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CA (US); **Bathsheba L. Grossman**,
Santa Cruz, CA (US)(51) **Int. Cl.**
A63H 33/00 (2006.01)(73) Assignee: **RHINO TOYS, INC.**, Santa Cruz,
CA (US)(52) **U.S. Cl.** **446/489**(21) Appl. No.: **12/878,398**(22) Filed: **Sep. 9, 2010**(57) **ABSTRACT****Related U.S. Application Data**(60) Provisional application No. 61/240,943, filed on Sep.
9, 2009.

A handheld, bead-play toy includes a plurality of hub aspects, a plurality of rail aspects, and one or more beads. Each rail aspect interconnects two different hub aspects. Each bead is slideably connected to a rail aspect.

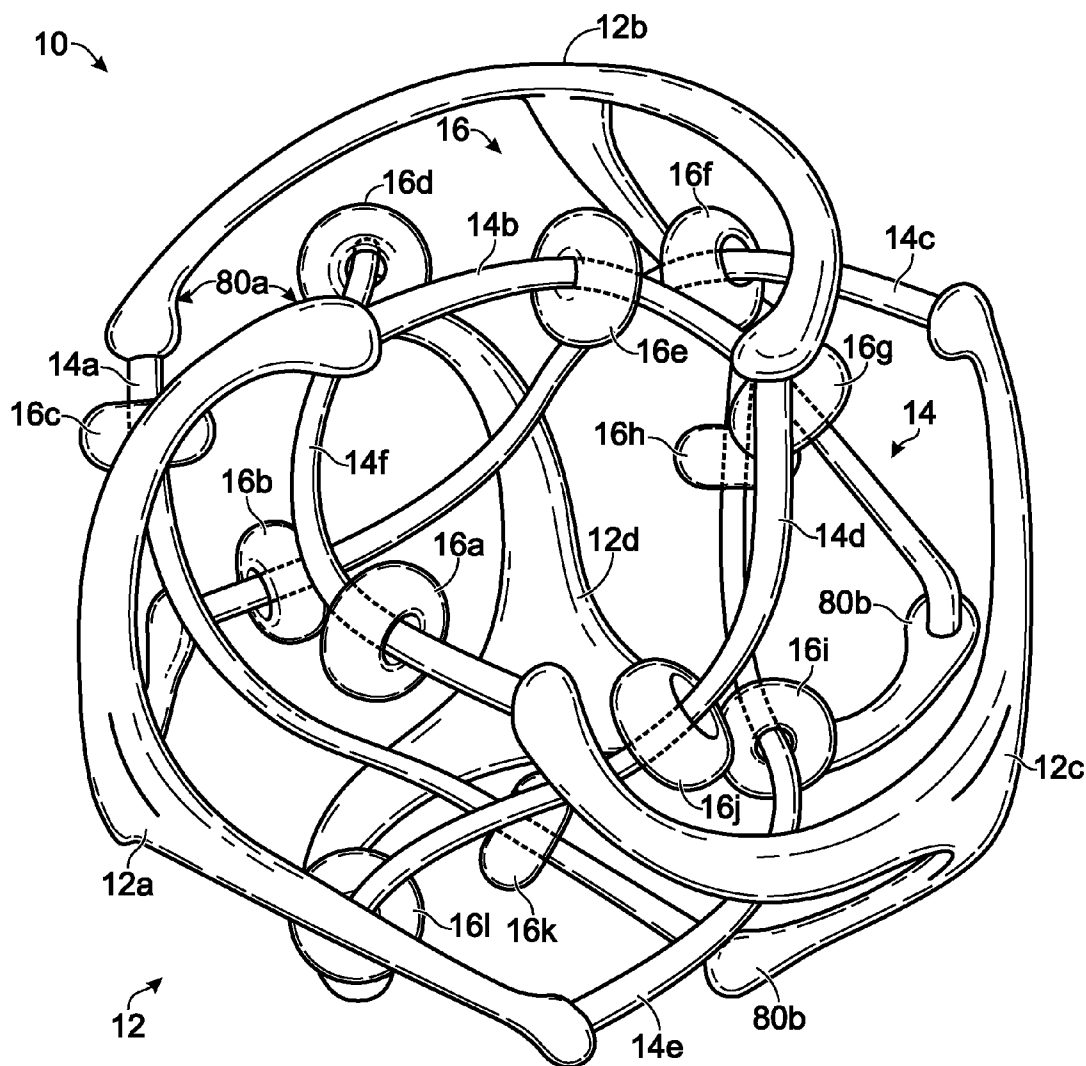


Fig. 1

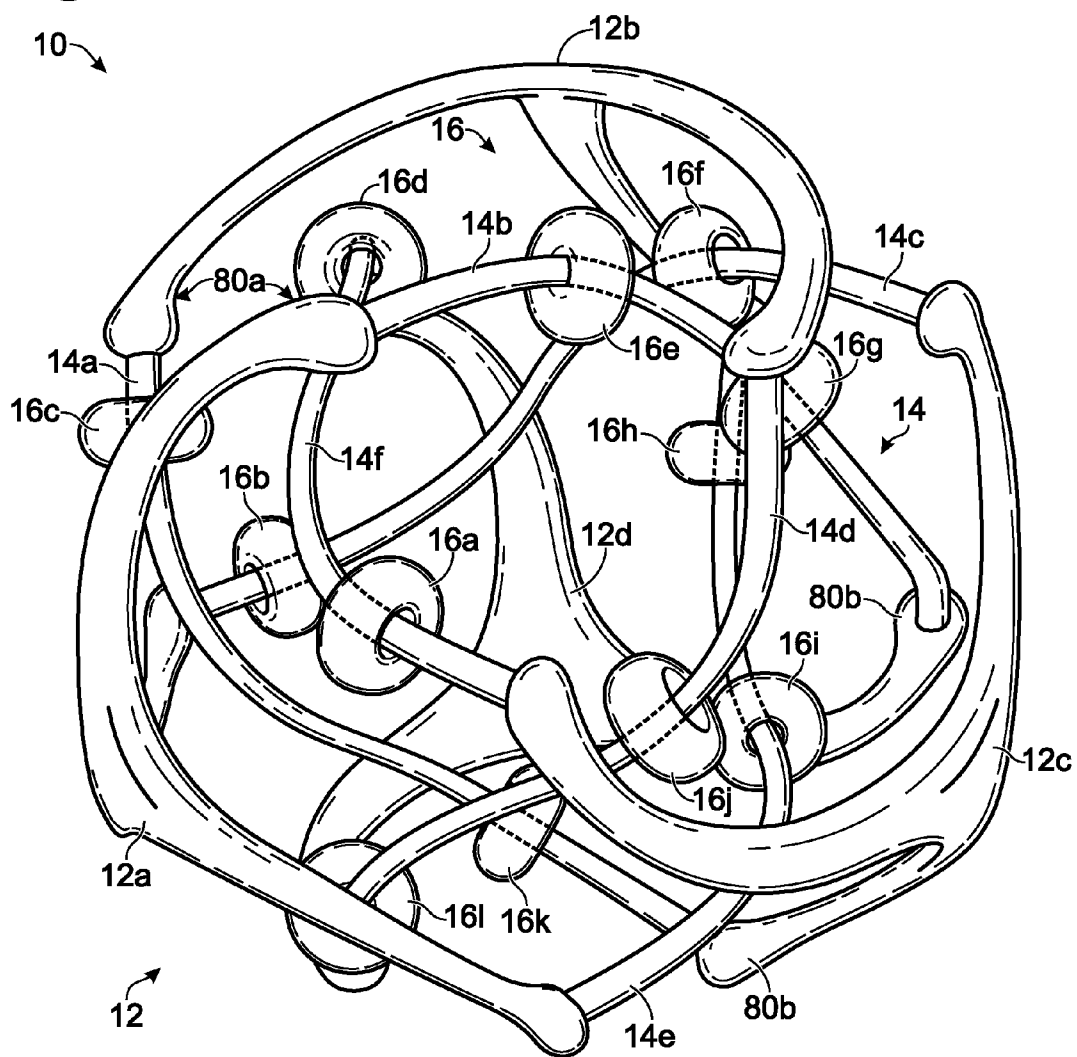
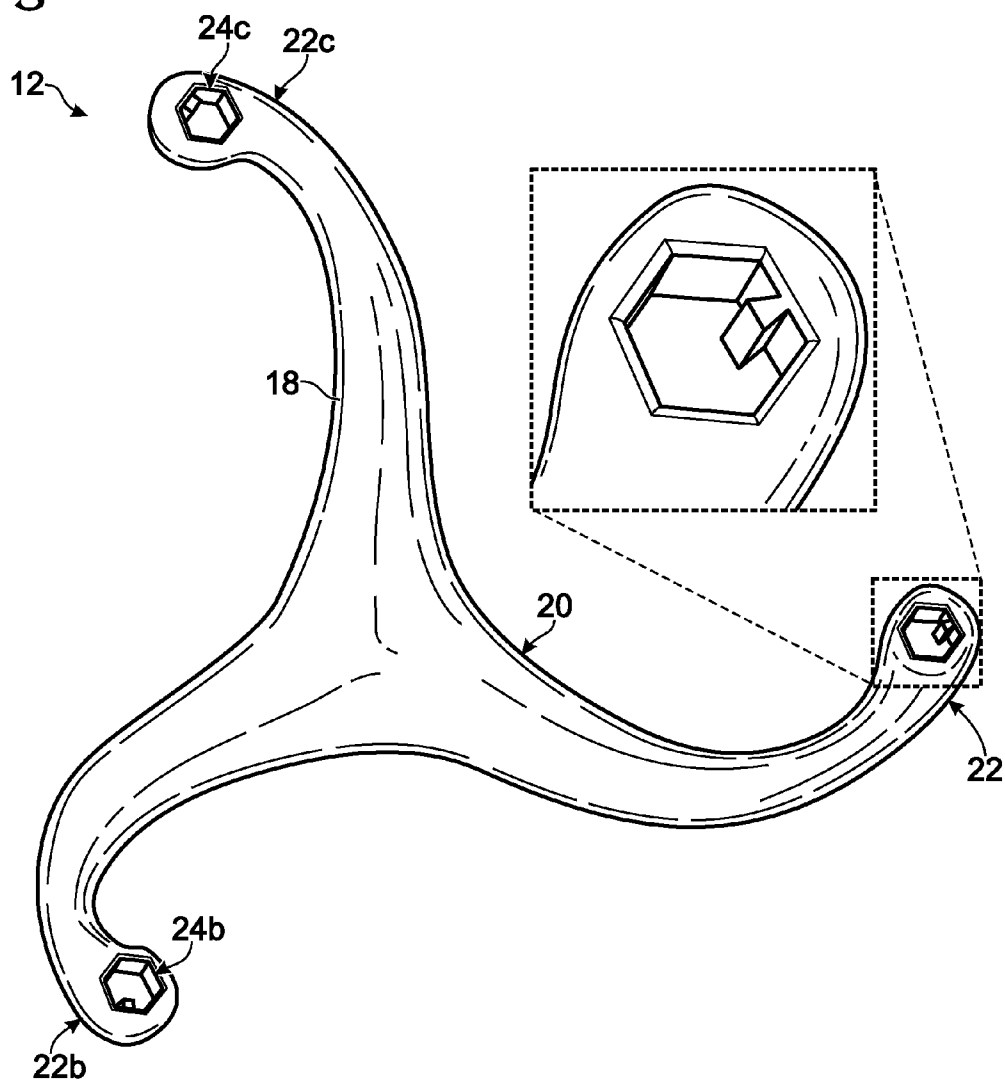
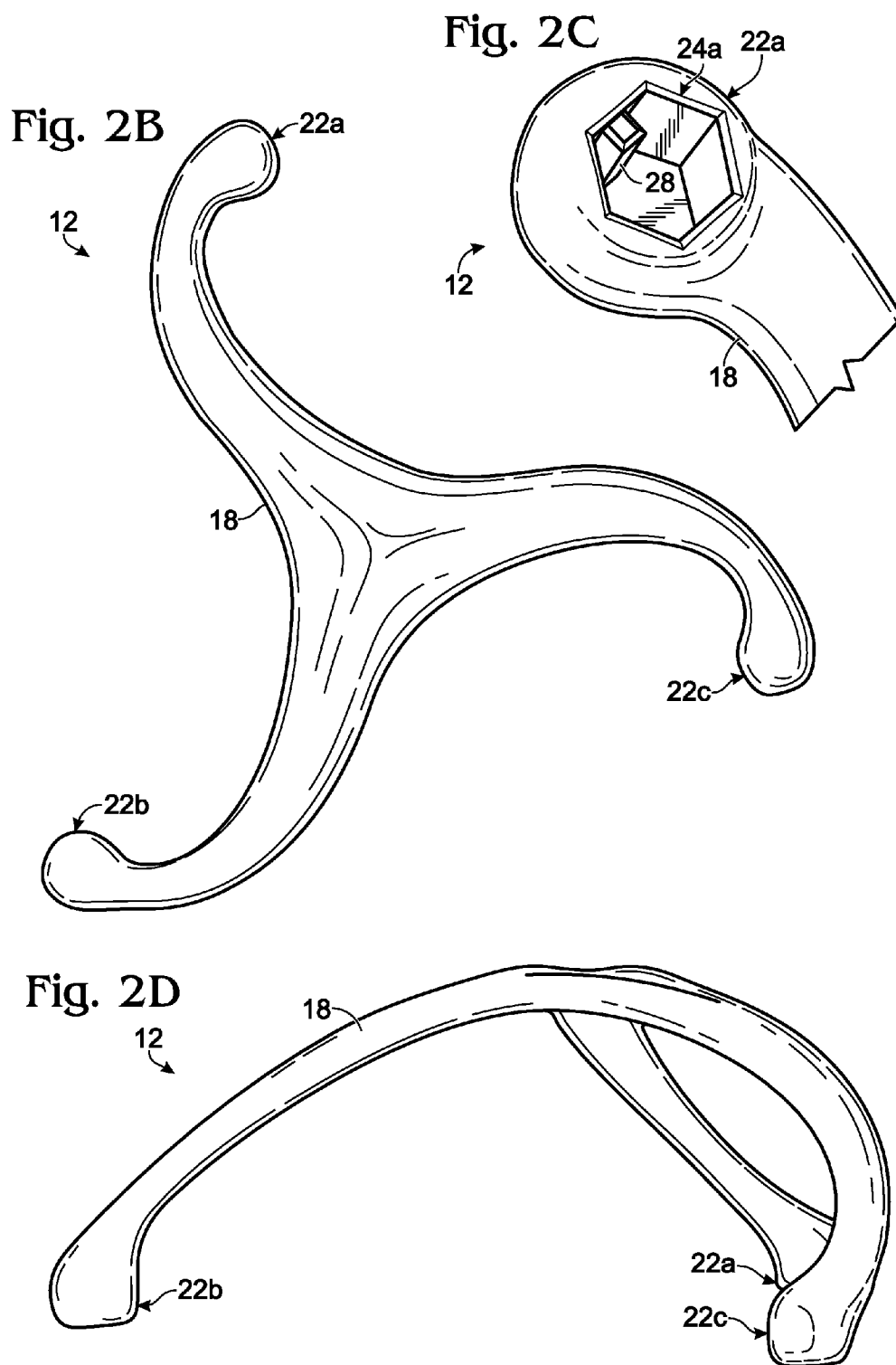


Fig. 2A





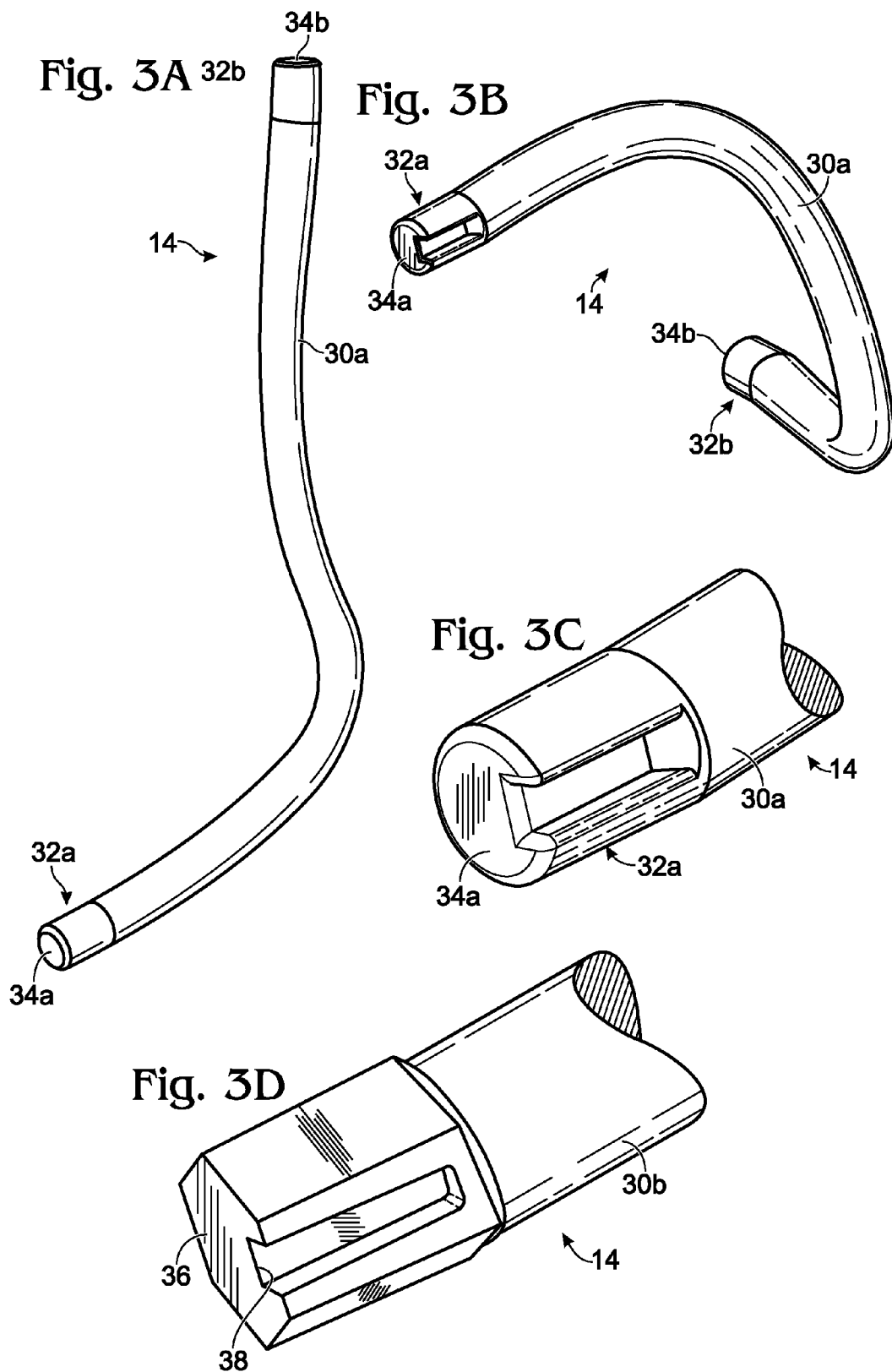


Fig. 4A

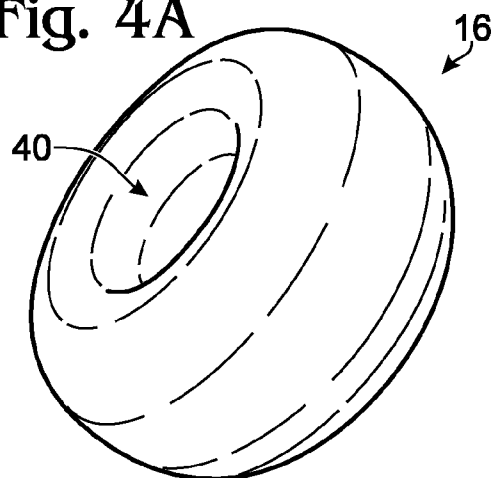


Fig. 4B

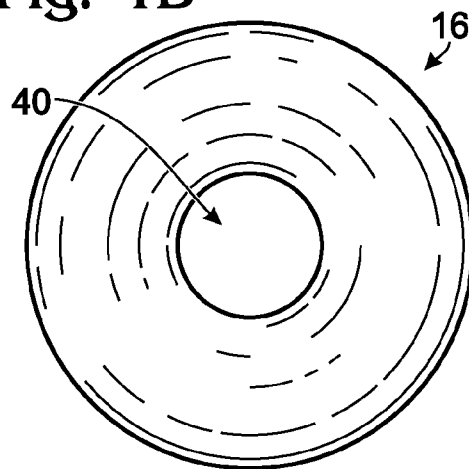
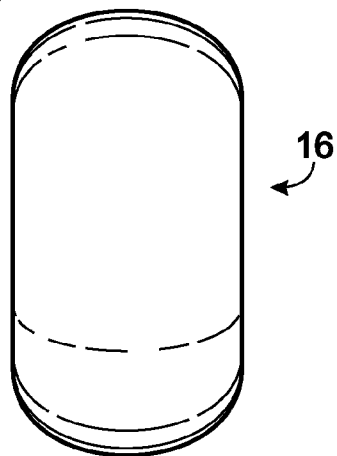
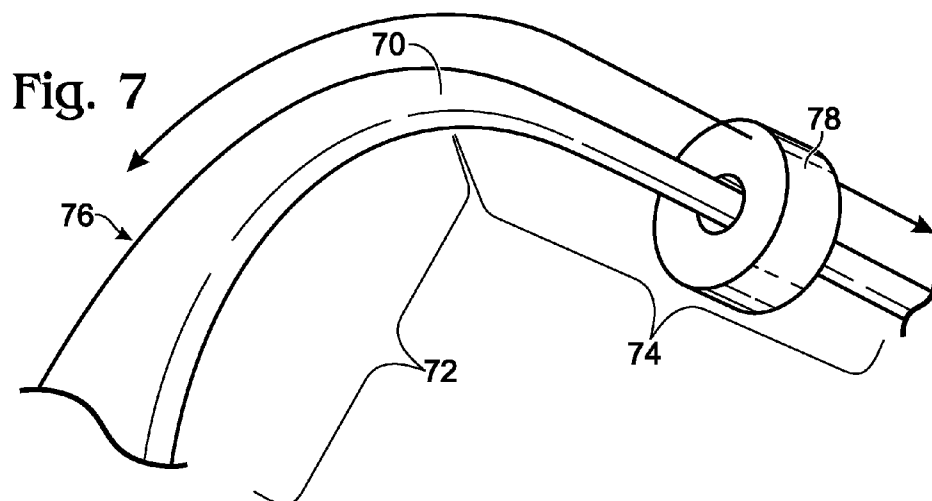
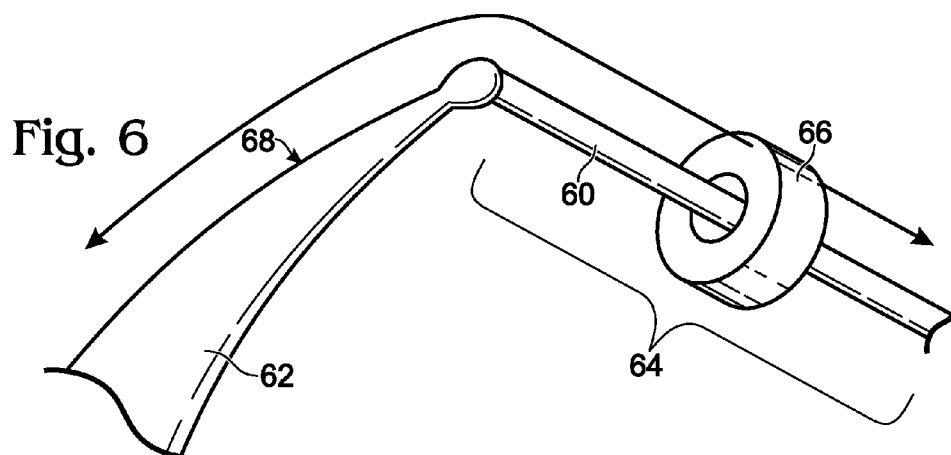
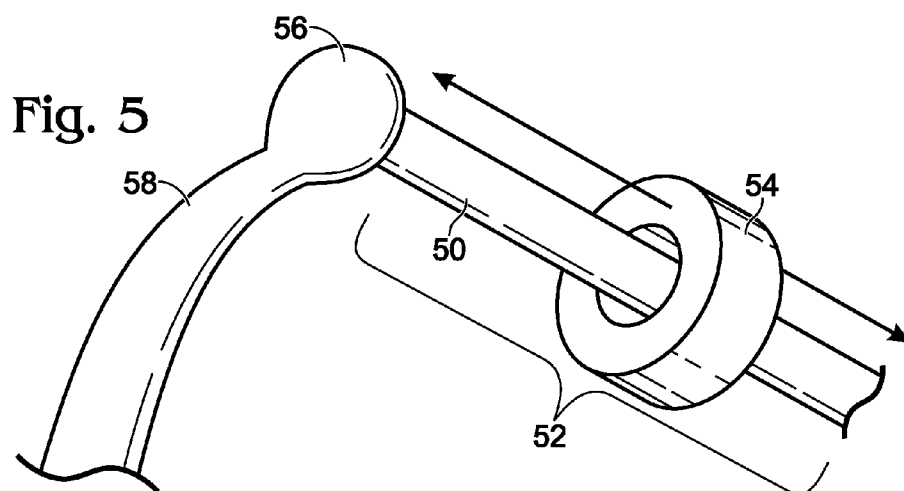
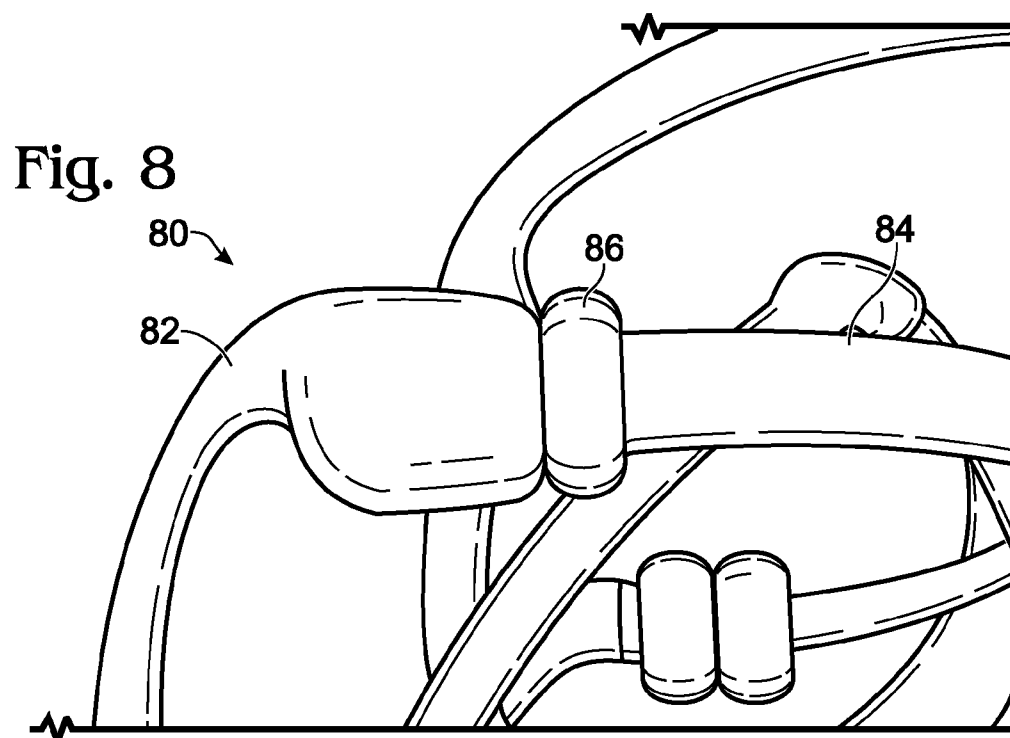


Fig. 4C







HANDHELD TOY

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to U.S. Provisional Application No. 61/240,943, filed Sep. 9, 2009, entitled Handheld Toy, the entirety of which is hereby incorporated by reference for all purposes.

BACKGROUND

[0002] Toys are often an important part of a child's learning and development process. Furthermore, toys entertain children and allow children to exercise their imagination and creativity.

SUMMARY

[0003] The present disclosure is directed to a handheld, bead-play toy. It is suitable for use by people of all ages and can be particularly entertaining and educational for young children. The toy provides many different levels of play. At a most simplistic level, the seemingly chaotic shape of the toy can be visually stimulating to young minds. At a slightly more advanced level, the toy can be turned and/or shaken to make noise and provide visual stimulation. At an even more advanced level, the toy provides an opportunity to practice physical and mental dexterity as beads are manually and purposefully moved about the toy. At its most advanced level, the simultaneously simplistic and complicated geometrical relationships between the various aspects of the toy can be studied, thus providing a fun way to learn about symmetry, patterns, geometry, and other mathematical concepts. The toy can provide sensory stimulation including tactile stimulation, visual stimulation, audible stimulation, and even oral stimulation. The toy may also promote the development of fine motor skills and/or teach cause and effect relationships.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. 1 shows an example handheld, bead-play toy in accordance with an embodiment of the present disclosure.

[0005] FIGS. 2A-2D show an example hub piece useable to construct handheld, bead-play toys in accordance with an embodiment of the present disclosure.

[0006] FIGS. 3A-3D show example rail pieces useable to construct handheld, bead-play toys, in accordance with an embodiment of the present disclosure.

[0007] FIGS. 4A-4C show an example bead useable to construct handheld, bead-play toys in accordance with an embodiment of the present disclosure.

[0008] FIG. 5 shows an example arrangement in which a rail piece entirely forms a rail aspect of a handheld, bead-play toy in accordance with an embodiment of the present disclosure.

[0009] FIG. 6 shows an example arrangement in which a rail piece and a hub piece cooperate to form a rail aspect of a handheld, bead-play toy in accordance with an embodiment of the present disclosure.

[0010] FIG. 7 shows an example arrangement in which an integrated piece forms a rail aspect of a handheld, bead-play toy in accordance with an embodiment of the present disclosure.

[0011] FIG. 8 shows an example, handheld, bead-play toy in accordance with another embodiment of the present disclosure.

DETAILED DESCRIPTION

[0012] FIG. 1 shows a nonlimiting example of a handheld, bead-play toy 10. Toy 10 includes a plurality of hub aspects 12 (e.g., hub aspect 12a, hub aspect 12b, hub aspect 12c, and hub aspect 12d). Toy 10 also includes a plurality of rail aspects 14 (e.g., rail aspect 14a, rail aspect 14b, rail aspect 14c, rail aspect 14d, rail aspect 14e, and rail aspect 14f) interconnecting the various hub aspects 12. Furthermore, toy 10 includes a plurality of beads 16 (e.g., bead 16a, bead 16b, bead 16c, bead 16d, bead 16e, bead 16f, bead 16g, bead 16h, bead 16i, bead 16j, bead 16k, and bead 16l) slideable along the rail aspects 14.

[0013] Toy 10 is shown with four hub aspects 12, six rail aspects 14, and twelve beads 16. However, it is to be understood that toys can be constructed with virtually any number of hub aspects, rail aspects, and beads. The example embodiments shown in the drawings and described herein are not limiting, but rather demonstrate concepts that may be applied to toys of different configurations, sizes, shapes, colors, materials, number of hub aspects, number of rail aspects, and/or number of beads. All such toys are within the intended scope of this disclosure.

[0014] FIGS. 2A-2D show a nonlimiting example of a hub aspect 12 formed from a single hub piece 18. In general, hub aspects in accordance with the present disclosure are configured to operatively connect to two or more rail aspects. In the illustrated embodiment, hub aspect 12 is formed from a single hub piece 18 that is configured to be coupled to three physically distinct rail pieces (not shown). As such, hub piece 18 includes a central portion 20, from which three spoke portions (e.g., spoke portion 22a, spoke portion 22b, and spoke portion 22c) extend.

[0015] In other embodiments, a hub piece may include a different number of spoke portions, thus allowing operative connections to a different number of rail aspects. While hub piece 18 is characterized by a smooth and somewhat spiraling shape, it is to be understood that other shapes are within the scope of this disclosure. The spoke portions can be relatively long and skinny as shown, or the spoke pieces can be substantially wider. In some embodiments, a hub aspect may not have any visually discernable spoke portions, but rather rail connection points that are located near a perimeter of an unspoked piece. Spoke portions can be tapered along their lengths, as shown, and/or spoke portions can have a substantially uniform thickness along their lengths. An end or other part of a spoke portion can be sized to prevent a bead from sliding toward the central portion of the hub aspect along the spoke portion.

[0016] At the end of each spoke portion 22, hub piece 18 includes a mortise (e.g., mortise 24a, mortise 24b, and mortise 24c). Each mortise is configured to mate with a corresponding tenon from a rail piece, as described below. In the illustrated embodiment, each mortise is hexagonally shaped. However, a mortise can be differently shaped without departing from the intended scope of this disclosure. Other polygonal mortises, circular mortises, triangular mortises, starred mortises, rectangular mortises, and mortises of virtually any other shape can be used. Likewise, the corresponding tenons of the rail pieces may be sized and shaped to mate with any particular mortise.

[0017] FIG. 2C and a magnified portion of FIG. 2A shows a mortise 24a in more detail. As can be seen, mortise 24a includes a key 28. The key 28 is configured to cooperate with a corresponding key of the rail, so that the mortise and the tenon can only mate in one orientation, which can facilitate assembly of the toy. While key 28 is shown as a dovetailed projection, it is to be understood that virtually any key, whether projection, slot, or other, may be used without departing from the scope of this disclosure.

[0018] Hub pieces may be manufactured using any suitable technique with any suitable material or combinations of materials. As one nonlimiting example, hub pieces can be injection molded using 120 shore A hardness polyvinyl chloride (PVC). PVC and/or other plastics may be shaped into hub pieces using various molding, casting, and extrusion techniques. Furthermore, rubbers, metals, woods, glasses, fiber composites, and/or other materials may be used without departing from the intended scope of this disclosure. The material, shape, thickness, structure, and size of the hub pieces can be selected to achieve a desired flexibility/resiliency, or otherwise tune various parameters of an assembled toy (e.g., weight, rattling volume, size, cost, etc.).

[0019] As shown in FIG. 1, each of a plurality of hub pieces that are used to construct a toy may have substantially the same shape. In other embodiments, one or more hub pieces may be differently shaped than one or more other hub pieces. Toy 10 includes hubs that are sized and the shaped for easy gripping by small hands.

[0020] FIGS. 3A-3D show nonlimiting examples of a rail aspect 14 formed from a rail piece (i.e., rail piece 30a in FIGS. 3A-3C and rail piece 30b in FIG. 3D). In general, rail aspects in accordance with the present disclosure are configured to extend between two or more hub aspects. In the embodiment illustrated in FIGS. 3A-3C, rail aspect 14 is formed from a single rail piece 30a that is configured to be coupled to two physically distinct hub pieces (not shown). As such, rail piece 30a includes opposing end portions (i.e., end portion 32a and end portion 32b).

[0021] Rail piece 30a has a somewhat helical shape in the illustrated embodiment. The length and/or shape of the rail pieces may be selected to hold the various hub pieces in a desired spatial arrangement relative to one another. Rail piece 30a is substantially symmetrical about its midpoint along its length. As shown in FIG. 1, each of the plurality of rail pieces that are used to construct a toy may have substantially the same length and substantially the same shape. In other embodiments, one or more rail pieces may be differently sized and/or shaped than one or more other rail pieces and/or one or more rail pieces may be asymmetrical about its midpoint along its length.

[0022] Turning back to FIGS. 3A-3D, as introduced above, the rail pieces include a tenon at each end (e.g., tenon 34a and tenon 34b of rail piece 30a, and tenon 36 of rail piece 30b). Such tenons can be configured to mate with a corresponding mortise from a hub piece, as described above. Tenon 34a and tenon 34b are shaped with a substantially circular cross section, and tenon 36 is shaped with a substantially hexagonal cross section. However, a tenon can be differently shaped without departing from the intended scope of this disclosure. Other polygonal tenons, triangular tenons, starred tenons, rectangular tenons, and tenons of virtually any other shape can be used.

[0023] Hexagonal tenon 36 is configured to mate with hexagonal mortise 24a, hexagonal mortise 24b, or hexagonal

mortise 24c of hub piece 18 of FIGS. 2A-2D. As such, hexagonal tenon 36 includes a key 38 configured to cooperate with a corresponding key of hub piece 18, so that the tenon and the mortise can only mate in one orientation. While key 38 is shown as a dovetailed slot, it is to be understood that virtually any key, whether slot, projection, or other, may be used without departing from the scope of this disclosure. In some embodiments, a circular tenon (e.g., tenon 34a) may mate with a hexagonal mortise. The gaps between the tenon and the mortise provide a space for glue or another fastener, thus reducing potential spill out when a tenon is inserted in a mortise that is preloaded with glue.

[0024] In other embodiments, a rail piece may include a mortise and a hub piece may include a tenon. Furthermore, a mortise and tenon connection need not be used to physically connect a rail piece and a hub piece. Virtually any connection technique may be used without departing from the intended scope of this disclosure. Welds, glues, magnetism, and other forms of connecting two distinct structures together may be used. Such connection techniques can be used independently of one another or in conjunction with other connection techniques. For example, a mortise and tenon connection can be augmented with a glue or weld. Furthermore, in some embodiments, a rail aspect and a hub aspect may be commonly formed from an integrated structure (e.g., a single injection molded piece of plastic). It is to be noted that several of the connection techniques described herein allow strong and permanent connections without using screws or other small connection pieces that could be dangerous to small children.

[0025] A rail piece can be tapered. As a nonlimiting example, rail piece 30a is approximately 5.5 mm in cross section at its midpoint and approximately 6.5 mm in cross section at its ends. Such tapering may facilitate bead movement along its length. Whether tapered or not, a rail piece may be formed with a variety of different cross sectional shapes, which may be uniform along the length of the rail piece, or which may change along the length of the rail.

[0026] Rail pieces may be manufactured using any suitable technique with any suitable material or combinations of materials. As one nonlimiting example, rail pieces can be injection molded using acrylonitrile butadiene styrene (ABS). ABS and/or other plastics may be shaped into rail pieces using various molding, casting, and extrusion techniques. Furthermore, rubbers, metals, woods, glasses, fiber composites, and/or other materials may be used without departing from the intended scope of this disclosure. The material, shape, thickness, structure, and size of the rail pieces can be selected to achieve a desired flexibility/resiliency, or otherwise tune various parameters of an assembled toy (e.g., weight, rattling volume, size, cost, etc.).

[0027] FIGS. 4A-4C show a nonlimiting example of a bead 16. In general, beads in accordance with the present disclosure are configured to slide or otherwise move along a rail aspect. In the illustrated embodiment, the beads are toroidally shaped with a hole 40 large enough to fit around a rail aspect. In such embodiments, the hole can be sized to snugly fit about a rail aspect, thus creating increased friction between the rail and the bead and limiting rattling and movement. In other embodiments, the hole can be sized to loosely fit about a rail aspect, thus reducing friction between the rail and the bead and promoting rattling and movement. A toroidal bead is provided as an example, but beads of other shapes are within

the intended scope of this disclosure. In some embodiments, the beads may be decorated or themed (e.g., to resemble cars, trains, characters, etc.).

[0028] As shown in FIG. 1, when assembled, a toy may include one or more beads slideably connected to one or more rail aspects. In the illustrated embodiment, each rail aspect serves as a track for two beads. In other embodiments, different rails may include different numbers of beads, and some or all rails may include no beads. The length of a rail aspect and the size of the beads are the only limits on how many beads can be slideably connected to each rail aspect. All beads can be sized and shaped the same, or one or more beads can be sized and/or shaped differently than one or more other beads. Some beads may not include a fully surrounded hole through which a rail aspect passes. A bead may include virtually any type of sliding joint.

[0029] Beads may be manufactured using any suitable technique with any suitable material or combinations of materials. As one nonlimiting example, beads can be injection molded using acrylonitrile butadiene styrene (ABS). ABS and/or other plastics may be shaped into beads using various molding, casting, and extrusion techniques. Furthermore, rubbers, metals, woods, glasses, fiber composites, and/or other materials may be used without departing from the intended scope of this disclosure. The material, shape, thickness, structure, and size of the beads can be selected to tune various parameters of an assembled toy (e.g., weight, rattling volume, size, cost, etc.).

[0030] As describe above, in some embodiments, each rail aspect is completely formed by a single rail piece. This type of arrangement is illustrated in FIG. 5. In particular, a rail piece 50 forms the entire length of the rail aspect 52 along which a bead 54 can slide. In this arrangement, an end 56 of a hub piece 58 is too large for the bead to slide past, and thus effectively forms the boundary between the rail aspect and the hub aspect. Another arrangement is shown in FIG. 6, where a rail piece 60 and a hub piece 62 collectively form the length of the rail aspect 64 along which a bead 66 can slide. In this arrangement, an intermediate portion 68 of hub piece 62 tapers to a width that is too large for the bead to slide past, and thus effectively forms the boundary between the rail aspect and the hub aspect. Another arrangement is shown in FIG. 7, where an integrated piece 70 forms the hub aspect 72 and the rail aspect 74. In this arrangement, an intermediate portion 76 of the integrated piece 70 tapers to a width that is too large for a bead 78 to slide past, and thus effectively forms the boundary between the rail aspect and the hub aspect. A toy can be designed with any one or more of the above described arrangements.

[0031] In some embodiments, one or more beads may be fixed to a rail aspect so as not to slide relative to the rail aspect. Such a bead may be fixed to an end portion of a rail aspect, where the rail aspect meets a hub aspect, and/or such a bead may be fixed to an intermediate portion of the rail aspect between the opposing ends of the rail aspect. When positioned at an end of the rail aspect, a bead may be additionally or alternatively fixed to the hub aspect. A bead may be fixed to a rail and/or hub aspect in any suitable manner, including but not limited to, ultrasonic welding, adhesive, and/or integrated molding.

[0032] FIG. 8 shows a nonlimiting example of a handheld, bead-play toy 80. Toy 80 includes a hub aspect 82, a rail aspect 84, and a bead 86 that is fixed to an end portion of rail aspect 84.

[0033] Returning to toy 10 of FIG. 1, an example assembly of the hub pieces, rail pieces, and beads described above is shown. Each of the hub pieces includes three spokes and three mortises. As such, each hub piece can be linked to up to three other hub pieces via a rail piece. Toy 10 is assembled so that each of the four hub pieces is linked to each of the other three hub pieces via the rail pieces. In other words, no hub piece is connected to any other hub piece by more than one rail piece. Furthermore, no hub piece is connected to itself by a rail piece (i.e., both ends of a rail piece are not connected to the same hub piece). The rail pieces are all that hold the various hub pieces together. If not for the rail pieces, the hub pieces would not be connected to one another.

[0034] Toy 10 is also configured and assembled so that an end of each spoke portion is adjacent to an end of another spoke portion from another hub piece. The adjacent ends of the spoke portions form a spoke pair (e.g., spoke pair 80a and spoke pair 80b). Furthermore, each spoke pair is connected to another spoke pair from two different hub pieces via two rail pieces. This symmetrical geometry creates six spoke pairs, evenly distributed around a perimeter of the toy.

[0035] Toy 10 is configured and assembled so that the various rail pieces are sufficiently spaced relative to all other rail pieces so that no bead on one rail piece can slide into another bead on another rail piece. Furthermore, a curved path of the rails allows beads to travel a relatively long distance. Toy 10 is designed so that when the toy is gripped on the hubs, the beads are free to slide along the rails inside an outer ball-like perimeter defined by the hubs. In many embodiments, bead travel is enhanced by having the rails traversing a volume predominately inside a perimeter defined by the hubs. Such a volume may be generally spherical, and the toy may thus be generally ball shaped. However, it is to be understood that rails need not travel through the interior of such a perimeter in all embodiments, and that one or more (or all) rails may be located near the perimeter established by the hubs. Furthermore, in some embodiments, one or more hubs may be interior a perimeter defined by two or more other hubs.

[0036] Toy 10 is configured so that the hub pieces and rail pieces are sufficiently stiff enough to hold a default shape. However, both the hub pieces and the rail pieces are somewhat resilient, thus providing the toy with some ability to flex out of the default shape. As introduced above, various aspects of the hub pieces and the rail pieces (e.g., material, size, structure, etc.) can be selected to tune the overall flexibility of an assembled toy. Toys in accordance with the present disclosure can range from completely stiff to completely flaccid.

[0037] In some embodiments, the rails and the hubs may be permanently connected, and in other embodiments, the hubs and the rails may be configured for repeated assembly and disassembly. In some cases the hubs may connect to other hubs via a bridge or other means than the rails for added stability.

[0038] Toy 10 is approximately 150 grams when sized with approximately a six inch diameter and when constructed with PVC hub pieces and ABS rail pieces and beads, as described above. Such a relatively light weight toy facilitates handheld play, even for very young children. When the toy is moved, gravity and momentum can cause the beads to slide about the rail pieces. As the beads slide, they can rattle on the rail pieces and rattle against the hub pieces and/or each other. Such rattling results in a toy that generates a clickety-clack sound with only a small amount of movement, which may be enjoyable for young children. While a six inch, 150 gram toy is

described above, it is to be understood that the concepts described herein can be used to make a toy of virtually any size or weight.

[0039] In some embodiments, the appearance of the toy can be tuned by selecting particular colors and/or levels of transparency for the hub pieces, rail pieces, and/or beads. The hub pieces, rail pieces, and/or beads can be colored the same as all other hub pieces, rail pieces, and beads, respectively, or one or more pieces can be colored differently than one or more other pieces. For example, all the hub pieces can be the same color and same level of transparency (e.g., opaque blue), and all the rail pieces can be the same color and same level of transparency (e.g., opaque white), while some of the beads are visually different than other beads (e.g., partially-transparent red, partially-transparent green, and partially transparent blue). The color configuration described above is only one of the infinite number of color combinations that can be created without departing from the scope of this disclosure.

[0040] In some embodiments, one or more portions of a toy may include glow-in-the-dark materials and/or lights (e.g., light emitting diode lights).

[0041] It is to be understood that the configurations and/or approaches described herein are exemplary in nature, and that these specific embodiments or examples are not to be considered in a limiting sense, because numerous variations are possible. The embodiments described above and the embodiments illustrated in the drawings serve as examples of the variety of different toys that include multiple hubs that are connected to each other through rails to encourage hand held

play and to maximize bead travel, distance, and speed, while minimizing bead obstruction by other beads, rails, hubs, and/or hands. Other geometric, organic, and/or random hubs and rails are of course envisioned. The subject matter of the present disclosure includes all novel and nonobvious combinations and subcombinations of the various configurations, features, functions, and/or properties disclosed herein, as well as any and all equivalents thereof.

1. A handheld, bead-play toy, comprising:
 - a plurality of hub aspects;
 - a plurality of rail aspects, each rail aspect interconnecting two different hub aspects of the plurality of hub aspects; and
 - one or more beads slideably connected to one of the plurality of rail aspects.
2. A handheld toy, comprising:
 - four hub pieces, each hub piece including a central portion and three spoke portions extending from that central portion; and
 - six rail pieces, each rail piece interconnecting spoke portions from two different hub pieces so that each hub piece is connected to each other hub piece via a rail piece.
3. The handheld toy of claim 2, further comprising one or more beads slideably connected to one of the six rail pieces.
4. The handheld toy of claim 2, further comprising a different two beads slideably connected to each of the six rail pieces.

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