) via a coupling mechanism that allows the bassinet accessory 500a to be readily removable from the playard 1000b when, for example, the child outgrows the bassinet accessory 500a. The bassinet accessory 500a may generally be coupled to the soft goods 300 and/or the frame 100b in several ways including, but not limited to, a zipper mechanism and straps (e.g., one strap connected to the bassinet accessory 500a may extend over a portion of the soft goods 300 covering a corner 130 and clip onto a corresponding strap coupled to the frame 100b via a buckle).

**[0533]** For example, FIG. 53A shows the bassinet accessory 500a may be coupled to the soft goods 300 via a zipper mechanism 527. As shown, the top edges of the side surfaces 524 may support one set of zipper teeth 529 and a zipper handle 528 that couples to another set of zipper teeth 340 disposed on an interior bottom edge of the top portion 302 of the soft goods 300. Thus, the bassinet accessory 500a, via the bassinet soft goods 522, may hang from the interior side of the top portion 302 of the soft goods 300. Said in another way, the zipper mechanism 527 may be disposed within the partially enclosed space 501 along the interior sides of the bassinet soft goods 522 and the top portion 302 such that the zipper mechanism 527 is not observable from the exterior of the playard 1000b.

**[0534]** FIG. 52 shows the bassinet soft goods 522 may have a height,  $h_{sg}$ , that is less than the height,  $h_{t,1}$ , of the bassinet accessory 500a. However, it should be appreciated that in other implementations, the bassinet soft goods 522 may extend over the top portion 302 of the soft goods 300 and couple to the soft goods 300 and/or the frame 100b along the exterior of the playard 1000b. For these implementations, the height,  $h_{sg}$ , may be approximately equal or equal to the height,  $h_{t,1}$ , of the bassinet accessory 500a.

**[0535]** The caregiver may align and attach the zipper teeth 340 and 529 via the zipper handle 528 to install the bassinet accessory 500a onto the playard 1000b. Additionally, the caregiver may readily remove the bassinet accessory 500a from the playard 1000b by pulling on the zipper handle 528 to disengage the zipper teeth 340 and 529. Once the bassinet accessory 500a is removed from the playard 1000b, the bassinet accessory 500a may be folded as shown in FIG. 53B and stowed separately.

**[0536]** The zipper mechanism 527 may generally span at least a portion of the side surfaces 524 to securely couple the bassinet accessory 500a to the soft goods 300. In some implementations, the bassinet accessory 500a and the soft goods 300 may include multiple zipper mechanisms 527 that each span different portions of the side surfaces 524 such that collectively, the multiple zipper mechanisms 527 span the entirety of the top edges of the side surfaces 524. The zipper mechanism 527 may generally reduce or, in some instances, eliminate unwanted openings formed between the side surfaces 524 and the top portion 302.

**[0537]** As described above, the support tubes 540 and the hub 550 may form a foldable structure generally disposed on the bottom surface 526 of the bassinet soft goods 522 to facilitate folding and/or unfolding of the bassinet accessory 500a together with the frame 100b. As shown in FIG. 52, the hub 550 may be disposed at or near the center of the bottom surface 526 and the support tubes 540 may extend radially from the hub 550 to the respective corner portions 537 of the bottom surface 526 of bassinet soft goods 522. Said in another way, the support tubes 540 may be disposed along the diagonal segments of the bottom surface 526 (i.e., the line segments connecting the corners of the bottom surface 526 that do not share the same edge).

**[0538]** To facilitate folding and/or unfolding of the bassinet accessory 500a, each support tube 540 may be rotatably coupled to the hub 550. In particular, each support tube 540 may have a first end 542a rotatably coupled to the hub 550 and a second end 542b opposite the first end 542a disposed at one corner portion 537 of the bassinet soft goods 522. Additionally, the support tubes 540 and/or the hub 550 may be directly coupled to the bassinet soft goods 522 via one or more attachment mechanisms so that the bassinet soft goods 522 move together with the support tubes 540 and/or the hub 550 when folding and/or unfolding the bassinet accessory 500a. The attachment mechanisms may include, but are not limited to, a strap, a screw fastener, a webbing tab, and a fabric tunnel.

**[0539]** In some implementations, the attachment mechanism(s) may be disposed at or near opposing ends 542a and 542b of each support tube 540 to ensure the center portion and the side portions of the bottom surface 526 of the bassinet soft goods 522 fold together with the support tubes 540 and the hub 550. For instance, FIG. 52 shows the bottom surface 526 of the bassinet soft goods 522 may include a strap 530 that forms a fabric tunnel through which the support tube 540 is inserted. The strap 530 may be disposed near the first end 542a of the support tube 540 and sewn directly onto the bottom surface 526 of the bassinet soft goods 522. For example, the support tube 540 may have a length,  $L_t$ , and the strap 530 may be offset from the end 542a of the support tube 540 by a distance less than 50% of the length  $L_t$ . In some implementations, the strap 530 may be positioned sufficiently close to the hub 550 such that at least a portion of the strap 530 physically contacts the hub 550. FIG. 53B further shows the second end 542b of each support tube 540 may be fastened directly to the bassinet soft goods 522 via a screw fastener 534a inserted from the bottom side of the bottom surface 526 through an opening 532 at the corner portion 537.

**[0540]** In the unfolded configuration, the support tubes 540 and the hub 550 provide a flat platform to support the mattress 510 as shown in FIG. 52 where the support tubes 540 are oriented substantially horizontal or horizontal along the bottom surface 526 of the bassinet soft goods 522. In the folded configuration, the support tubes 540 rotate with respect to the hub 550 such that the support tubes 540 are oriented substantially vertical or vertical. For the bassinet accessory 500a, the hub 550 moves upwards when unfolding the bassinet accessory 500a and, conversely, downwards when folding the bassinet accessory 500a.

**[0541]** In some implementations, the ends 542b of each support tube 540 may remain stationary or substantially stationary with respect to the ground 90 (e.g., the bassinet soft goods 522 may deform causing the ends 542b and/or the corner portions 537 to vary slightly as described above). In other words, the ends 542b of each support tube may remain at a height,  $h_b$ , from the ground 90 even as the ends 542b displace laterally when the bassinet accessory 500a is folded and unfolded. Thus, as the hub 550 is displaced vertically, the support tubes 540 may rotate with respect to the hub 550 where the ends 542b of each support tube 540 function as a pivot point that is constrained to move only laterally (e.g., a pin joint disposed in a slider joint).

**[0542]** In some implementations, the bassinet accessory 500a and the playard 1000b may be shaped and/or dimensioned such that the hub 550 and the support tubes 540 remain substantially

within or entirely within the interior space 102 in both the folded and unfolded configurations. In other words, the bassinet accessory 500a does not increase the overall size of the foldable playard 1000b. This may be accomplished by tailoring the length,  $L_t$ , of each support tube 102 to be approximately less than or equal to the height,  $h_b$ , of the bottom portion 301a separating the bottom surface 526 from the ground 90 in the unfolded configuration. Since the ends 542b of each support tube 540 remain at the same or similar height,  $h_b$ , from the ground 90, the support tube 102 does not extend past the feet 114 of the frame 100b when it rotates from a horizontal orientation corresponding to the unfolded configuration to a vertical orientation corresponding to the folded configuration. In some implementations, the height,  $h_b$ , may be sufficiently greater than the length,  $L_t$ , of the support tube 540 such that the hub 550 is also contained entirely within the interior space 102 in the folded configuration.

**[0543]** It should be appreciated the support tubes 540 and the hub 550 of the bassinet accessory 500a may remain within the interior space 102 of the playard 1000b due, in part, to the relatively shallower height,  $h_{t,1}$ , of the partially enclosed space 501, which results in a larger height,  $h_b$ , for the bottom portion 301a for a given height,  $H$ , of the playard 1000b. As a result, the support tubes 540 may be formed from a single rigid component, simplifying manufacture and assembly of the bassinet accessory 500a. However, it should be appreciated that, in other implementations, the length of the support tube may be changed between the folded and unfolded configurations to ensure the bassinet accessory remains substantially confined within the interior space 102 of the playard 1000b (see, for example, the telescoping support tubes 540 in the bassinet accessory 500b).

**[0544]** FIGS. 54A-54C show a series of figures that illustrate the process of unfolding the foldable playard 1000b and the bassinet accessory 500a. Specifically, FIG. 54A shows the foldable playard 1000b in the folded configuration. As shown, the bassinet accessory 500a is contained entirely within the interior space 102 of the playard 102 and, hence, is not observable in FIG. 54A. Furthermore, FIG. 54A shows the mattress 510 may wrap around the frame 100b to maintain the playard 1000b in the folded configuration.

**[0545]** To unfold the playard 1000b with the bassinet accessory 500a, the mattress 510 is first removed from the frame 100b. The caregiver may then pull the slider 120 towards the corner 130 of one leg support assembly 110a to at least partially unfold the frame 100b. In some implementations, the caregiver may pull the slider 120 until the latch 200a is engaged, thus locking

the frame 100b in the unfolded configuration. Since the bassinet soft goods 522 are coupled to the soft goods 300, the bassinet accessory 500a may also at least partially unfold in response to the frame 100b unfolding. However, the weight (i.e., the gravitational force) of the support tubes 540 and the hub 550 may cause the bassinet accessory 500a to sag downwards even when the frame 100b is locked in the deployed unfolded configuration.

**[0546]** To prevent the support tubes 540 and the hub 550 from sagging downwards, the hub 550 may include a hub latch 570 with a release handle 576 that, when in a locked state, prevents the support tubes 540 from rotating relative to the hub 550. While unfolding the bassinet accessory 500a, the hub latch 570 may instead be in an unlocked state to allow the caregiver to pull the hub latch 570 and, in turn, rotate the support tubes 540. As shown in FIGS. 54B and 54C, the support tubes 540 may rotate towards a horizontal orientation corresponding to the unfolded configuration as the hub latch 570 is pulled upwards (see A in FIG. 54C). Once the bassinet accessory 500a is unfolded, the hub latch 570 may be rotated (see B in FIG. 54C) to change the hub latch 570 from an unlocked state to a locked state thus maintaining the support tubes 540 and the hub 550 at the desired unfolded configuration. The hub 550 may further include integrated mechanical stops 554 to prevent the hub 550 from moving further upwards once the hub 550 and the support tubes 540 are at the deployed unfolded configuration. This ensures the caregiver is unable to move the hub 550 past the desired unfolded configuration.

**[0547]** Additionally, conventional playards typically include a bottom support structure that folds with the frame. When unfolding the playard, the caregiver should bend over and reach through an opening in the bassinet soft goods to press down upon the bottom support structure to ensure the bottom support structure is properly unfolded. In contrast, the playard 1000b may not include a separate bottom support structure as described above. This means the caregiver does not have to bend over and reach down towards the floor portion 304 of the soft goods 300 when unfolding the bassinet accessory 500a together with the playard 1000b. Rather, the caregiver may pull on the hub latch 570, which is already positioned above the ground 90 when the bassinet accessory 500a is partially unfolded in response to the unfolding of the frame 100b. In this manner, the caregiver may experience less physical strain when unfolding the bassinet accessory 500a.

**[0548]** To fold the playard 1000b and the bassinet accessory 500a, the caregiver may release the hub latch 570 (and the latch 200a) and press down on the hub 550 and/or move the slider 120 of

one leg support assembly 110a downwards towards the corresponding foot 114. In this manner, the bassinet accessory 500a may be unfolded and folded without assembling and disassembling, respectively, a portion of the bassinet accessory 500a unlike conventional bassinet accessories (e.g., the support tube assemblies 64 in the bassinet accessory 60).

**[0549]** FIGS. 55A and 55B show several views of the hub 550 and the hub latch 570 in the locked state. FIGS. 56A and 56B show several views of the hub 550 and the hub latch 570 in the unlocked state. As shown, the hub 550 may include a base 551 with a channel 552 to receive each support tube 540. The hub 550 may further include a pair of snap-fit hooks 555 for each channel 552 where each pair of snap-fit hooks 555 are disposed on opposing sides of the corresponding channel 552 and on a bottom side of the hub 550. The snap-fit hooks 555 are shaped to receive a pin 544 coupled to the support tube 540 to facilitate rotation of the support tube 540. Thus, each pair of snap-fit hooks 555 defines a rotation axis 556 about which the support tube 540 rotates with respect to the hub 550.

**[0550]** The channel 552 may extend from the edge of the base 551 to an end 567 located near the center of the base 551. The channel 552 may have a length,  $L_c$ , corresponding to the distance between the edge of the base 551 and the end 567. As shown, the channel 552 may have a notched opening on the top side of the base 551 that extends from the edge of the base 551 and terminates before reaching the end 567. The bottom side of the channel 552 may have a mechanical stop 554 (e.g., a section of the hub 550 that extends around the support tube 540 and across the channel 552) disposed at the edge of the base 551 and an opening 553 that extends from the mechanical stop 554 to the end 567 of the channel 552.

**[0551]** The features of the channel 552 (e.g., the notched opening, the mechanical stop 554, the opening 553) may be shaped, dimensioned, and positioned to constrain the rotational motion of the support tube 540. In particular, the channel 552 may only allow the support tube 550 to rotate between a horizontal orientation and a vertical orientation when folding or unfolding the bassinet accessory 500a. For example, the notched opening allows the support tube 540 to rotate such that the end 542b may be disposed above the hub 550 when folding the bassinet accessory 500a. In another example, the mechanical stop 554 may be shaped to physically contact the support tubes 540 once the support tubes 540 are oriented horizontally. In this manner, the mechanical stops 554

may limit the rotation of the support tubes 540 such that the hub 550 is unable to move past the desired unfolded configuration when unfolding the bassinet accessory 500a.

**[0552]** As described above, the hub 550 may further include a hub latch 570. When the hub latch 570 is in the locked state, the combination of the hub 550 and the hub latch 570 prevents the support tubes 540 from moving relative to the hub 550 and, hence, prevents the hub 550 from moving relative to the playard 1000b. In this manner, the hub latch 570 locks the bassinet accessory 500a in the unfolded configuration.

**[0553]** The hub latch 570 may be rotatably coupled to the base 551 via a rolled rivet 566 disposed at the center of the base 551. As shown in FIG. 55A, the hub latch 570 may include a base 572 disposed within a center opening 558 of the base 551. The hub latch 570 may include a release handle 576 for the caregiver to grab and pull when unfolding the bassinet accessory 500a. The hub 550 may further include multiple hooks 560 disposed on the bottom side of the base 551 and around the periphery of the base 572 of the hub latch 570 to provide additional mechanical support to the hub latch 570. In particular, the hooks 560 may impose mechanical constraints that limit the hub latch 570 only to rotational motion about the rolled rivet 566.

**[0554]** To lock the support tubes 540, the hub latch 570 may include arms 574 for each support tube 540 that extend radially from the base 572. FIG. 55B shows each arm 574 may be disposed over the opening 553 of a corresponding channel 552 in the locked state. Thus, the combination of the arm 574 and the mechanical stop 554 may effectively form a clamp that constrains and prevents movement of the support tube 540 relative to the hub 550. FIGS. 56A and 56B show when the hub latch 570 is rotated to the unlocked state, the arms 574 no longer cover the openings 553 of each channel 552, which allows the support tubes 540 to rotate relative to the hub 550 towards the folded configuration.

**[0555]** In some implementations, the hub 550 may further include a spring element 565 (e.g., a torsion spring) that generates a spring bias force to rotate the hub latch 570 towards the locked state. To ensure the hub latch 570 does not move past the locked state (e.g., the arms 574 move past the openings 553), the hub 550 may include mechanical stops 562 (e.g., a rib that projects downwards from the base 551) for the arms 574 to rest against. The mechanical stops 562 are positioned on the base 551 such that the arms 574 are disposed over the corresponding openings 553.

**[0556]** FIG. 57 shows another exemplary bassinet accessory 500b coupled to the playard 1000b. As shown, the bassinet accessory 500b may include a support structure 520 that defines a partially enclosed space 501 to contain the child in the unfolded configuration. The support structure 520 may include bassinet soft goods 522 with sides surfaces 524 and a bottom surface 526 that surround at least a portion of the partially enclosed space 501. The support structure 520 may further include a hub 550 and support tubes 540 that form a foldable structure to facilitate folding and unfolding of the bassinet accessory 500b. In the unfolded configuration, the support tubes 540 and the hub 550 may form a flat platform to support a mattress (not shown).

**[0557]** It should be appreciated that the bassinet accessory 500b may also be installed onto other playards. For examples, FIG. 61 shows the bassinet accessory 500b may be installed on the playard 1000c described above.

**[0558]** The bassinet soft goods 522, the support tubes 540, and the hub 550 of the bassinet accessory 500b may incorporate similar features described above for the bassinet accessory 500a. For brevity, these features are not repeated below. Additionally, the shape and dimensions of the bassinet accessory 500b, including the heights,  $h_{i,1}$ ,  $h_b$ , and  $h_m$ , may be similar to or the same as the dimensions described above for the bassinet accessory 500a. The bassinet accessory 500b may also meet various consumer safety standards (e.g., ASTM F2194) as described above in relation to the bassinet accessory 500a.

**[0559]** FIG. 57 shows the hub 550 may be disposed at or near the center of the bottom surface 526 and the support tubes 540 may extend radially from the hub 550 to the respective corner portions 537 of the bottom surface 526 of the bassinet soft goods 522 similar to the bassinet accessory 500a. The support tubes 540 may be rotatably (e.g., pivotably) coupled to the hub 550 to facilitate folding and unfolding of the bassinet accessory 500b. The support tubes 540 may also be coupled directly to the bassinet soft goods 522 via one or more attachment mechanisms such that the bassinet soft goods 522 move together with the support tubes 540 and the hub 550 when folding and unfolding the bassinet accessory 500b. It should be appreciated that, in other implementations, the bassinet soft goods 522 may be coupled to the hub 550.

**[0560]** In this example, the hub 550 moves upwards when folding the bassinet accessory 500b and, conversely, downwards when unfolding the bassinet accessory 500b. The benefit of this approach is that the bassinet accessory 500b may maintain the deployed unfolded configuration

without a separate locking mechanism (e.g., the hub latch 570), thus simplifying the hub 500. In the unfolded configuration, the support tubes 540 and the hub 550 may once again provide a flat platform to support the mattress 510 where the support tubes 540 are oriented substantially horizontal or horizontal along the bottom surface 526 of the bassinet soft goods 522. In the folded configuration, the support tubes 540 rotate (e.g., pivot) with respect to the hub 550 such that the support tubes 540 are oriented substantially vertical or vertical and such that the ends 542b of the support tubes are disposed below the hub 550 in the folded configuration.

**[0561]** The hub 550 may once again include integrated mechanical stops 554 to prevent the hub 550 from moving past the unfolded configuration once the support tubes 540 are aligned horizontally. Compared to the bassinet accessory 500a, however, the weight of the hub 550 and/or the support tubes 540 does not cause the bassinet accessory 500b to unfold. Rather, the weight of the hub 550, the support tubes 540, the child, and/or the mattress 510 apply a force that unfolds the bassinet accessory 500b and thereafter maintains the bassinet accessory 500b in the unfolded configuration. In this manner, the process of unfolding the bassinet accessor 500b may be simplified.

**[0562]** One challenge, however, is that the bassinet accessory 500b may provide a relatively shallow partially enclosed space 501. For example, in the folded configuration, the length,  $L_{t,l}$ , of the support tubes 540, is longer than the height,  $h_{t,l}$ , of the bassinet accessory 500b. Similar to the bassinet accessory 500a, the distal ends 542b of each support tube 540 in the bassinet accessory 500b may remain stationary or substantially stationary with respect to the ground 90. In other words, the distal ends 542b of each support tube may remain at a height,  $h_{t,l}$ , from the top horizontal plane 92 of the playard 1000b as the ends 542b displace laterally when the bassinet accessory 500b is folded and unfolded. If the length of the support tubes 540 remains constant (e.g., the support tube is formed of a single rigid component), the rotation of the support tubes 540 from the horizontal orientation in the unfolded configuration to the vertical orientation in the folded configuration would cause the hub 550 and a portion of the support tubes 540 to protrude above the top horizontal plane 92 of the playard 1000b in the folded configuration, thus increasing the overall size of the foldable playard 1000b in the folded configuration.

**[0563]** To reduce the extent the bassinet accessory 500b protrudes above the top horizontal plane 92 of the playard 1000b in the folded configuration, the support tubes 540 may be telescoping such

that the length,  $L_{t,1}$ , of the support tubes 540 in the unfolded configuration changes to a shorter length  $L_{t,2}$ , in the folded configuration. Thus, in some implementations, the length,  $L_{t,1}$ , of the support tubes 540 in the unfolded configuration is greater than the height,  $h_{t,1}$ , of the bassinet accessory 500b while the length,  $L_{t,2}$ , of the support tubes 540 in the folded configuration is approximately equal to or less than the height,  $h_{t,1}$ . It should be appreciated that, in some implementations, the height of the bassinet accessory 500b may change between the folded and unfolded configurations. For example, FIG. 61 shows the bassinet accessory 500b may have a height,  $h_{t,2}$ , in the folded configuration that differs from the height,  $h_{t,1}$ , in the unfolded configuration due, for example, to the deformation of the bassinet soft goods 522. For these implementations, the length,  $L_{t,1}$ , of the support tubes 540 in the unfolded configuration remains greater than the height,  $h_{t,1}$ , and the length,  $L_{t,2}$ , of the support tubes 540 in the folded configuration is approximately equal to or less than the height,  $h_{t,2}$ .

**[0564]** To unfold the playard 1000b with the bassinet accessory 500b, the caregiver may remove the mattress 510 wrapped around the frame 100b as before. Then, the caregiver may move a slider 120 towards a corner 130 of one leg support assembly 110a to unfold the frame 100b. Once the slider 120 is moved sufficiently to engage the latch 200a, the frame 100b is locked in the unfolded configuration. As before, the unfolding of the frame 100b may cause the bassinet accessory 500b to at least partially unfold. In some implementations, the weight of the hub 550 and the support tubes 540 may be sufficient to ensure the bassinet accessory 500b unfolds without any external force applied by the caregiver. In some implementations, the caregiver may simply push down upon the hub 550 to unfold the bassinet accessory 500b. In some implementations, the caregiver may place the mattress 510 onto the hub 550 and the weight of the mattress 510 may ensure the bassinet accessory 500b is in the unfolded configuration. Similar to the bassinet accessory 500a, the bassinet accessor 500b may be unfolded without the caregiver having to reach down towards the floor portion 304, which may reduce the physical strain experienced by the caregiver when unfolding the bassinet accessory 500b.

**[0565]** FIGS. 58A-58D show a series of figures that illustrate the process of folding the playard 1000b and the bassinet accessory 500b. FIG. 58A shows the hub 550 may include a center opening 558 and the bottom surface 526 of the bassinet soft goods 522 may include a center opening 536. To fold the playard 1000b and the bassinet accessory 500b, the caregiver may first disengage the latch 200a on the frame 100b. Then, the caregiver may extend their hand/arm through the center

openings 558 and 536 to access the bottom portion 301a of the playard 1000b. FIG. 58B shows the floor portion 304 of the soft goods 300 may include a strap 342. When the caregiver reaches into the bottom portion 301a, they may pull the strap 342 together with the floor portion 304 of the soft goods 300 in an upwards direction. FIG. 58C shows the caregiver may continue to pull the strap 342 through the center openings 536 and 558, which causes the floor portion 304 to contact the bassinet soft goods 522 and/or a portion of the hub 550. As the caregiver continues to pull the strap 342 further, the contact between the floor portion 304 and the bassinet soft goods 522 and/or the hub 550 causes the hub 550 to move upwards and the support tubes 540 to rotate such that the ends 542b move downwards relative to the hub 550 (see arrows in FIG. 58C). The caregiver may continue to pull on the strap 342 until the playard 1000b and the bassinet accessory 500b are folded as shown in FIG. 58D.

**[0566]** In some implementations, the playard 1000b and the bassinet accessory 500b may be folded without the caregiver having to insert their hand/arm through the center openings 536 and 558. Instead, the caregiver may pull up on the hub 550 and/or move the slider 120 down towards the foot 114 to fold the playard 1000b and the bassinet accessory 500b. Once the playard 1000b is folded, the caregiver may lay the playard 1000b on its side and press floor portion 304 into the interior space 102 before wrapping the mattress 510 around the frame 100b. In this manner, the caregiver does not have to bend over and reach down to the floor portion 304.

**[0567]** In some implementations, the length,  $L_{t,2}$ , of the support tubes 540 in the folded configuration may be tailored such that the hub 550 is disposed entirely within the interior space 92 (i.e., the hub 550 does not extend significantly beyond the top horizontal plane 92). In some implementations, the length,  $L_{t,2}$ , of the support tubes 540 may be tailored such that the hub 550 protrudes above the top horizontal plane 92 with a bottom side of the hub 550 flush against the top horizontal plane 92. This configuration may be preferential when the exterior width of the hub 550 is greater than or equal to the width of the interior space 102 in the folded configuration. Under these conditions, the lateral dimensions of the playard 1000b may increase if the hub 550 is disposed within the interior space 102, which may be undesirable. Thus, by positioning the hub 550 just above the playard 1000b, the lateral dimensions of the frame 100b in the folded configuration may be kept small (i.e., the lateral dimensions would be the same when the playard 1000b does not include the bassinet accessory 500b) without appreciably increasing the height of the playard 1000b in the folded configuration. In some implementations, the top side of the hub

550 may extend above the top horizontal plane 92 of the playard 1000b by a distance less than or equal to 1 inch.

**[0568]** FIGS. 59A-59C show several views of the bassinet accessory 500b removed from the playard 1000b. As shown, the center opening 536 of the bassinet soft goods 522 may be aligned with the center opening 558 of the hub 550. In some implementations, the center opening 536 may have a width that is equal to or smaller than the exterior width of the hub 550. In other words, the center opening 536 may only be accessible through the center opening 558 and not from the sides of the hub 550. It should be appreciated that, in other implementations, the hub 550 and/or the bassinet soft goods 522 may not include the center openings 536 and 558, respectively. Instead, the caregiver may fold the bassinet accessory 500b by pulling on the hub 550 as described above.

**[0569]** FIG. 59A further shows each support tube 540 may have a first support tube 546a coupled to the hub 550 and a second support tube 546b telescopically coupled to the first support tube 546a. As shown, the first support tube 546a may have a larger width (or diameter) such that a portion of the second support tube 546b may be disposed within the first support tube 546a. It should be appreciated, however, that in other implementations, the first support tube 546a may have a smaller width than the second support tube 546b such that a portion of the first support tube 546a is disposed within the second support tube 546b. The relative lengths of the first and second support tubes 546a and 546b may be chosen to provide a desired length,  $L_{t,1}$ , in the unfolded configuration and a desired length,  $L_{t,2}$ , in the folded configuration. For example, the length,  $L_{t,1}$ , may be chosen such that the end 542b extends to the corner portion 537 and the length,  $L_{t,2}$ , may be approximately equal to or less than the height,  $h_{t,1}$  (or the height,  $h_{t,2}$ ) as described above.

**[0570]** In some implementations, the support tube 540 may include a spring element (not shown) disposed within the first support tube 546a to impart a bias force that extends the length of the support tube 540 (e.g., the spring element may move the second support tube 546b away from the first support tube 546a). Additionally, one or both of the support tubes 546a and 546b may include a mechanical stop (not shown) that limits the extent the second support tube 546b extends from the first support tube 546a. Furthermore, the first support tube 546a and the second support tube 546b may overlap in the unfolded configuration. For example, FIG. 60A shows an overlap section 548. In some implementations, the overlap section 548 may have a length of about 1.5 inches to

ensure the support tube 540 has sufficient mechanical rigidity to support the bassinet accessory 500b in the unfolded configuration.

**[0571]** FIGS. 59A and 59B further show each support tube 540 may be directly coupled to the bottom surface 526 of the bassinet soft goods 522 via a strap 530 with a fastener 534b disposed near the end 542a of the first support tube 546a. As shown in FIG. 60A, the strap 530 may include a fastener 534a to couple the strap 530 to the first support tube 546a. The strap 530 may further be sewn directly into the bottom surface 526 to form a fabric tunnel that physically contacts the hub 550. FIG. 60B further shows a fastener 534a may couple the bassinet soft goods 522 to the end 542b of the second support tube 546b. As shown, the fastener 534a may be inserted through an opening (not shown) at or near the corner portion 537 from the bottom side of the bottom surface 526.

**[0572]** Similar to the bassinet accessory 500a, the bassinet accessory 500b may be coupled to the top portion 302 of the soft goods 300 via multiple zipper mechanisms 527. In this manner, the caregiver may readily remove the bassinet accessory 500b from the playard 1000b for cleaning or storage. FIG. 59C shows the bassinet accessory 500b folded for storage. The hub 550 may once again include a base 551 with multiple channels 552 to receive the support tubes 540. The channel 552 may provide support for a pin 544 mounted to each support tube 540 to facilitate rotation of the support tube 540 relative to the hub 550. As shown in FIG. 59C, the top side of the channel 552 may be covered by a section of the base 551 corresponding to the mechanical stop 554 while the bottom side of the channel 552 may be exposed. Thus, support tube 540 may rotate such that the end 542b of the support tube 540 is disposed below the hub 550 when folding the bassinet accessory 500b. When the support tubes 540 are horizontally oriented in the unfolded configuration, the mechanical stops 544 may physically contact the support tubes 540 thus preventing the hub 550 from moving past the unfolded configuration.

**[0573]** FIG. 61 shows the bassinet accessory 500b may be installed onto the playard 1000c in a similar manner as the playard 1000b. For clarity, the bassinet soft goods 522 are not shown. Instead, FIG. 61 shows a plane 538 corresponding to the respective bottom corner portions 537 of the bassinet soft goods 522 for reference. As shown, the hub 550 may be disposed above the top horizontal plane 92 of the playard 1000c such that the bottom side of the hub 550 is flush with the top horizontal plane 92. As described above, this arrangement may ensure the frame 100c folds to

its smallest lateral dimensions without appreciably increasing the height of the playard 1000c due to the addition of the bassinet accessory 500b. FIG. 61 also shows the support tube 540 in its contracted state where the second support tube 546b is disposed nearly entirely within the first support tube 546a.

## **Conclusion**

**[0574]** All parameters, dimensions, materials, and configurations described herein are meant to be exemplary and the actual parameters, dimensions, materials, and/or configurations will depend upon the specific application or applications for which the inventive teachings is/are used. It is to be understood that the foregoing embodiments are presented primarily by way of example and that, within the scope of the appended claims and equivalents thereto, inventive embodiments may be practiced otherwise than as specifically described and claimed. Inventive embodiments of the present disclosure are directed to each individual feature, system, article, material, kit, and/or method described herein.

**[0575]** In addition, any combination of two or more such features, systems, articles, materials, kits, and/or methods, if such features, systems, articles, materials, kits, and/or methods are not mutually inconsistent, is included within the inventive scope of the present disclosure. Other substitutions, modifications, changes, and omissions may be made in the design, operating conditions and arrangement of respective elements of the exemplary implementations without departing from the scope of the present disclosure. The use of a numerical range does not preclude equivalents that fall outside the range that fulfill the same function, in the same way, to produce the same result.

**[0576]** Also, various inventive concepts may be embodied as one or more methods, of which at least one example has been provided. The acts performed as part of the method may in some instances be ordered in different ways. Accordingly, in some inventive implementations, respective acts of a given method may be performed in an order different than specifically illustrated, which may include performing some acts simultaneously (even if such acts are shown as sequential acts in illustrative embodiments).

**[0577]** All publications, patent applications, patents, and other references mentioned herein are incorporated by reference in their entirety.

[0578] All definitions, as defined and used herein, should be understood to control over dictionary definitions, definitions in documents incorporated by reference, and/or ordinary meanings of the defined terms.

[0579] The indefinite articles “a” and “an,” as used herein in the specification and in the claims, unless clearly indicated to the contrary, should be understood to mean “at least one.”

[0580] The phrase “and/or,” as used herein in the specification and in the claims, should be understood to mean “either or both” of the elements so conjoined, *i.e.*, elements that are conjunctively present in some cases and disjunctively present in other cases. Multiple elements listed with “and/or” should be construed in the same fashion, *i.e.*, “one or more” of the elements so conjoined. Other elements may optionally be present other than the elements specifically identified by the “and/or” clause, whether related or unrelated to those elements specifically identified. Thus, as a non-limiting example, a reference to “A and/or B”, when used in conjunction with open-ended language such as “comprising” can refer, in one embodiment, to A only (optionally including elements other than B); in another embodiment, to B only (optionally including elements other than A); in yet another embodiment, to both A and B (optionally including other elements); etc.

[0581] As used herein in the specification and in the claims, “or” should be understood to have the same meaning as “and/or” as defined above. For example, when separating items in a list, “or” or “and/or” shall be interpreted as being inclusive, *i.e.*, the inclusion of at least one, but also including more than one, of a number or list of elements, and, optionally, additional unlisted items. Only terms clearly indicated to the contrary, such as “only one of” or “exactly one of,” or, when used in the claims, “consisting of,” will refer to the inclusion of exactly one element of a number or list of elements. In general, the term “or” as used herein shall only be interpreted as indicating exclusive alternatives (*i.e.* “one or the other but not both”) when preceded by terms of exclusivity, such as “either,” “one of,” “only one of,” or “exactly one of.” “Consisting essentially of,” when used in the claims, shall have its ordinary meaning as used in the field of patent law.

[0582] As used herein in the specification and in the claims, the phrase “at least one,” in reference to a list of one or more elements, should be understood to mean at least one element selected from any one or more of the elements in the list of elements, but not necessarily including at least one of each and every element specifically listed within the list of elements and not excluding any

combinations of elements in the list of elements. This definition also allows that elements may optionally be present other than the elements specifically identified within the list of elements to which the phrase “at least one” refers, whether related or unrelated to those elements specifically identified. Thus, as a non-limiting example, “at least one of A and B” (or, equivalently, “at least one of A or B,” or, equivalently “at least one of A and/or B”) can refer, in one embodiment, to at least one, optionally including more than one, A, with no B present (and optionally including elements other than B); in another embodiment, to at least one, optionally including more than one, B, with no A present (and optionally including elements other than A); in yet another embodiment, to at least one, optionally including more than one, A, and at least one, optionally including more than one, B (and optionally including other elements); etc.

**[0583]** In the claims, as well as in the specification above, all transitional phrases such as “comprising,” “including,” “carrying,” “having,” “containing,” “involving,” “holding,” “composed of,” and the like are to be understood to be open-ended, *i.e.*, to mean including but not limited to. Only the transitional phrases “consisting of” and “consisting essentially of” shall be closed or semi-closed transitional phrases, respectively, as set forth in the United States Patent Office Manual of Patent Examining Procedures, Section 2111.03.

## CLAIMS

1. A frame (100e) for a foldable playard (1000a), the frame having a compact folded configuration for storage of the frame and a deployed unfolded configuration to support the foldable playard on a ground surface (90) to contain a child (50) in an interior space (102) of the foldable playard, the frame comprising:

a plurality of X-frame assemblies positioned at respective side faces (106) of the interior space, each X-frame assembly of the plurality of X-frame assemblies comprising a plurality of X-frame tubes (142a, 142b), each X-frame tube of the plurality of X-frame tubes being a straight tube; and

a plurality of leg support assemblies (110e) coupled to the plurality of X-frame assemblies, each leg support assembly of the plurality of leg support assemblies comprising:

a leg tube (112) having a centerline axis (111a) positioned along a side edge (104) of the interior space;

a corner (130), coupled to a top end (113a) of the leg tube, having a first corner arm (134) and a second corner arm (136); and

a slider (120), slidably coupled to the leg tube, having a first slider arm (124) and a second slider arm (126),

wherein:

the first corner arm of a first leg support assembly of the plurality of leg support assemblies and the second corner arm of a second leg support assembly of the plurality of leg support assemblies are each horizontally offset from a side face (106) of the interior space intersecting the first centerline axis of the first leg support assembly and the second centerline axis of the second leg support assembly such that at least a portion of the first corner arm of the first leg support assembly overlaps at least a portion of the second corner arm of the second leg support assembly along the side face when the frame is in the compact folded configuration;

the first slider arm of the first leg support assembly and the second slider arm of the second leg support assembly are each horizontally offset from the side face such that at least a portion of the first slider arm of the first leg support assembly overlaps at least

a portion of the second slider arm of the second leg support assembly along the side face when the frame is in the compact folded configuration;

respective sliders of the plurality of leg support assemblies are identical; and  
respective corners of the plurality of leg support assemblies are identical.

2. The frame of claim 1, wherein each X-frame tube of the plurality of X-frame tubes is rotatably coupled to at least one leg tube of the plurality of leg support assemblies such that no portion of each X-frame tube is separated from the at least one leg tube by a gap less than 1.5 inches in each of the compact folded configuration, the deployed unfolded configuration, and a configuration between the compact folded configuration and the deployed unfolded configuration.

3. The frame of claim 2, wherein respective first and second slider arms of the plurality of leg support assemblies each have a length (l<sub>sr</sub>) equal to or greater than 1.5 inches.

4. The frame as in claims 2 or 3, wherein respective first and second corner arms of the plurality of leg support assemblies each have a length (l<sub>cr</sub>) equal to or greater than 1.5 inches.

5. The frame of claim 1, wherein:  
the first slider arm of the first leg support assembly is offset away from the interior space; and  
the second slider arm of the first leg support assembly is offset towards the interior space.

6. The frame of claim 1, wherein the first and second slider arms of the first leg support assembly are together one of offset towards the interior space or offset away from the interior space.

7. The frame as in claims 1, 5, or 6, wherein:

the first corner arm of the first leg support assembly is offset away from the interior space; and

the second corner arm of the first leg support assembly is offset towards the interior space.

8. The frame as in claims 1, 5, or 6, wherein the first and second corner arms of the first leg support assembly are together one of offset towards the interior space or offset away from the interior space.

9. The frame of claim 1, wherein each X-frame tube of the plurality of X-frame tubes has a constant cross section.

10. The frame of claim 1, wherein the plurality of X-frame tubes of each X-frame assembly comprises:

a first X-frame tube (142a); and

a second X-frame tube (142b) rotatably coupled to the first X-frame tube, the second X-frame tube being horizontally offset from the first X-frame tube by a distance (wx) ranging between 0.625 inches and 1.5 inches.

11. The frame of claim 1, further comprising:

only one latch (200a), coupled to one X-frame assembly of the plurality of X-frame assemblies and/or one leg support assembly of the plurality of leg support assemblies, to maintain the frame in the deployed unfolded configuration.

12. The frame of claim 1, further comprising:

a storage latch (600a-600c), coupled to one leg support assembly of the plurality of leg support assemblies, to maintain the frame in the compact folded configuration.

13. The frame of claim 12, wherein the frame only comprises the storage latch to maintain the frame in the compact folded configuration.

14. The frame of claim 12, wherein:

the slider of the one leg support assembly is disposed proximate to the top end of the leg tube of the one leg support assembly when the frame is in the deployed unfolded configuration; and

the storage latch prevents the slider of the one leg support assembly from moving towards the top end of the leg tube by physically contacting a top surface (129) of the slider thereby maintaining the frame in the compact folded configuration.

15. The frame of claim 14, wherein the storage latch comprises:

a push button (610) partially protruding through an opening (113d) located near a bottom end (113b) of the leg tube, the push button having a restraining surface (612) to physically contact the top surface of the slider of the one leg support assembly so as to prevent the slider from moving towards the top end of the leg tube, the push button, when pressed, being inserted through the opening and disposed within a cavity (113c) of the leg tube such that the slider is able to move towards the top end of the leg tube; and

a spring element (620), disposed within the cavity of the leg tube and directly coupled to the push button, to apply a spring bias force to the push button causing the push button to protrude through the opening such that the restraining surface of the push button is able to contact the top surface of the slider when the push button is not pressed.

16. The frame of claim 15, wherein:

the push button includes a ramped surface (616); and

when the frame transitions from the deployed unfolded configuration to the compact folded configuration, a bottom surface (127) of the slider physically contacts the ramped surface of the push button causing the push button to be inserted into the cavity of the leg tube thereby allowing the slider to move below the push button such that the top surface of the slider is positioned below the restraining surface of the push button.

17. The frame of claim 14, wherein:

the storage latch comprises:

a base (640) coupled to the leg tube of the one leg support assembly and disposed below the slider of the one leg support assembly;

a latch member (642) coupled to the base and extending along the leg tube such that an end (643) of the latch member is disposed above the slider when the frame is in the compact folded configuration; and

a hook (644), disposed at the end of the tab, to physically contact the top surface of the slider of the one leg support assembly so as to prevent the slider from moving towards the top end of the leg tube; and

the latch member, when pulled, bends such that the hook is physically separated from the slider thereby allowing the slider to move towards the top end of the leg tube.

18. The frame of claim 17, wherein the base of the storage latch is integrally formed together with a foot (114) disposed at a bottom end (113b) of the leg tube.

19. The frame of claim 17, wherein:

the hook includes a ramped surface (646); and

when the frame transitions from the deployed unfolded configuration to the compact folded configuration, a bottom surface (127) of the slider physically contacts the ramped surface of the hook causing the latch member to bend thereby allowing the slider to move below the hook such that the top surface of the slider is disposed below the hook of the latch member.

20. The frame of claim 1, wherein the slider of each leg support assembly is disposed proximate to the top end of the leg tube of the leg support assembly when the frame is in the deployed unfolded configuration.