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(54) **PLAYGROUND CLIMBING STRUCTURE**

(75) Inventors: **Sharon Gillett**, Shillington, PA (US); **Lloyd W. Reese**, Farmington, MO (US)

Correspondence Address:
POLSTER, LIEDER, WOODRUFF & LUCCHESI
12412 POWERSCOURT DRIVE SUITE 200
ST. LOUIS, MO 63131-3615 (US)

(73) Assignee: **PlayPower LT Farmington, Inc.**

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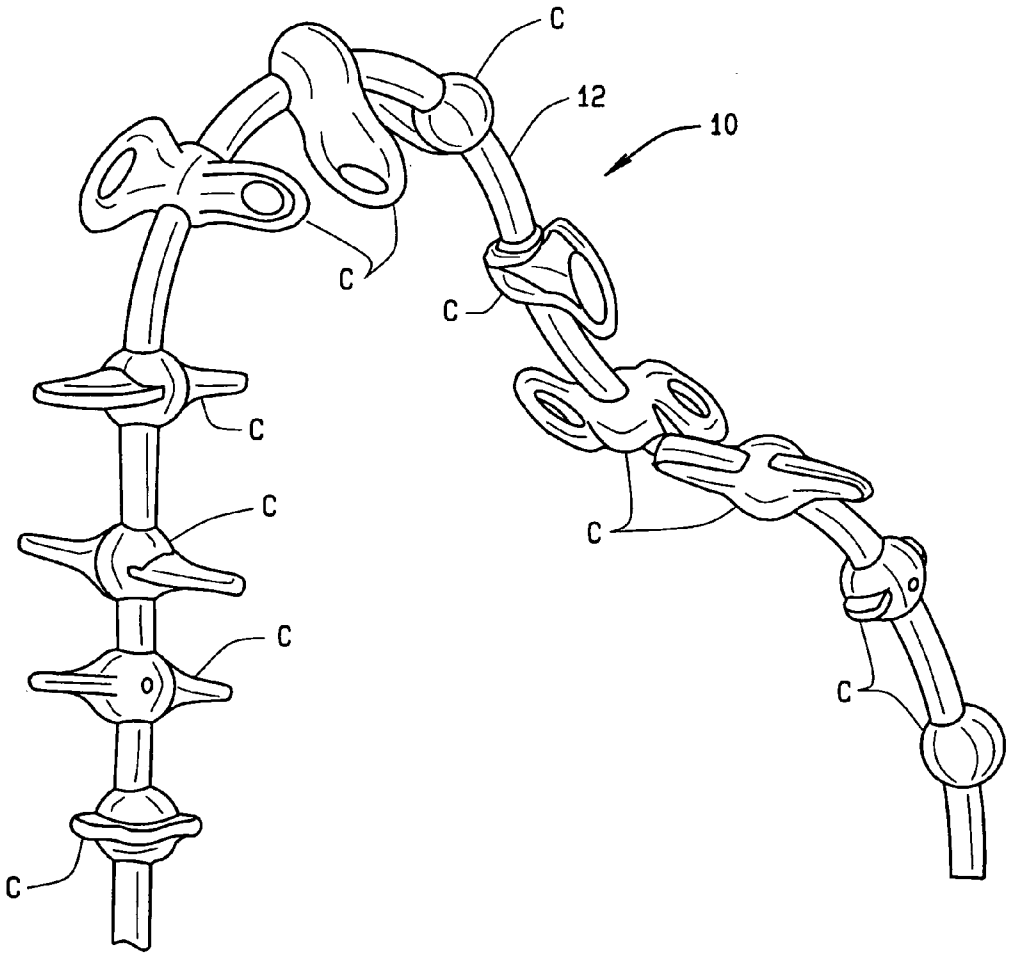
A63B 9/00 (2006.01)

(52) **U.S. Cl.** **482/35**

(57) **ABSTRACT**

A climbing structure comprises a plurality of climbing units secured to a pole. The climbing units are made from interengageable members having different climbing elements. Hence, many different climbing units can be formed from a set of a few climbing elements. The climbing elements can be varied along the pole such that, near ground level, the climbing elements comprise foot rests. Further up, the climbing elements can comprise steps or a combination of steps and handgrips. If the pole is arced, the climbing elements along the upper portion (or generally horizontal portion) of the pole, can comprise primarily handgrips. Additionally, the climbing units themselves can be assembled together and mounted to the pole using a variety of structures. They can, for example require a hole to be formed in the pole and can be placed at only discrete locations along the pole. Alternatively, they can rely on a clamping mechanism and can be placed at any desired position along the pole.



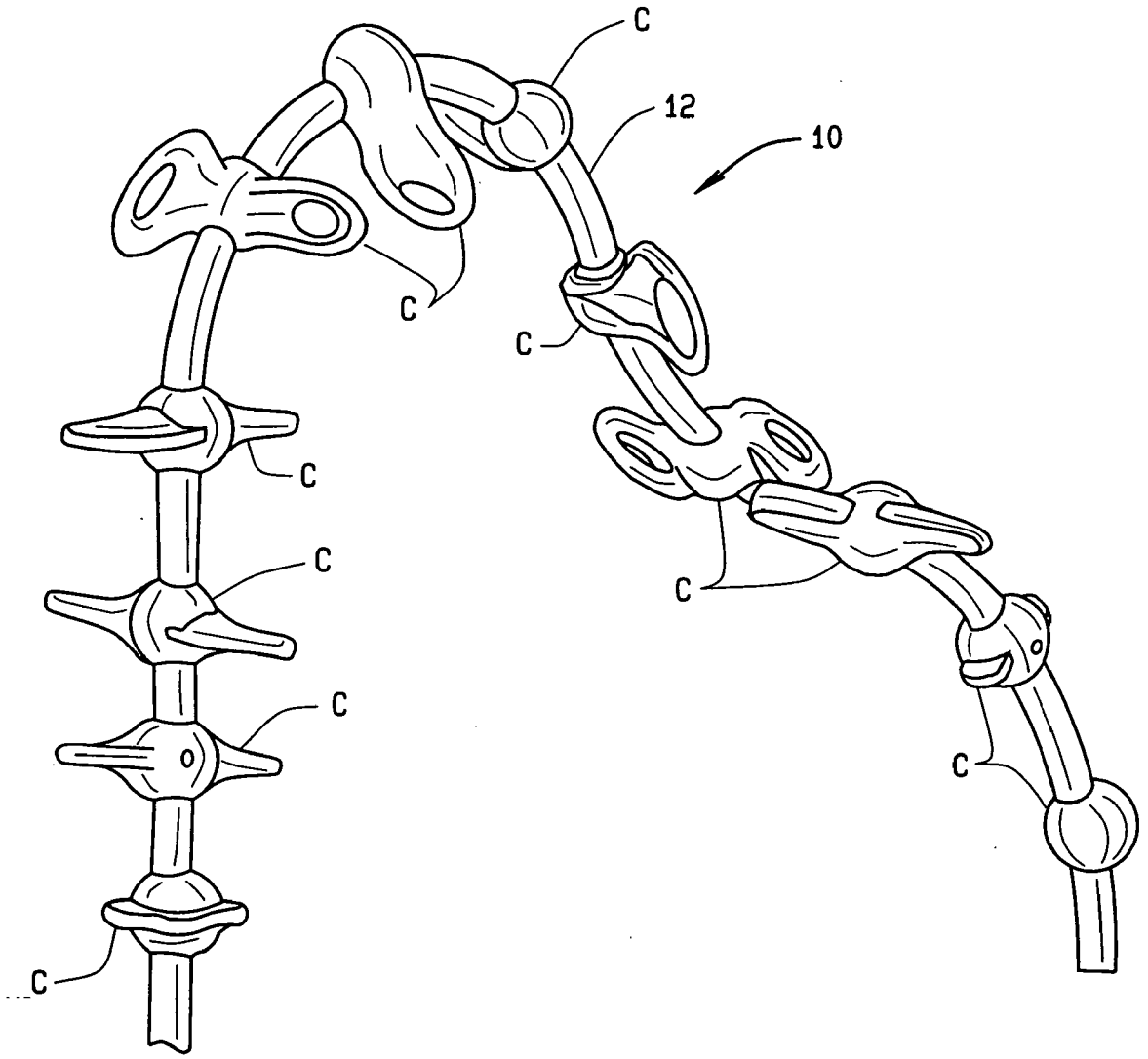
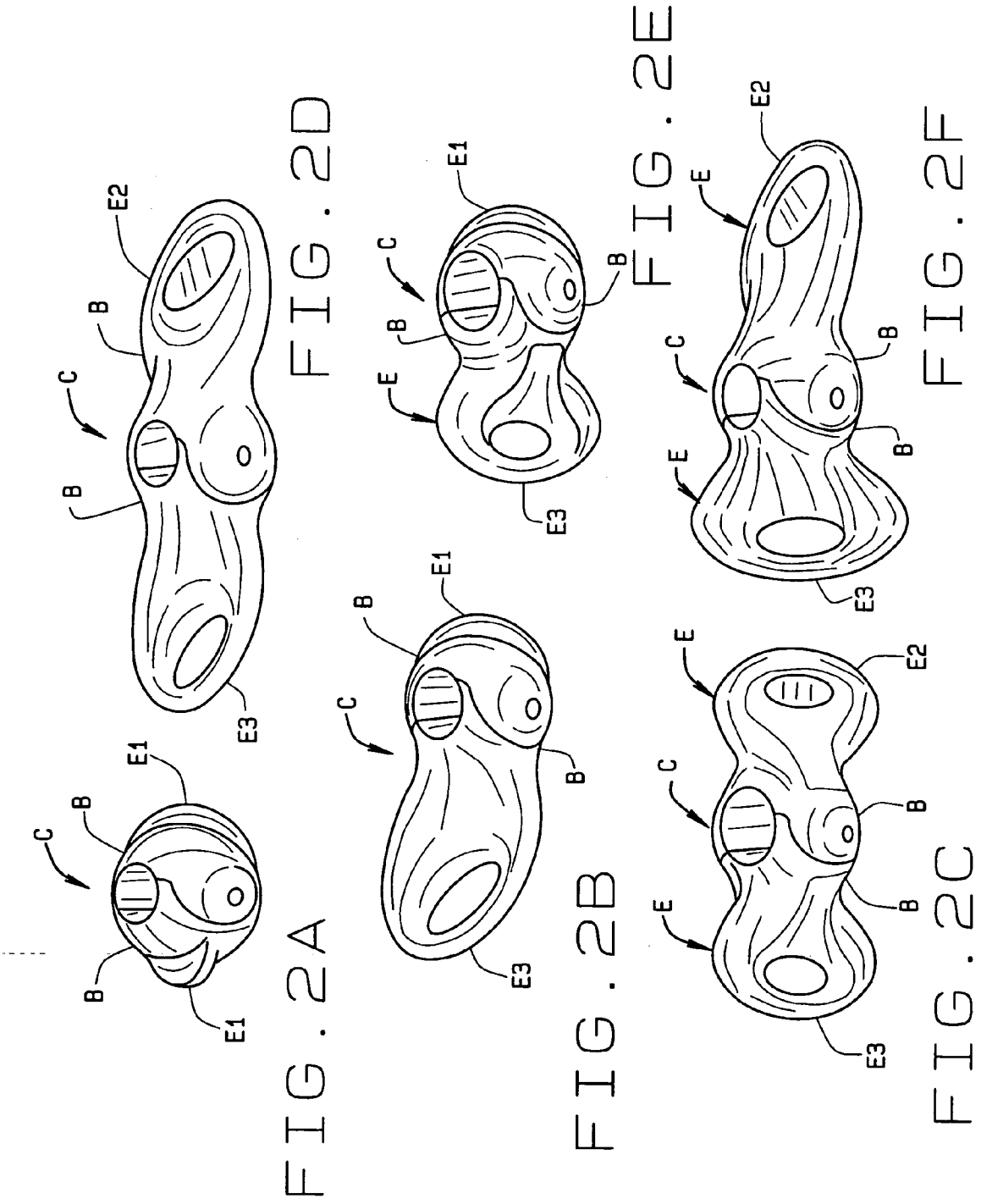


FIG. 1


E2
B
C
B
E3
FIG. 2D
E1
B
C
B
E
E3
FIG. 2E
E2
E
C
B
B
E3
FIG. 2F
E1
C
B
B
E3
FIG. 2B
E1
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C
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E1
FIG. 2A
E
E2
C
B
B
E
E3
FIG. 2C

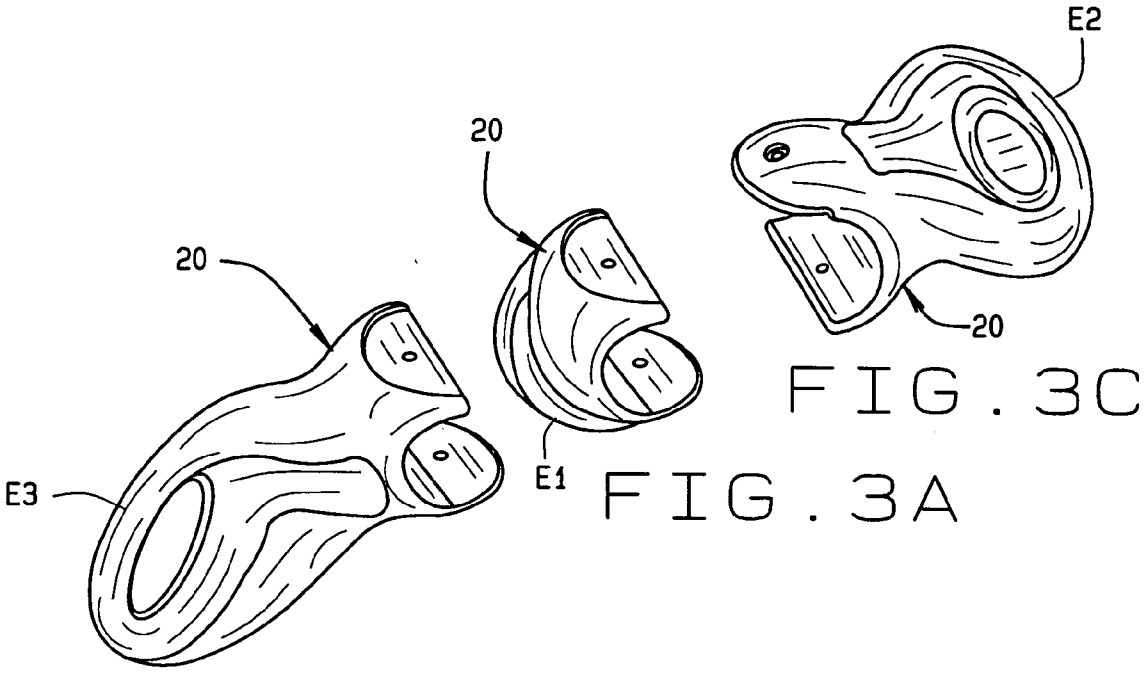


FIG. 3C

FIG. 3A

FIG. 3B

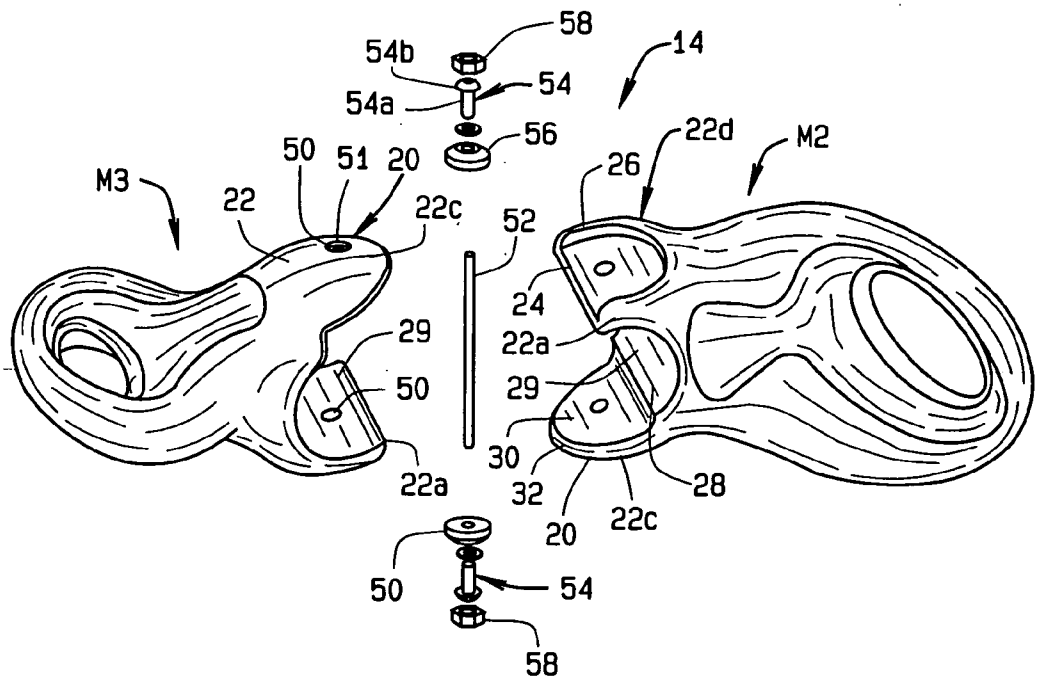


FIG. 4

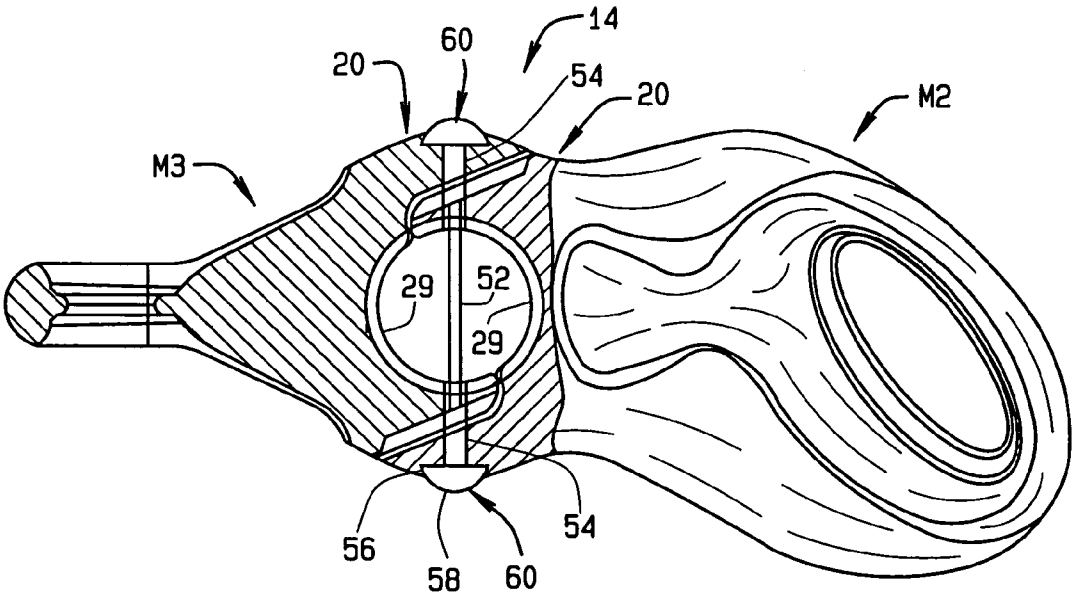


FIG. 5

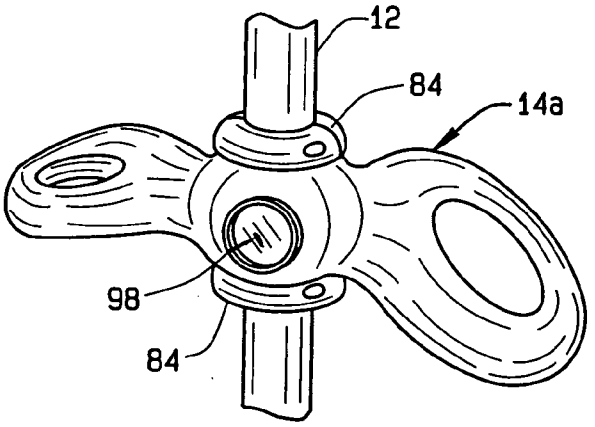


FIG. 7A

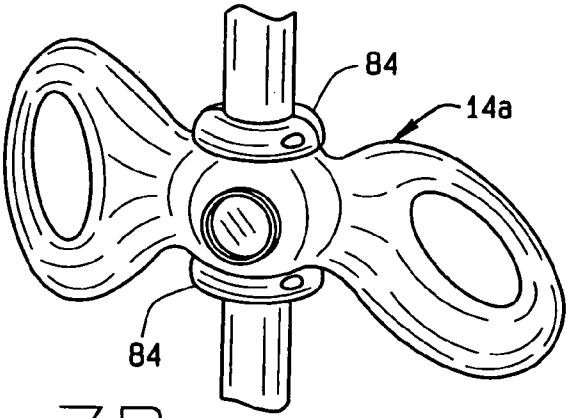


FIG. 7B

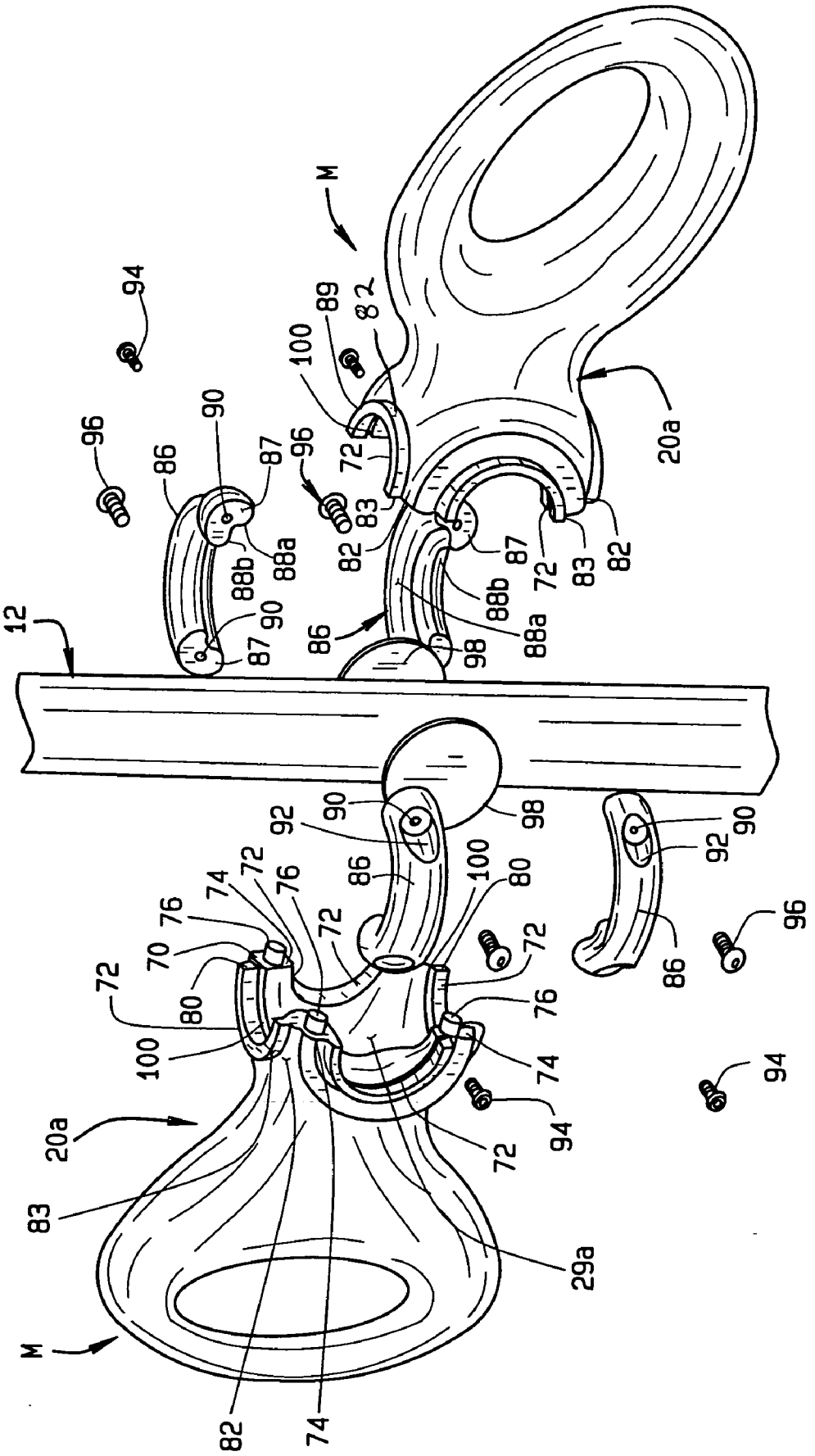


FIG. 6

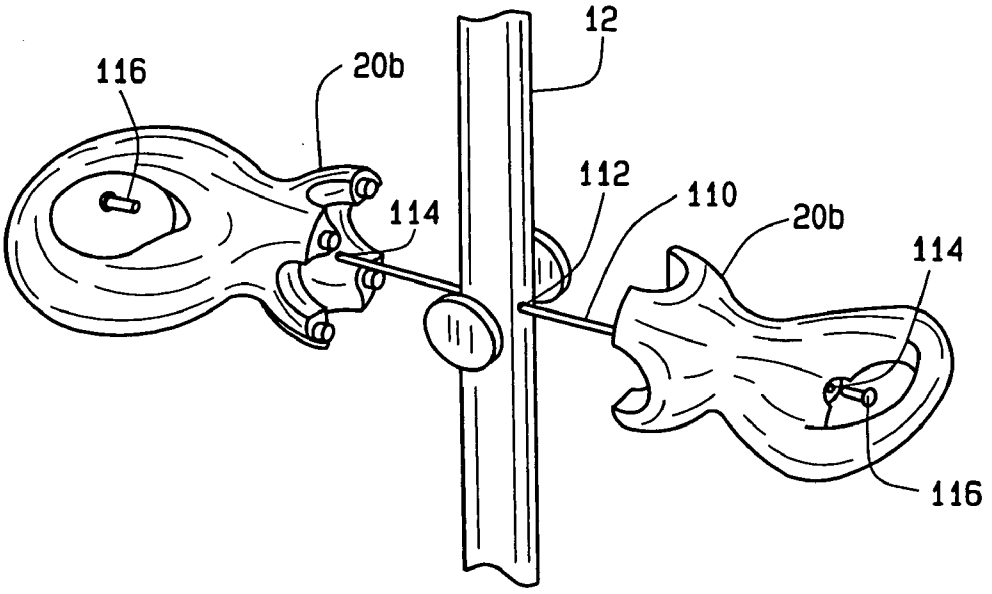


FIG. 8

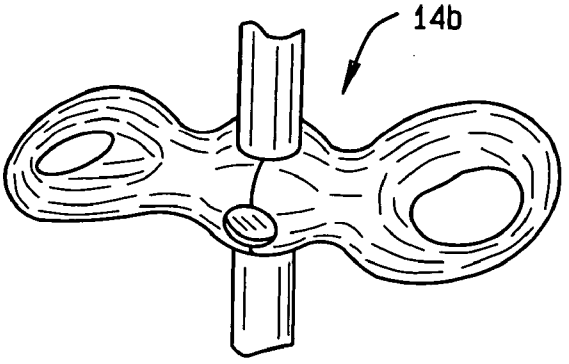


FIG. 9A

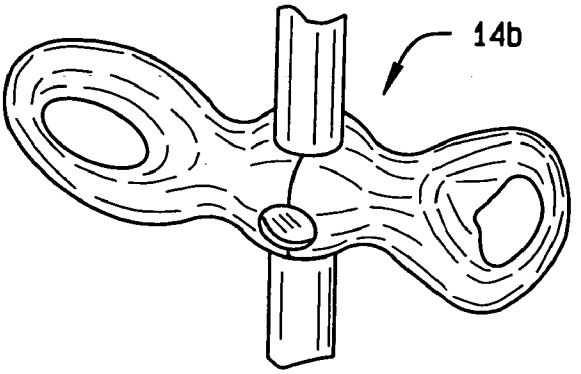


FIG. 9B

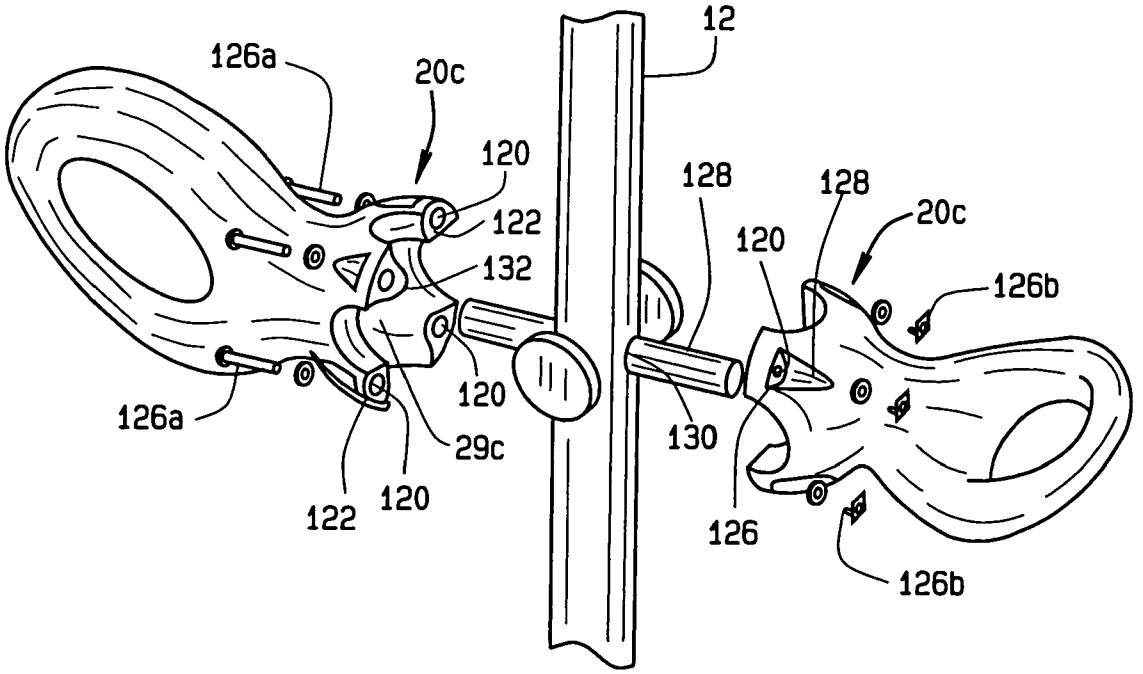


FIG. 10

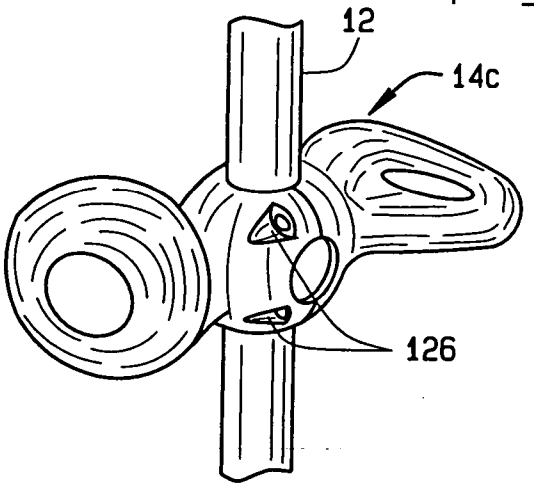


FIG. 11A

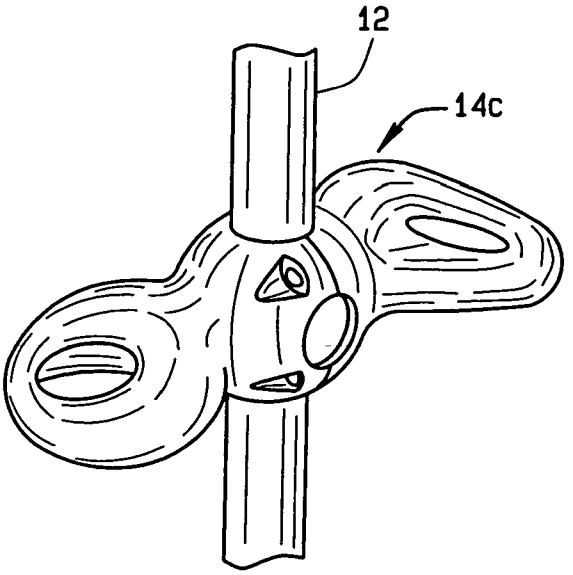


FIG. 11B

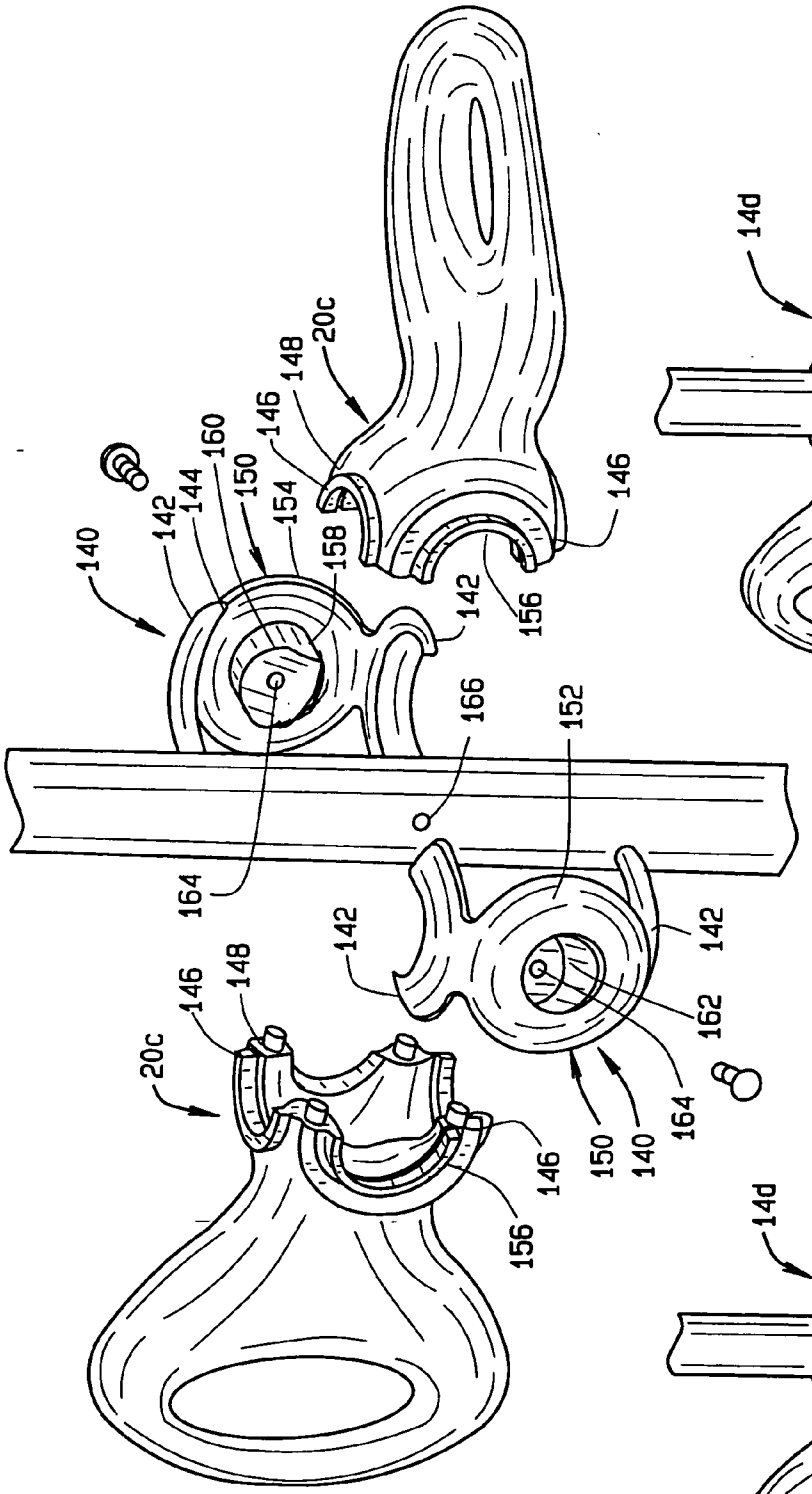


FIG. 12

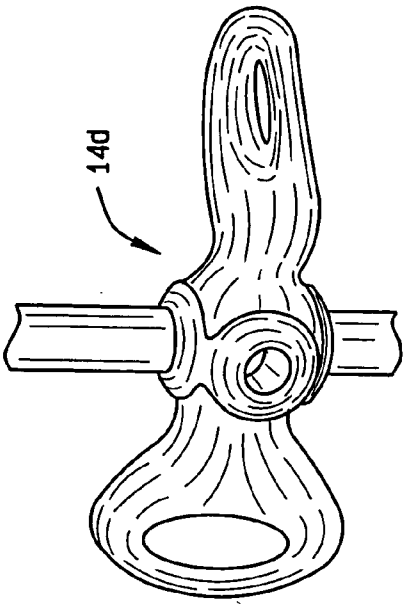


FIG. 13B

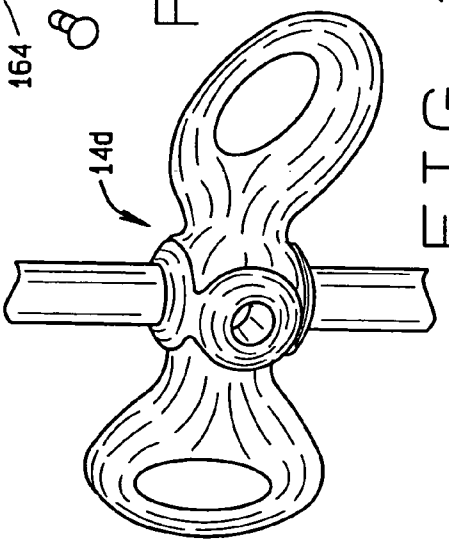
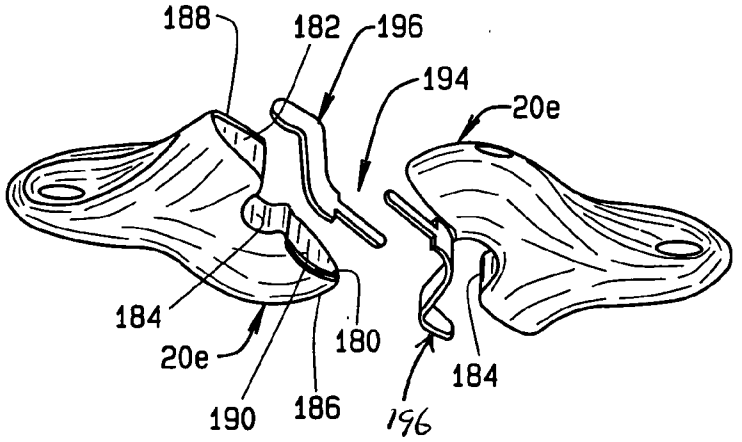


FIG. 13A


188
182
196
194
20e
184
20e
180
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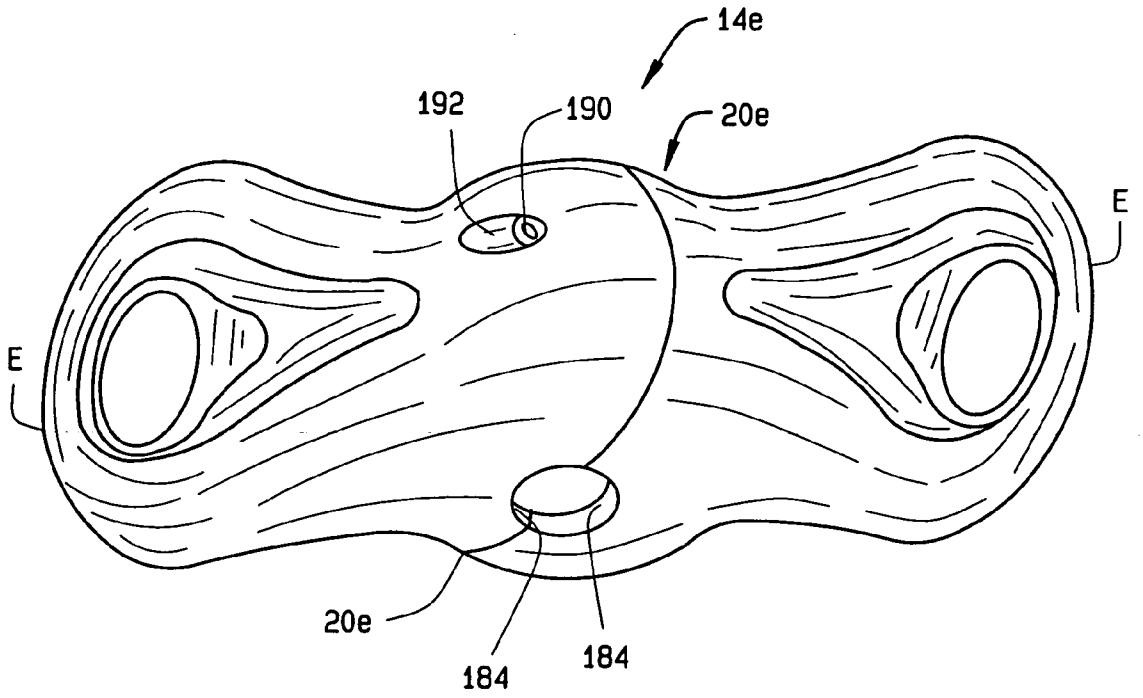
190
186
196

FIG. 14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E
20e
184
184

FIG. 15

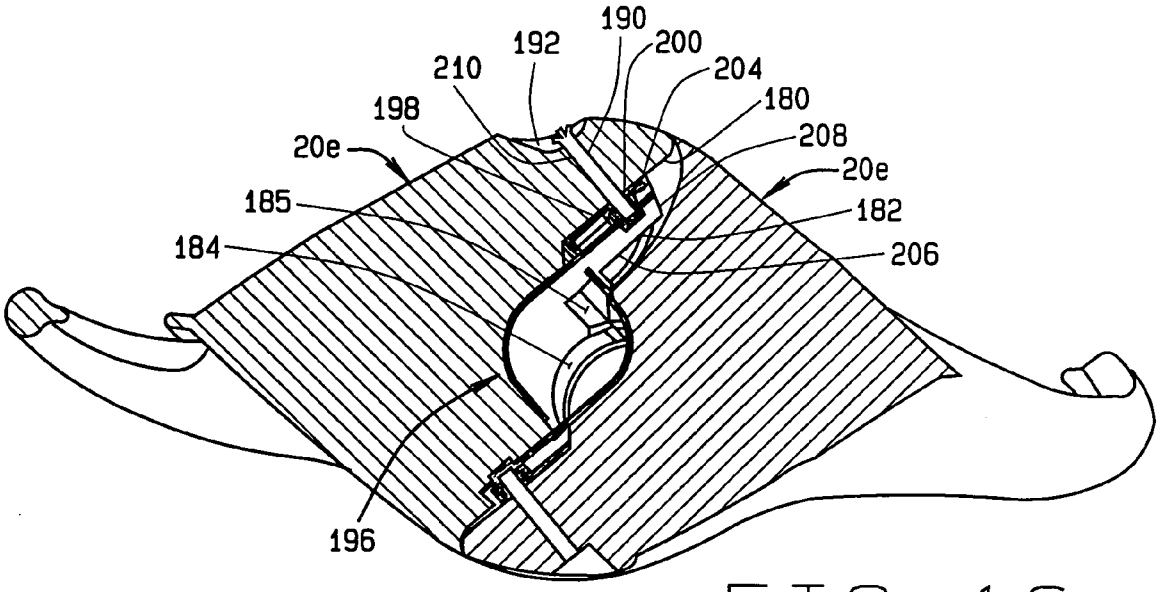
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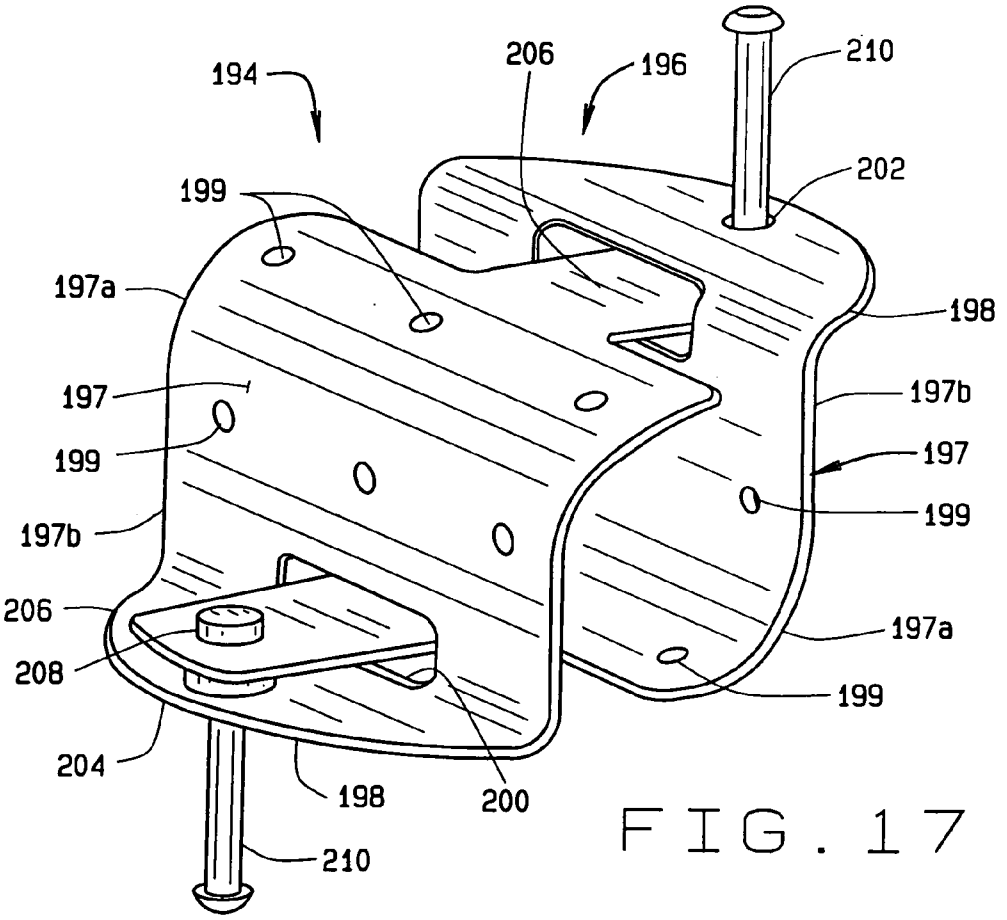
FIG. 16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197b
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200
210

FIG. 17

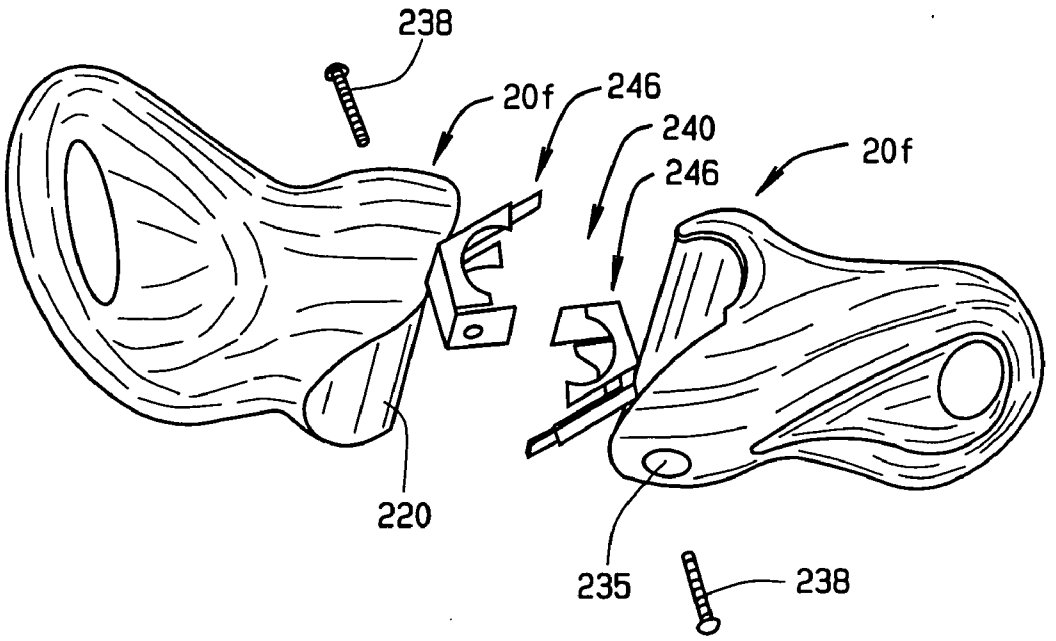
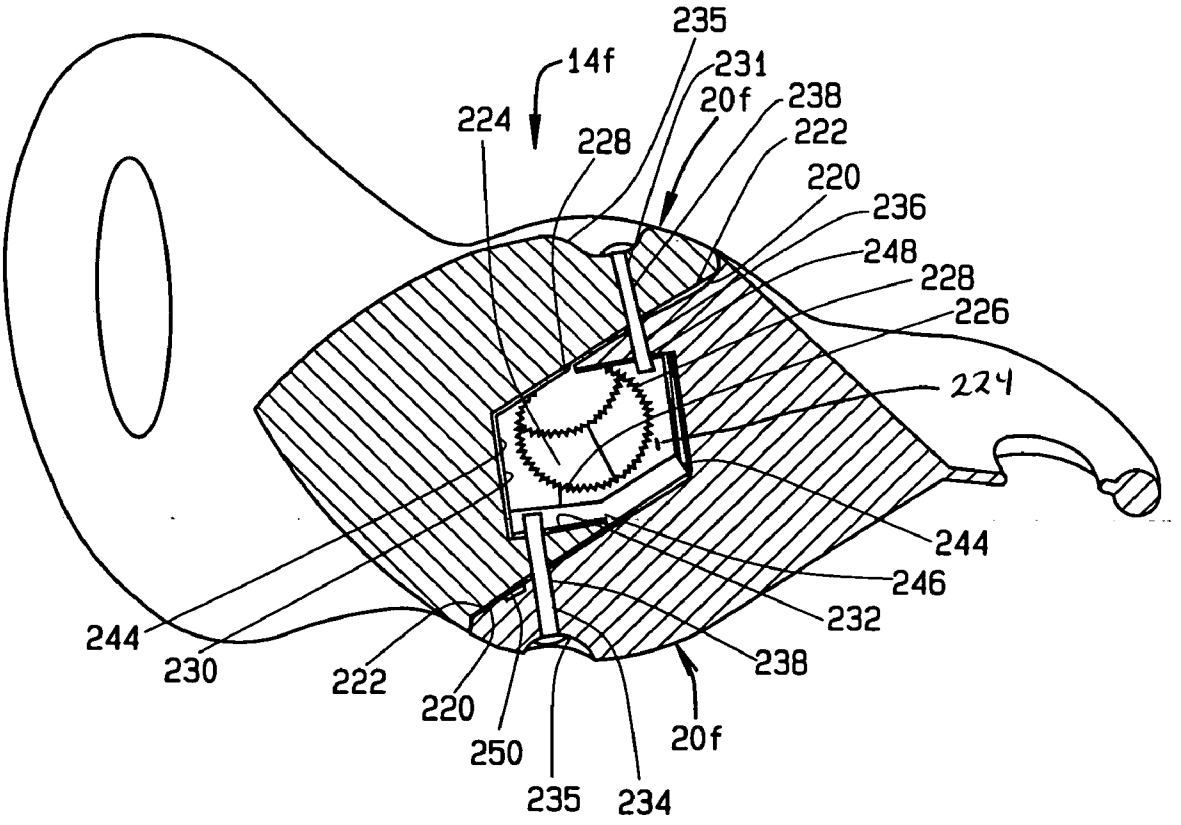

238
20f
246
240
246
20f
220
235
238

FIG. 18


235
14f
231
224
228
20f
238
222
220
236
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222
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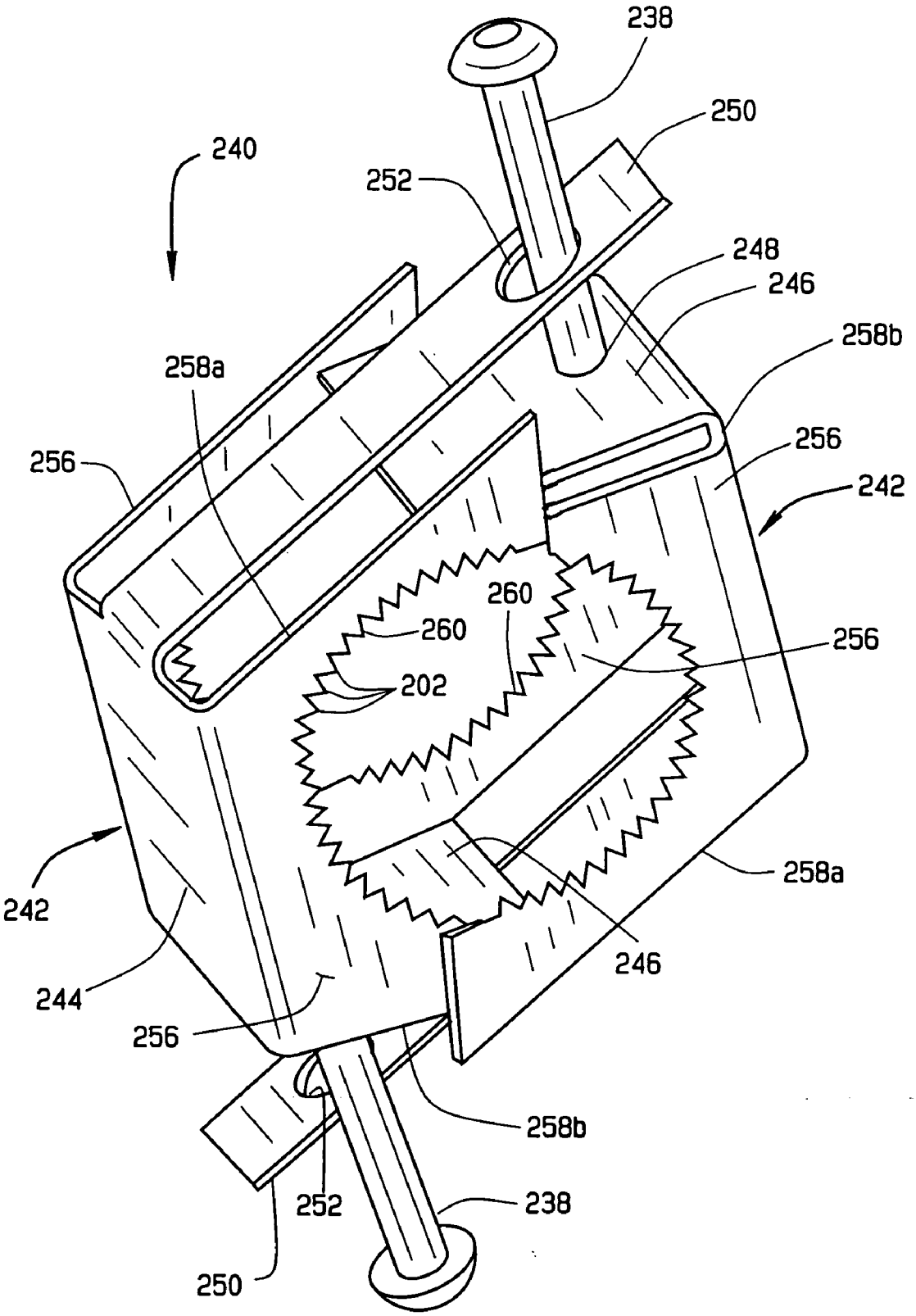
250
235
234
20f

FIG. 19


238
250
240
252
248
246
258b
258a
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256
242
260
260
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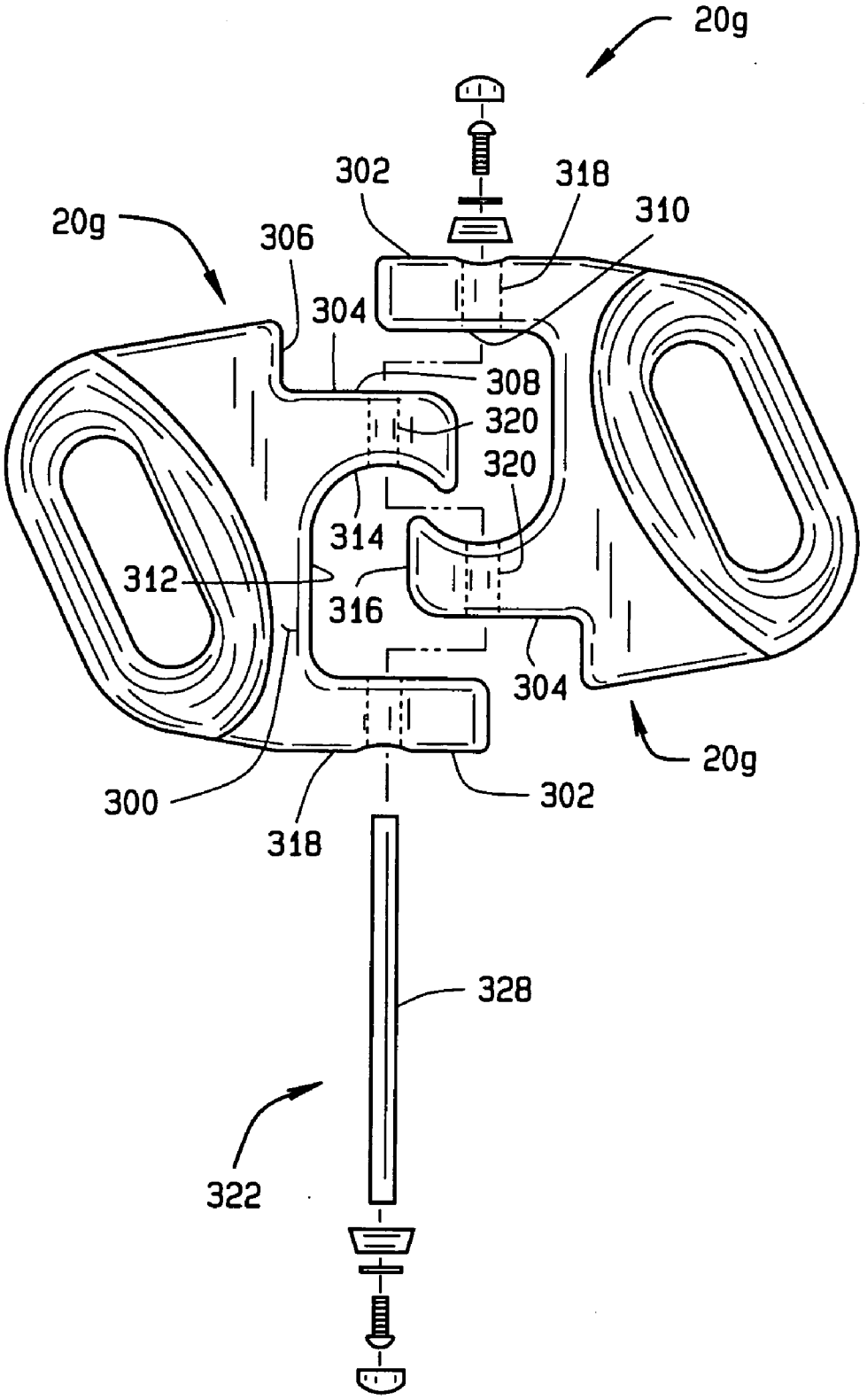
202
242
258a
246
244
256
258b
252
238
250

FIG. 20


20g
302
318
310
20g
306
304
308
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320
314
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316
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20g
300
302
318
328
322

FIG. 21

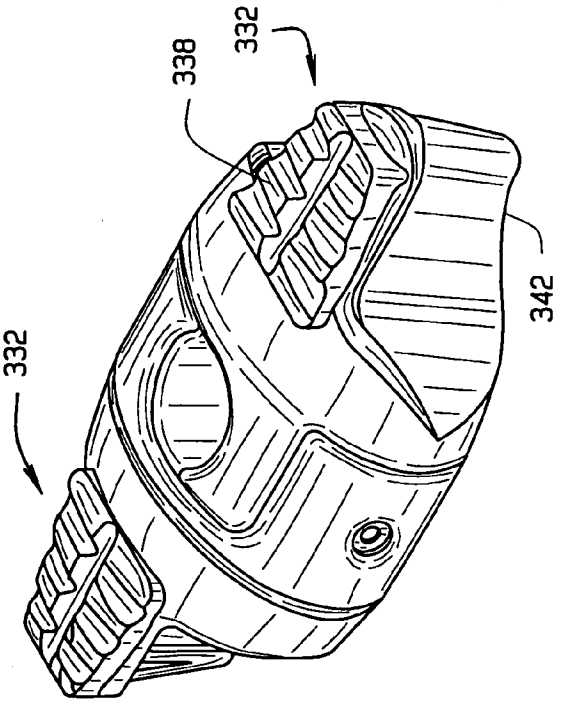

FIG. 22B

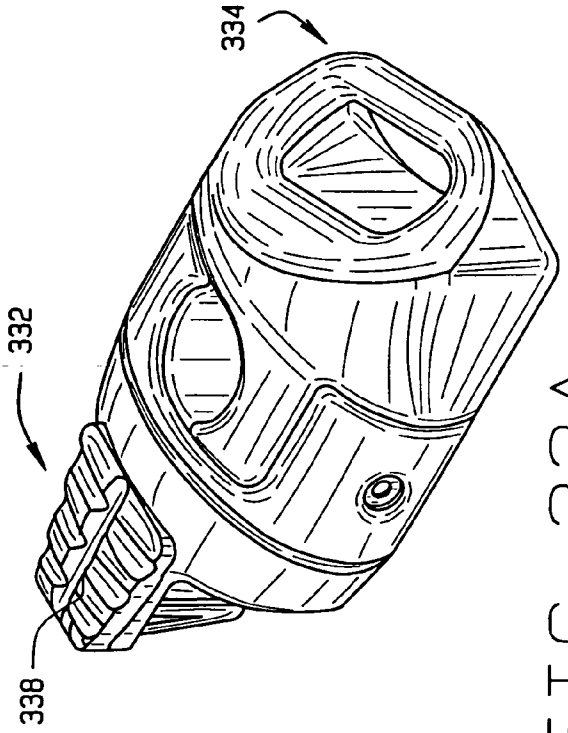

FIG. 22A

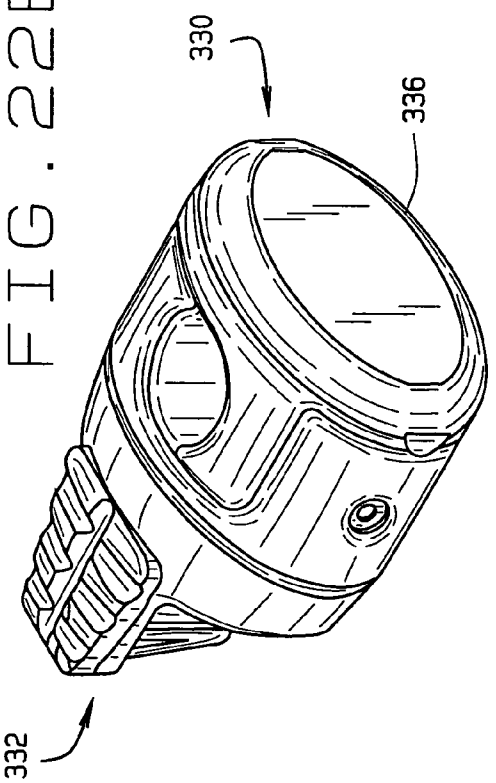

FIG. 22D

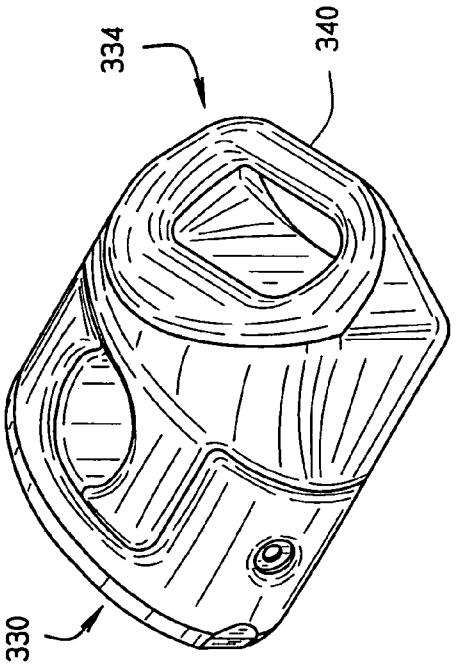

FIG. 22C

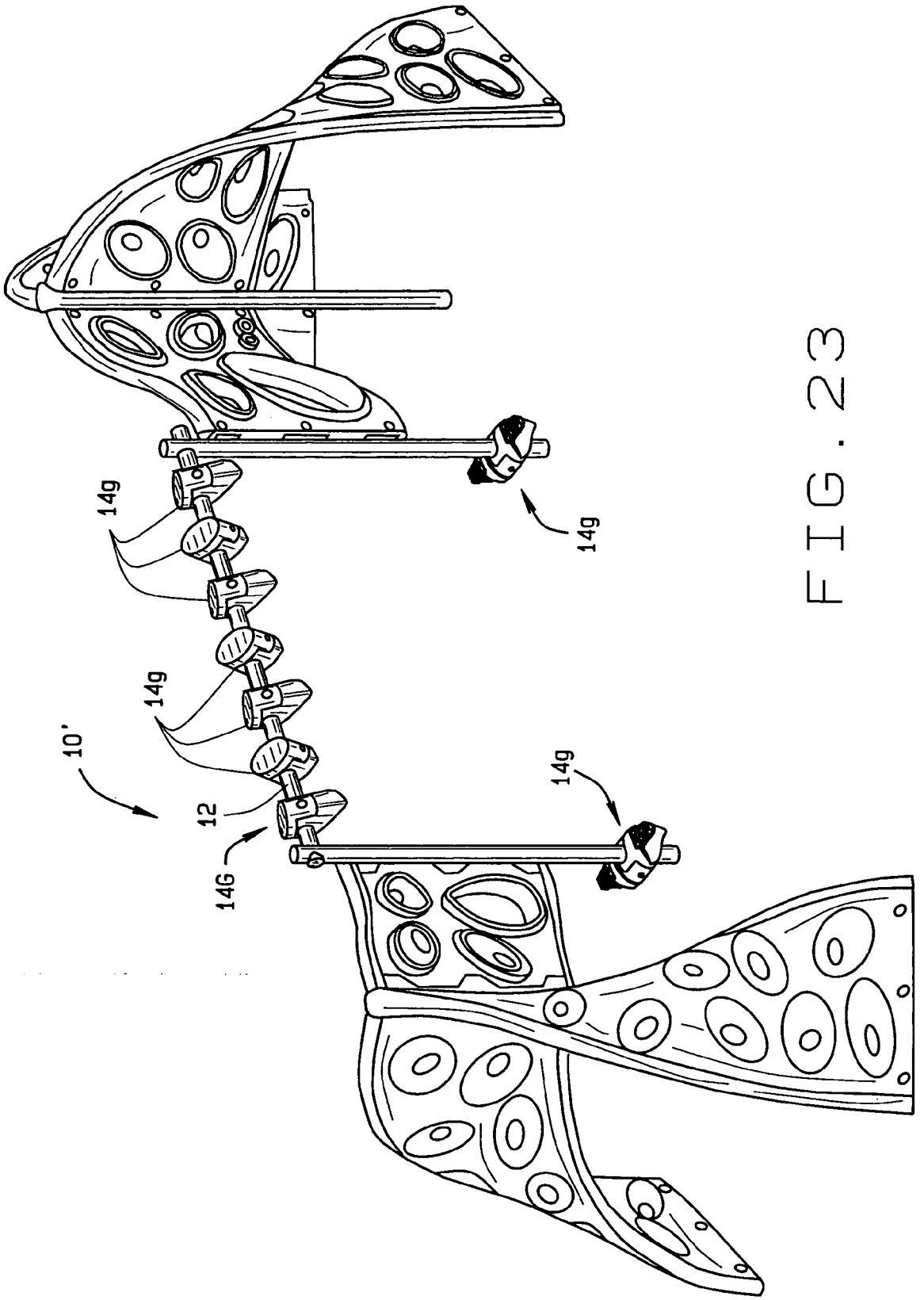

FIG. 23

PLAYGROUND CLIMBING STRUCTURE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority under 35 U.S.C. §119 to U.S. Provisional Application No. 60/632,110 filed Dec. 1, 2004 entitled "Playground Climbing Structure" and which is incorporated herein by reference.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

BACKGROUND OF THE INVENTION

[0003] This invention relates to playground equipment and, in particular, to a climbing structure for indoor or outdoor playgrounds.

[0004] Various types of climbing structures have long been a standard part of playgrounds. Such structures include "monkey bars", geodesic domes, poles, etc. Such structures are made from a determined set of pieces, and hence, the structure itself is limited in shape, generally, to a single structure. It would be desirable to provide a climbing structure which is made from interchangeable and matable parts to enable different climbing elements to be positioned along the climbing structure. This would enable the same parts or elements to be used to produce different climbing structures.

BRIEF SUMMARY OF THE INVENTION

[0005] A climbing structure of the present invention comprises a plurality of climbing units secured to a pole. The climbing units are made from a pair of interengageable member elements which are secured together. Each climbing member element comprises a body with a climbing element extending from the body. A climbing unit is formed by selecting two elements from a set of elements. Hence, many different climbing units can be formed from a set of a few climbing elements. The climbing elements can be varied along the pole such that, near ground level, the climbing elements comprise foot rests. Further up, the climbing elements can comprise steps or a combination of steps and handgrips. If the pole is arced, the climbing elements along the upper portion (or generally horizontal portion) of the pole, can comprise primarily handgrips. Additionally, the climbing units themselves can be assembled together and mounted to the pole using a variety of structures. They can, for example require a hole to be formed in the pole and can be placed at only discrete locations along the pole. Alternatively, they can rely on a clamping mechanism and can be placed at any desired position along the pole.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0006] **FIG. 1** is a perspective view of an illustrative embodiment of a climbing structure incorporating climbing units of the present invention;

[0007] FIGS. **2**A-F are perspective views of illustrative embodiments of different climbing units which can be incorporated into the climbing structure of **FIG. 1**;

[0008] FIGS. **3**A-C are perspective views of the interchangeable and interengageable members from which the climbing elements of FIGS. **2**A-F are made;

[0009] **FIG. 4** is an exploded view of a first illustrative embodiment of a climbing unit of the present invention;

[0010] **FIG. 5** is a line drawing of the assembly system of **FIG. 4**;

[0011] **FIG. 6** is an exploded perspective view of a second illustrative embodiment of a climbing unit of the present invention;

[0012] **FIGS. 7A** and B show the members of the climbing unit of **FIG. 6** assembled to a pole in two alternative positions;

[0013] **FIG. 8** is an exploded perspective view of a third illustrative embodiment of a climbing unit of the present invention;

[0014] **FIGS. 9A** and B show the members of the climbing unit of **FIG. 8** assembled to a pole in two alternative positions;

[0015] **FIG. 10** is an exploded perspective view of a fourth illustrative embodiment of a climbing unit of the present invention;

[0016] **FIGS. 11A** and B show the members of the climbing unit **FIG. 10** assembled to a pole in two alternative positions;

[0017] **FIG. 12** is an exploded perspective view of a fifth illustrative embodiment of a climbing unit of the present invention;

[0018] **FIGS. 13A** and B show the members of the climbing unit of **FIG. 12** assembled to a pole in two alternative positions;

[0019] **FIG. 14** is an exploded perspective view of a sixth illustrative embodiment of a climbing unit of the present invention;

[0020] **FIG. 15** is a perspective view of the climbing unit of **FIG. 14** when assembled;

[0021] **FIG. 16** is a line drawing of the climbing unit of **FIG. 14**;

[0022] **FIG. 17** is an enlarged perspective view of a clamp assembly for holding the climbing unit of **FIG. 14** to a pole;

[0023] **FIG. 18** is an exploded view of a seventh illustrative embodiment of a climbing unit of the present invention;

[0024] **FIG. 19** is a cross-sectional view of the climbing unit of **FIG. 18**;

[0025] **FIG. 20** is an enlarged perspective view of a clamp assembly for holding the climbing unit of **FIG. 18** to a pole;

[0026] **FIG. 21** is an exploded perspective view of an eighth illustrative embodiment of a climbing unit of the present invention;

[0027] FIGS. **22**A-D show the different matable elements of the climbing unit of **FIG. 21** to form different climbing unit combinations; and

[0028] **FIG. 23** is a perspective view of an illustrative playground structure incorporating the climbing units of **FIGS. 21-22D**.

[0029] Corresponding reference numerals will be used throughout the several figures of the drawings.

DETAILED DESCRIPTION OF THE INVENTION

[0030] The following detailed description illustrates the invention by way of example and not by way of limitation. This description will clearly enable one skilled in the art to make and use the invention, and describes several embodiments, adaptations, variations, alternatives and uses of the invention, including what I presently believe is the best mode of carrying out the invention. Additionally, it is to be understood that the invention is not limited in its application to the details of construction and the arrangements of components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting.

[0031] An illustrative embodiment of a playground climbing structure **10** incorporating climbing units of the present invention is shown generally in **FIG. 1**. The climbing structure **10** includes a pole **12** to which climbing units C are mounted. The pole **12** is shown to have its opposite ends at ground level, and with an upper concave bend and a lower convex second bend. The pole **12**, however, can take any desired configuration. Further, the opposite ends of the pole can both be embedded in the ground (as shown in **FIG. 1**), the pole can have a bottom end and an upper end, or the pole **12** can have its opposite ends supported between two supporting structures.

[0032] The climbing units C, as seen more clearly in FIGS. **2**A-F, can take different forms, and can include stepping units, platform units, and grasping elements. The climbing units C are each comprised of two members chosen from a group of interchangeable and interengagable members. The climbing unit members each include a body B from which a climbing element E extends. The climbing member bodies, as will be described below, are connected together about the pole **12** to be secured to the pole **12**. As seen in FIGS. **2**A-F and FIGS. **3**A-C, there are three basic climbing elements—(1) a ridge E**1**; (2) a step E**2**; and (3) a hand grip or hand hold E**3**. The step and hand grip can be configured to extend from the member body such that its major plane is generally parallel to or perpendicular to the axis of the pole. The ridge can be formed to be generally perpendicular to the axis of the pole or to extend diagonally relative to the axis of the pole. The climbing unit members can be paired together to form different overall climbing elements for the playground structure **10**. For example, a step member can be paired with a ridge member, a hand grip member or another step member; a horizontal hand grip member can be paired with a vertical hand grip member; a vertical hand grip member can be paired with a horizontal step member; etc. With five distinct members, thirty-two (32) different climbing units can be formed; with six distinct members, sixty-four (64) different climbing units can be formed.

[0033] A first illustrative climbing unit **14** is shown in **FIGS. 4-5**. The climbing units are formed from two members or elements (shown in FIGS. **3**A-C), as noted above, and each member comprises a body **20** having an outer surface **22** defining top and bottom surfaces **22***a*, a front side **22***c* and a back side **22***d*. The body outer surface **22** is basically semispherical in shape. However, the outer portion is truncated at its top and bottom **22***a*. Additionally, a semicircular notch **24** is formed in the outer surface back side **22***d*. The notch **24** is surrounded by a semicircular wall **26**. The inner surface **28** of the body is shaped to complementarily to the shape of the pole **12**. Poles for climbing structures are generally cylindrical; hence, the body inner surface **28** is shown to define one-half of a cylindrical tube **29**. However, the pole and body inner surface could have other shapes—the pole could be square, triangular, etc. and the surface **28** would then define one-half of this geometric shape.

[0034] At the front **22***c* of the body, the inner surface **28** is flattened to define a generally semicircular platform **30**. The platform **30** is surrounded by a step **32**. The platform **30** and step **32** are shaped to correspond in shape to the notch **24** and wall **26**. As best seen in **FIGS. 4 and 5**, the platform **30** of one member is received in the notch **26** of a second member. The bodies **20** of the two members are shaped such that the surfaces of the two members at the junction between the two members are flush with each other. This forms a substantially smooth surface, as seen in FIGS. **2**A-E. As seen in FIGS. **2**A-E, when two members are connected together, the bodies **20** form a generally circular assembly from which climbing structures **40** (E**1**-E**3**) extend.

[0035] The body **20** includes opposed and aligned holes **50** in its front and back surfaces. The opening **50** at the front surface **22***c* is counterbored at the outer surface, as at **51**. A hole is also formed in the pole **12** about which the members are to be connected to form the climbing unit **14**. To assemble the climbing unit **14** about the pole **12**, the two selected members are positioned on the pole in a mated configuration, as seen in **FIG. 5**, with the platform **30** of one member received in the notch **26** of the other member. In this position, the openings **50** of the two members are aligned with each other and with the opening in the pole. When placed together, the inner surfaces **28** of the two members form an opening corresponding in shape to the shape of the pole. As shown, the inner surfaces **28** of the two members form a circle or cylinder **29** having a diameter corresponding in size to the diameter of the pole about which the unit **14** is to be assembled. Although shown as cylindrical, the pole **12** and the member inner surface could be in other geometric shapes.

[0036] To mount the unit **14** to the pole, a shaft **52** is passed through the member openings **50** and through the pole opening. The shaft **52** is sized such that its opposite ends extend into, but not beyond, the openings **50** in the opposite side of the combined unit **14**, as seen in **FIG. 5**. The opposite ends of the shaft **52** are threaded, and securing members **54** are threaded onto the ends of the shaft **52**. The connecting members **54** each include an internally threaded tube **54***a* which is received about the threaded end of the shaft **52** and a head **54***b*. The connector head **54***b* has a pocket to receive a driver, such as a screwdriver head, the end of an allen wrench, etc. The shaft could be headed at one end (such as in the shape of a traditional bolt) to eliminate

the need for one of the connecting members **54**. Alternatively, one or both of the connecting members could be replaced with a bolt. Further, one of the body openings **50** could be internally threaded to threadingly receive the shaft **52**, again, eliminating the need for one or both of the connecting members **54**.

[**0037**] Prior to threading the connector onto the shaft, a first cap part **56** is received in the counterbored section **51** of the opening **50**. This cap first part includes a central opening sized to receive (and hide) the connector head **54***b*. A cap second part **58** is received on the cap first part to cover the connector head **54***b*. The cap first and second parts **56** and **58**, when combined form a cap or button **60**, as seen in **FIG. 5**, which extends slightly from the surface of the climbing unit bodies **20**. The cap **60** covers the connector head **54***b*, thereby protecting the cover from the elements. In addition, the cap **60** will form an aesthetically pleasing cover to the openings **50** and will hide the connector from view.

[**0038**] A second illustrative embodiment of the climbing unit is shown in **FIG. 6**. The climbing unite **14***a* is shown mounted to a pole **12** in two different configurations in **FIGS. 7A and 7B**. The climbing unit **14***a* is comprised of two members which have mating or interengageable bodies **20***a* from which the climbing elements extend. The bodies **20***a* each define one-half of a geometric shape. In the drawings, the bodies are shown to be semispherical, but could be any desired shape. The bodies **20***a* have an end surface **70** in which four semicircular openings **72** are formed. The openings are formed as two pair of opposed openings, and are spaced about 90° apart. Hence, a first pair of openings defines top and bottom openings and the second pair of the openings defines front and back (or side) openings. The four openings **72** define four abutment surfaces **74** between the openings **72** at the end surface **70**. Pegs **76** are formed in the abutment surfaces **74** of one of the bodies **20***a* and peg receiving holes (not shown) are formed in the abutment surfaces **74** of the other of the bodies **20***a*. The peg receiving holes are shaped complimentary to the pegs and are sized to receive the pegs. As can be appreciated, when the two members are joined together, the pegs **76** of one member are received in the peg receiving holes **78** of the other.

[**0039**] Collars **80** extend generally upwardly (or generally outwardly) around the periphery of each of the openings **72**. The bodies **20***a* are flattened, as at **82**, around the collars **80** to form a shoulder **83** at the base of the collar. When the two units are adjacent each other, the collars **80** around each hole **72** will define four circular collars—one pair of the collars will be upper and lower collars which surround the pole **12**, and the other pair of collars will define front and back collars.

[**0040**] Rings **84** surround the upper and lower collars. The rings **84** are comprised of ring halves **86**. The ring halves have generally flat end surfaces **87** and are generally C-shaped in top plan and generally L-shaped in vertical cross-section, as seen in **FIG. 6B**, to define a curved inner surface **88***a* and a seat **88***b* along the inner surface of the ring halves. The surface **88***a* is sized to surround the collar **80** and the seat **88***b* is sized to sit adjacent the axial outer surface (i.e., the top or bottom) of the collar **80**. The collar halves are provided with holes **90** which extend generally perpendicularly from the end surface **87** through to the outer surface of the ring halves **86**. Counter-bores **92** are formed about a portion of the holes **90** to facilitate connection of the two ring halves together. When the two ring halves are in abutting relationship, the holes **90** of the two ring halves will be in alignment with each other.

[**0041**] Fasteners are received in the holes **90** to secure the two ring halves together. The fasteners can comprise a bolt **94** having a threaded shaft which is received in an internally threaded tube **96**. The bolt **94** and threaded tube **96** each have heads which bear against the bottom surface of the counter bore **92**. As noted above with the climbing unit **14**, the fasteners can be replaced with different types of fastening combinations. The body collars **80** and the rings **84** are sized such that when the body **20***a* is assembled about the pole **12**, the body **20***a* will frictionally grip the pole.

[**0042**] The assembly of the two members M together to form a unit will leave the side openings **72** opened—the top and bottom openings will surround the pole **12**. Plates **98** are provided to close the side openings. The openings **72** are each provided with a groove **100** along the inner surfaces of the collars **80**. The grooves **100** of adjacent collars define a circular groove, and the plates **98** are sized and shaped to be received in the groove. Hence, the plates will be retained in the groove in the assembled unit **14***a*.

[**0043**] The bodies **20***a* of the members M of the unit **14***a* can be joined together in different orientations—in 90° increments. Hence, for example, the right member M (with reference to **FIG. 6**) can be rotated 90° about a horizontal axis, so that the climbing element of the right member M would be generally horizontal, rather than generally vertical (again with reference to **FIG. 6**). This is shown in **FIGS. 7A and 7B** wherein the left climbing element is shown generally horizontal (**FIG. 7A**) and generally vertical (**FIG. 7B**) while the right climbing element remains generally vertical. To facilitate the ability to rotate that units relative to each other in this manner, the inner surface **29***a* of the body **20** is provided with two semicircular surfaces. One of the semicircular surfaces extend between one pair of the openings **72** and the other semi-circular surface extends between the other pair of openings. Hence, the assembled unit **14***a* will define two tubes which intersect at 90° when the unit **14***a* is assembled.

[**0044**] A third illustrative embodiment of the climbing unit is shown in **FIG. 8** mounted. The climbing unit **14***b* of **FIG. 8** is generally similar to the climbing unit **14***a* of **FIG. 6**. However, the collars of the climbing unit **14***a* are omitted from the climbing unit **14***b*. Rather, the climbing unit **14***b* is mounted to the pole **12** by means of a shaft **110** which extends through an opening **112** in the pole **12** and openings **114** in the climbing unit members. The ends of the shaft **112** are threaded, and fasteners **116** comprising internally threaded tubes are screwed onto the ends of the shaft. Hence, the climbing unit **14***b* is secured to the pole **12** substantially in the same manner as the climbing unit **14** (**FIGS. 4 and 5**). Because the member bodies **20***b* for the climbing unit **14***b* are substantially similar to the bodies **20***a* for the climbing unit **14***a*, each member can be secured or mounted to the pole **12** with its climbing element either generally horizontal or generally vertical, as shown in **FIGS. 9A and 9B** and as discussed above in conjunction with the unit **14***a*.

[**0045**] A fourth mounting method is shown in **FIG. 10**. The climbing unit **14***c* of **FIG. 10** includes a body **20***c*,

which is generally similar to the body **20***b* of unit **14***b* (**FIG. 8**). To connect the member bodies **20***c* together, the bodies each include holes **120** which extend generally perpendicularly from the end surfaces **122** of the bodies through the body to the outer surface of the body. The body is cut-away, as at **124**, around the opening **120** to define a floor **126**. Fasteners **126** extend through the holes **120** to connect the two bodies together. The fasteners can comprise an internally threaded tube **126***a* which receives a bolt, screw, or the like **126***b*.

[**0046**] To mount the unit **14***c* to the pole, a shaft **128** is passed through an opening **130** in the pole **12**, such that the shaft **128** extends from opposite sides of the pole. The climbing unit bodies **20***c* have passages **132** extending outwardly from the bodies' inner surfaces sized to receive the shaft **128**. The passages **132** do not extend through the bodies **20***c*. Hence, as can be appreciated, the shafts **128** support and position the climbing unit **14***c* on the pole **12**, and the fasteners **126** maintain the two halves of the climbing unit together.

[**0047**] The climbing unit **14***c*, like the climbing units **14***b* and **14***a*, have an inner surface **29***c* which defines intersecting cylinders, such that the climbing unit bodies can be positioned with their climbing elements positioned either generally horizontally (as seen in **FIG. 11A**) or generally vertically (as seen in **FIG. 11B**).

[**0048**] A fifth mounting/assembly method is shown in **FIG. 12**. Here, the climbing unit **14***d* comprises a pair of members each of which includes a body **20***d* from which a desired climbing element extends. The body **20***d* is substantially similar to the body **20***a* (**FIG. 6**), and thus will not be described further. The bodies **20***d* are held together by connecting members **140**. The connecting members **140** each comprise an upper and a lower ring segment **142** having an inner surface and an outer surface. A groove **144** is formed on the inner surface of the ring segments **142** and is sized and shaped to fit over or receive the lip **146** of the collars **148** of the bodies **20***d*. The outer surfaces of the ring segments are curved, and the curvature of the outer surface corresponds substantially to the curvature of the outer surface of the bodies **20***d*.

[**0049**] The upper and lower ring segments are connected to a mounting portion **150**. The mounting portion **150** comprises a base **152** and a post **154** extending inwardly from the base **152**. The base **152** defines a segment or cap of a sphere having a curvature which conforms to the curvature of the bodies **20**. Hence, as seen in **FIGS. 13A and 13B**, the mounting portion **150** and ring segments **142**, in combination with the bodies **20***d* generally define a sphere which surrounds the pole **12**. The mounting portion post **154** is sized to extend through the hole defined by the body opening **156** when the two members are adjacent each other. The post **154** is shown to include a generally sloped side wall **158** which leads to an end surface **160**. The post is sized such that its end wall **160** is substantially adjacent the pole **12** when the unit **14***d* is assembled and mounted to the pole **12**. The end surface **160** is concave, as seen, and has a curvature which corresponds generally to the curvature of the pole **12**. The post **160** is hollow to define a cup **162**. A hole **164** is formed in the base of the cup (i.e., the post end surface **160**).

[**0050**] To assemble the unit **14***d* about the pole **12**, the bodies **20***d* are positioned against the pole **12** in a desired orientation with the pegs of one body received in the peg holes of the other (see the description of unit **14***a*, **FIG. 6**). The connecting members **140** are then positioned on the bodies **20***d*, with their post bases adjacent the pole. The pole **12** has a hole **166** extending horizontally therethrough. The unit **14***d* is positioned on the pole **12** such that the post holes **164** are aligned with the pole hole **166**. A fastener is then passed through the post holes **164** and the pole hole **166** to both mount the unit **14***d* to the pole **12** and to hold the members of the unit **14***d* together. Because the posts **154** define cups **162**, the fasteners need only have a length slightly greater than the sum of the pole outer diameter and the width of the post bases.

[**0051**] The climbing units **14** and **14***b*-**14***d* all include a shaft, fastener, etc. which extends through the post. Although the climbing unit **14***a* is not described to include a shaft which would extend through the post, the climbing unit **14***a* could be provided with such a shaft. A shaft for the climbing unit **14***a* would be similar to the shaft used in the climbing unit **14***c*. Hence, to assemble the climbing units **14** and **14***b*-**14***d* and secure them to the pole, holes must be formed in the poles when the poles are produced or at the site during construction/assembly of the climbing structure **10**. As described above, in some of the embodiments (i.e., the embodiments of **FIGS. 4, 8**, and **12**), the fasteners which hold the unit bodies together also hold the unit to the pole. In other embodiments (i.e., the embodiments of **FIGS. 6 and 10**), the elements or structure which hold the two members of the climbing unit together are separate from the structure or elements which maintain the position of the climbing unit on the pole.

[**0052**] In **FIGS. 14-20**, two additional embodiments of the climbing unit are shown which do not rely on shafts extending through the pole into the climbing units to maintain the climbing unit in a desired position on the pole. Rather, the climbing units of **FIGS. 14-20** include a clamp assembly which maintains the climbing unit at a desired position on the pole. Hence, the climbing units of **FIGS. 14-20** can be positioned at any desired position along the pole, and holes need not be formed in the pole.

[**0053**] Turning to **FIGS. 14-17**, a climbing unit **14***e* is comprised of two members having identical bodies **20***e* and climbing elements E extending from the bodies **20***e*. The bodies **20***e* each have an outer surface shaped to form a desired geometric shape when the two bodies are connected to form the unit **14***e*. As shown in **FIGS. 14-16**, the bodies **20***e* combine to form a generally spherical base from which the climbing elements E extend. Hence, the outer surfaces of the bodies **20***e* each define a portion of a sphere. The bodies **20***e* could be combined to form other geometric shapes, if desired.

[**0054**] The bodies **20***e* include generally flat end surfaces **180** and **182** which are separated by a channel **184**. A groove **185** is formed in the channel **184**. A shoulder **186** extends about the circumference of the end surface **180** and a lip **188** extends about the circumference of the end surface **182**. A hole **190** extends from the outer surface of the body **20***e* to the surface **180**. The hole **190** is generally perpendicular to the surface **180**. A small counterbore **192** surrounds the hole **190** at the outer surface of the body **20***e*. The surfaces **180** and **182** are preferably not co-planar, and hence, do not lie on a diameter of the body **20***e*. Rather, the surfaces **180** and

182 each define planes which are generally perpendicular to the axis of the channel 184, are generally parallel to each other, and are spaced apart from each other.

[0055] A clamp 194 (shown in more detail in FIG. 17) is positioned between the bodies 20*e* to secure the unit bodies together and to position the unit 14*e* on the pole. The clamp 194 is comprised of two identical portions 196 which are made from, for example, a spring metal. The clamping elements 196 have a central web 197 which is shaped to be received in and to fit against the surface of the channel groove 185. Thus, the web 197 has a curved section 197*a* and a generally straight section 197*b* continuing from an end of the curved section. The curved section 197*a* defines an arc of about 90° and has a curvature corresponding to the curvature of the body channel 184, so that the curved section can be received in the body channel 184. Perforations 199 are formed in rows which extend across the width of the web near the ends of the curved section 197*a* (i.e., near the junction of the curved and straight web section and near the free end of the curved section). A flange 198 extends from the free end of the web straight section 197*b* and is generally perpendicular thereto. The flange 198 has a width at its base approximately equal to the width of the web 197. A slot 200 is formed at the junction of the web 197 and the flange 198 and is generally centered between the opposite sides of the member 196. An opening 202 is formed in an outer surface of the flange 198 near the end thereof. A hollow, internally threaded post 204 extends from the opposite surface of the flange 198 in alignment with the hole 202. A finger 206 narrower than the flange 198 extends from the free end of the curved potion 197*a* of the web 197. The finger 206 is generally parallel to the flange 198 and extends in the opposite direction of the flange 198. The finger 206 is sized to be able to pass through the slot 200 formed at the junction of the web 197 and the flange 198. A cup 208 is formed near the end of the finger 208.

[0056] In use, the clamp members 196 are positioned about a pole with the fingers 206 of each member passed through the slots 200 of the opposite members. The clamp members 196 are sized such that when positioned about a pole, the cup 208 of the finger 206 of one clamp member will be aligned with the post 204 of the flange 198 of the opposite or opposing clamp member, and with the cup 208 opening into the post 204, as seen in FIG. 17. After the clamp members 196 have been positioned about the pole, the bodies 20*e* of the unit 14*e* can be positioned about the clamp members 196 such that the clamp webs 197 are received in the channel grooves 185. Hence, the channel grooves 185 will facilitate positioning of the bodies with respect to the clamp members. The bodies 20*e* are further positioned such that their surfaces 180 are adjacent the flanges 198 of the clamp members 196. The flanges 198 and fingers 206 are sized such that the opening 202, post 204, and cap 208 are aligned with the body hole 190, as seen in FIG. 16. Bolts 210 are passed through the body holes 190 to engage the internally threaded posts 204. As the bolt 210 passes through the posts 204, the bolt will, by the action of the mating threads of the posts 204 and the bolt, pull the flange 198 of a first clamp member toward the surface 180 of a first unit body. At the same time, the bolt will urge the finger 206 of the second clamp member towards the surface 182 of the second unit body. Hence, the bolts will effectively urge the finger and flange between adjacent surfaces 180 and 182 of the two bodies 20*e* apart. This action will tend to cause the curved section of the web of the two clamp members 196 to tighten about the pole, thereby clamping the members about the pole.

[0057] Thus, the clamping members 196, due to their interconnection as described above and shown particularly in FIG. 17, will serve to maintain the two climbing unit bodies 20*e* together. In addition, the clamp members will grip the pole 12 to secure the climbing element 14*e* in a desired position on the pole.

[0058] A further embodiment of the climbing unit utilizing a second clamping mechanism is shown in FIGS. 18-20. In this embodiment, the member bodies 20*f* of the climbing unit 14*f* have each parallel end surfaces 220 and 222 separated by a central channel 224. When the member bodies 20*f* are adjacent each other, as seen in FIG. 19, the channels 224 have a diameter slightly larger than the outer diameter of the pole. The surfaces 220 and 222 are tangential to the channel 224 and intersect the channel approximately 180° apart. A cut-out 226 is formed between the opposite sides of the channel 224. The cutout has opposing end walls, a first side wall 228 which is generally coplanar with the body surface 220, a floor 230 and a second side wall 232. The floor 230 is spaced from the channel 224 and is shown to form an angle of about 110° to about 120° with the first side wall 228. The floor 230 and the second side wall 232, on the other hand, form an angle of approximately 90°. Thus, the side walls 228 and 232 are not parallel to each other. Rather, the two side walls subtend an angle of about 20° to about 30°. A hole 234 extends from the member body outer surface to the surface 220. The hole 234 is counter-bored, as at 235, at the outer surface of the body 20*f*. A second hole 236 extends from the surface 222 and opens into the end wall 232 of the cutout 226. When the two members 20*f* of the climbing unit 14*f* are assembled together, the hole 234 of one member is aligned with the hole 236 of the other member, as seen in FIG. 19. At least one of, and preferably both of, the holes 234 and 236 are internally threaded to receive a bolt 238.

[0059] The climbing unit member bodies 20*f* are held together and to the pole by means of a clamp 240. The clamp 240 is comprised of two identical clamp members 242 which interconnect to hold the two members 20*f* of the climbing unit 20 together and maintain the climbing unit at a desired position along the pole of the climbing structure. One clamp member is received in the cutout 226 of each climbing unit member 20*f*. The clamp members each include a back wall 244 having a width and a length enabling the clamp back wall to be received in the cutout 226 adjacent the cutout floor 230. A clamp end wall 246 extends from one end of the clamp back wall 244 at an angle of approximately 90°. The end wall is sized and shaped to be received against the cutout surface 232, and has a length approximately equal to the body surface 232. A hole 248 is formed in the end wall 246 approximately mid-way between the sides of the wall 246 and spaced slightly from the junction between the walls 244 and 246. A finger 250 extends from the opposite end of the clamp member back wall 244. The finger 250 is narrower than the back wall, and is generally centered relative to the back wall. The finger 250 forms an angle with the back wall of about 110° to about 120° so that the finger will be received against the surface 228 of the cutout 226 when the member is placed in the cutout. The finger 250 has a hole 252 formed near the free end thereof, and has a length, such

that the finger hole **252** will be generally aligned with the body hole **234** when the clamping member is placed in the unit member cutout **226**. Lastly, the clamping member includes a pair of opposed side walls **256** which extend from the sides of the back wall **244** at an angle of approximately 90°. The side walls **256** are connected only to the back wall **244**. They do not connect with the end wall **246** or the finger **250**. The walls **256** have edges **258***a,b* which are parallel to and generally co-planar with, the finger **250** and the end wall **246**, respectively. The side wall edge **258***a* has a length less than the length of the finger **250**, and the side wall edge **258***b* has a length approximately equal to the length of the end wall **246**. Arced cutouts **260** are formed in the edges of the side walls **256** opposite the junction between the side walls and the base wall **244**. The cutouts **260** are provided with a plurality of teeth **262**. The arced cutouts **260** preferably subtend an angle of greater than 180°, but could subtend an angle of 180° if desired.

[**0060**] As seen in **FIG. 20**, when the two clamping members **242** are adjacent each other, one clamping member **242** is inverted with respect to the other. The side walls **256** of the two clamping members overlap, such that the arced cutouts **260** define a circle sized to fit around the climbing structure pole **12**. Additionally, the finger **250** extends over the wall **246** such that the finger hole **252** is generally aligned with the wall hole **246**. Additionally, the wall **246** will contact or nearly contact the finger **250**.

[**0061**] To assemble the climbing unit **14***f* and to mount it to a climbing structure pole, the clamping units **242** are initially placed in the cutouts **226** of the climbing unit members **20***f*. The climbing unit members are then positioned about a pole in the orientation shown in **FIG. 19**. In this position, the surface **220** of one climbing unit member is adjacent the surface **222** of the other climbing unit. Additionally, the clamp member finger **250** is sandwiched between the surfaces **220** and **222**. The bolts **238** are then threaded into the bolt holes **234** and **236**. The bolt holes **234** and **236** are not perpendicular to the surfaces **220** and **222**. Rather, they define angles γ of between about 110° and about 120° with the surface **220**. This angle of the bolt holes **234** and **236** relative to the surfaces **220** and **222** cause the unit member bodies **20***f* and the clamping members **246** to pull together as the bolts **238** are tightened. As this occurs, the teeth **262** of the clamping members **246** more tightly engage the pole to more tightly clamp around and grip the pole, thereby holding the climbing unit **14***f* in place relative to the pole.

[**0062**] A further embodiment of the climbing unit **14***g* is shown in **FIG. 21**, with variations of the climbing unit shown in FIGS. **22**A-D. **FIG. 23** shows the different climbing units on a playground structure. The climbing unit **14***g* is similar to the climbing units **14**-**14***d*, in as much as it relies upon a shaft to mount the climbing unit to the pole **12**. However, as seen, the climbing unit **14***g*, when viewed in top plan (as seen in **FIG. 21**) is more rectangular in shape than the previously described embodiments. In end elevation, the climbing unit **14***g* is generally oval in shape. The climbing unit members each comprise complementarily shaped bodies **20***g*. The bodies **20***g* each include a base **300** and a pair of arms **302** and **304** extending from the base. The arm **302** has an outer surface which is flush with and a continuation of the outer surface of the member body **20***g*. The arm **304**, however, is set in slightly from the outer surface of the body, to define a shoulder **306** on the body on a side of the body opposite the arm **302**. The arm **304** has a flat outer surface **308** and the arm **302** has a flat inner surface **310**. Additionally, the arm **302** has a width approximately equal to the width of the shoulder **306** and a length generally equal to the length of the arm **304**. Hence, the arm **302** is received in the shoulder **306** as best seen in FIGS. **22**A-D.

[**0063**] The surface defined by the inner surface **310** of the arm **302** is generally flat. The inner surface **312** of the base **300** and the inner surface **314** of the arm **304** define a "J"-shaped surface, with the inner surface of the arm **304** forming the "hook" of the "J". The end surface **316** of the arm **304** is flat and butts against the flat surface **312** of the body base **300**. As seen in FIGS. **22**A-D, when the two members of the climbing unit **14***g* are assembled together, the curved inner surfaces **314** of the opposed arms **304** of the two members **20***g* are opposite each other and define a cylinder sized and shaped to fit around the pole **12**. Although the unit **14***g* is shown to form a circle which will surround the pole, as can be appreciated, and as described above, the inner surfaces of the arms **304** could define other polygonal shapes which would correspond to the shape of the pole **12**.

[**0064**] The members **20***g* include a passage **318** in their arms **302** and a passage **320** in the arms **304**. When the bodies **20***g* are positioned adjacent each other, the passages **318** and **320** of the arms are aligned. A fastener **322** comprising a shaft **324** extends through the passages to connect the two bodies **20***g* of the unit **14***g* together. The fastener **322** is identical to the fastener described above in connection with the climbing unit **14** (**FIG. 4**), and thus will not be described in further detail. The fastener shaft **324** can extend through a passage in the pole **12** to prevent the climbing unit **14***g* from moving axially along the pole.

[**0065**] The climbing unit members **20***g* can be provided in three basic forms as seen in FIGS. **22**A-D. They can be provided as a blank member **330**, as a foot or step member **332** or as a hand grip member **334**. The blank member **330** has a flat end surface **336** as best seen in **FIG. 22D**; the foot or step member **332** is provided with a tread surface **338** which extends from the member base **300**; and the hand hold grip member **334** forms a grip extending from the base **300**. As best seen in **FIG. 22B**, the tread surface **338** is textured to reduce slippage, is generally at the top of the body **20***g*, and is supported by a vertical wall **342**. As seen in FIGS. **22**A-D, the three types of members can be connected together in any combination. Hence, a hand grip member can be combined with a hand grip member, a step member or a blank; a step grip member can be combined with a hand grip member, a step member or a blank; and a blank member can be combined with a hand grip member or a step member. It is unlikely that two blank members would be connected together. Although this is possible as well.

[**0066**] Turning to **FIG. 23**, a playground structure **10'** is shown with the pole **12** being supported by two spaced apart support poles. The pole **12** is shown to be provided with climbing units **14***g* comprised of a blank member and a handgrip member. Additional climbing units **14***g* are shown at the base of the support poles comprised of two foot or step members. Additional climbing panels are mounted to the support poles.

[**0067**] As can be appreciated from the foregoing, the present invention provides for a climbing structure having a

plurality of climbing units made from interengageable members having different climbing elements. Hence, many different climbing units can be formed from a set of a few climbing elements. The climbing elements can be varied along the pole **12**, as seen in **FIG. 1**, such that, near ground level, the climbing elements comprise ridges or foot rests. Further up, the climbing elements can comprise steps or a combination of steps and handgrips. If the pole is arced, as shown in **FIG. 1**, then, along the upper portion (or generally horizontal portion) of the pole, the climbing elements can comprise primarily handgrips. Additionally, as can be seen from the foregoing, the climbing units themselves can be assembled together and mounted to the pole using a variety of structures. Some of the embodiments require a hole to be formed in the pole and can be placed at only discrete locations along the pole. Other embodiments rely on a clamping mechanism and can be placed at any desired position along the pole.

[**0068**] As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. Although three basic climbing elements are shown (e.g., a ledge, a step, and a handgrip) numerous other types of climbing elements can be provided. Additionally, the climbing elements can be provided in different forms or shapes. The bodies of the climbing unit members are shown to form a generally spherical body when connected. However, the bodies could combine to form any other desired shape. These examples are merely illustrative.

1. A climbing structure comprising a plurality of climbing units securable to a pole; the climbing units being formed from two mating and interengagable climbing unit members chosen from a set of climbing unit members; each climbing unit member comprising a body and a climbing element extending from the body; the climbing unit additionally comprising a mounting member to axially fix the two climbing unit relative to the pole and a fastener to secure said members together; whereby many different climbing units can be formed from a set of a few climbing unit members.

2. The climbing structure of claim 1 wherein said mounting member comprises a rod which extends through said pole and at least partially through said two climbing unit members.

3. The climbing structure of claim 2 said member bodies have an outer surface defining top and bottom surfaces, a front side and a back side; a notch formed in the outer surface back side; said inner surface being flattened at the body front to define a generally semicircular platform; said platform being sized and shaped to be received in said notch; whereby the platform of one body member is received in the notch of the other body member.

4. The climbing structure of claim 3 wherein said mounting member extends through said front and back surfaces of said member bodies; said fastener comprising an externally threaded member which is received in an internally threaded member, said fastener comprising said mounting member.

5. The climbing structure of claim 3 wherein at least a portion of said body inner surface is shaped to complementarily to the shape of the pole.

6. The climbing structure of claim 2 wherein said member bodies each comprise at least upper and lower cut-outs sized and shaped to define one portion of an opening which through which said pole can extend; said members each having opposed inner faces, the inner face of one member body abutting the inner face of the opposing member body in an assembled climbing unit.

7. The climbing structure of claim 6 wherein the body members include pegs and peg receiving holes on opposed inner faces; whereby, the pegs of one body member are received in the peg receiving holes of the opposed body member in an assembled climbing unit.

8. The climbing structure of claim 6 wherein said member bodies comprise a lip extending outwardly from said cut-out; said fastener comprising a ring assembly which engages said lips of said body members.

9. The climbing structure of claim 8 wherein said ring assembly is comprised of at least two pieces, said two pieces being connectable together to hold said member bodies together.

10. The climbing structure of claim 6 wherein said fastener comprises a rod which extends through said pole and through said body inner surface; said rod being connected to a threaded member adjacent said body climbing element.

11. The climbing structure of claim 6 wherein said fastener comprises a threaded member which extends through said opposed inner faces of said body members.

12. The climbing structure of claim 6 wherein said body comprises front and back cut-outs sized and shaped to define one portion of an opening which through which said pole can extend; whereby, said body can be mounted to said pole in two different orientations.

13. The climbing structure of claim 12 including a closure to close the cutouts of the body member through which the pole does not extend when the climbing unit is assembled about the pole.

14. The climbing structure of claim 13 wherein said bodies comprise a lip extending outwardly from said cut-outs and said fastener comprises a ring assembly which engages said lips; said ring assembly comprising a front potion and a back portion, said front and back portions each comprising an upper ring portion and a lower ring portion; said upper and lower ring potions being joined by said closure.

15. The climbing structure of claim 14 wherein said closure comprises a pedestal which extends inwardly toward said pole; said pedestal having an inner surface shaped complementarily to the shape of the pole; said mounting member comprising said shaft extending through said pedestal.

16. The climbing structure of claim 2 wherein said climbing unit body comprises a notch formed in one side surface thereof, said inner surface defining a generally flat surface which extends generally perpendicularly to an axis of said pole; said flat surface being sized and shaped to be received in said notch; and said inner surface further including a generally J-shaped surface comprising a first portion extending generally normal to said flat surface, and a curved portion; whereby, in an assembled unit, the curved surfaces of opposed members face each other to define a tube through which the pole extends.

17. The climbing unit of claim 16 wherein said mounting member comprises said fastening member; said fastening member rod extending through said mating surfaces of said body members.

18. The climbing structure of claim 1 wherein the climbing unit comprises an internal clamp which grips the climbing structure pole to secure the climbing unit to the pole; said clamp defining at least said fastening member.

19. The climbing structure of claim 18 wherein said member bodies include a channel formed in said inner surfaces to receive said clamp.

20. The climbing structure of claim 18 wherein said clamp comprises a pair of opposed clamp members; said clamp members each clamp member comprising a curved central web shaped to be received in the inner surface channel; a flange extending from one end of said web and a finger extending from the opposite end of said web; said clamp member further including an opening formed approximately at a junction of said flange and said web, a flange opening in said flange, and a cup on said finger; said finger being sized to extend through said opening, said cup being positioned on said finger to be generally aligned with said flange opening; said fastener further comprising a pair of threaded rods which extend through said climbing unit body members to pass through said flange opening and into said finger cup; whereby advancing said rods into said finger cups causes said clamp member to more tightly engage said pole.

21. The climbing structure of claim 18 wherein said clamp comprises a pair of clamp members; each clamp member comprising a back wall, a clamp end wall extending from one end of the clamp back wall and having a hole formed therein, a finger extending from an opposite end of the clamp member back wall and having a hole formed therein; said finger hole being generally aligned with the end wall hole, and opposed side walls extending from said back wall; said side walls comprising an inner edge shaped correspondingly to the shape of said pole; said finger having a length sufficient to be received between opposing surfaces of said climbing unit body members.

22. The climbing structure of claim 18 wherein said side wall inner edge is toothed.

23. A climbing unit of a playground structure; said climbing unit being comprised of two connected and mated climbing unit members; each climbing unit member comprising a body and a climbing element extending from the body; the climbing unit additionally comprising a mounting member to axially fix the two climbing unit relative to the pole and a fastener to secure said members together; whereby many different climbing units can be formed from a set of a few climbing unit members.

24. The climbing structure of claim 23 wherein said mounting member comprises a rod which extends at least partially through said two climbing unit members.

25. The climbing structure of claim 24 wherein said climbing unit body comprises a notch formed in one side surface thereof, said inner surface defining a generally flat surface which extends generally perpendicularly to an axis of said pole; said flat surface being sized and shaped to be received in said notch; and said inner surface further including a generally J-shaped surface comprising a first portion extending generally normal to said flat surface, and a curved portion; whereby, in an assembled unit, the curved surfaces of opposed members face each other to define a tube.

26. The climbing unit of claim 25 wherein said mounting member comprises said fastening member; said fastening member rod extending through said mating surfaces of said body members.

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