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(54) **CONSTRUCTION TOY**

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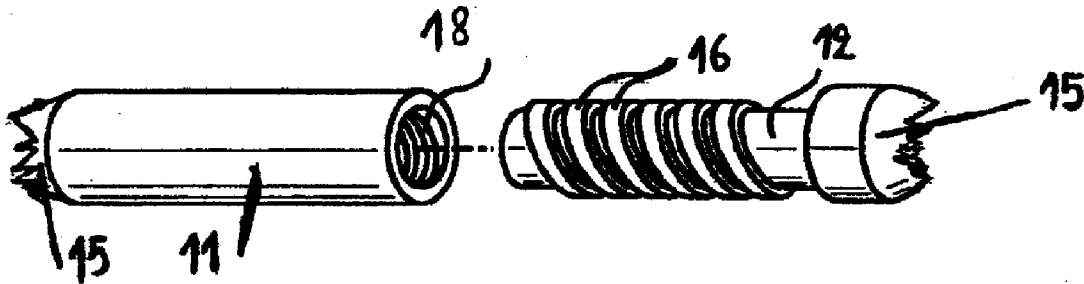
(57) **ABSTRACT**

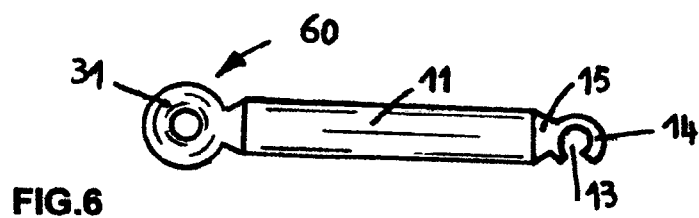
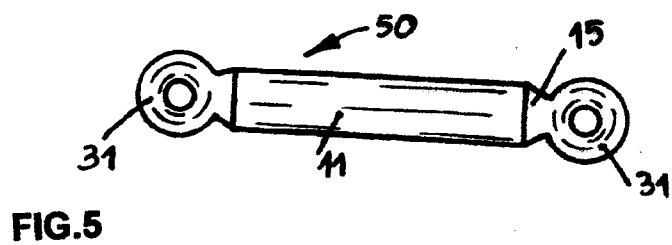
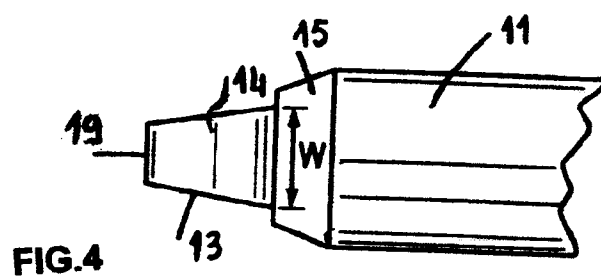
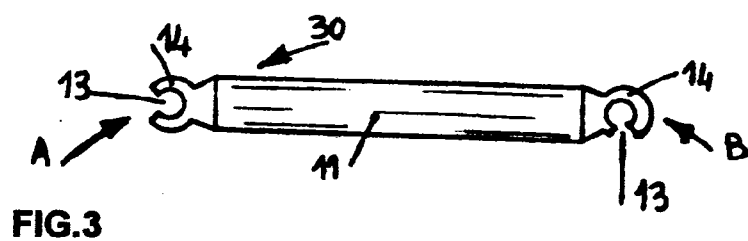
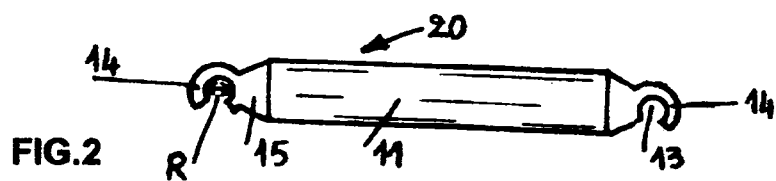
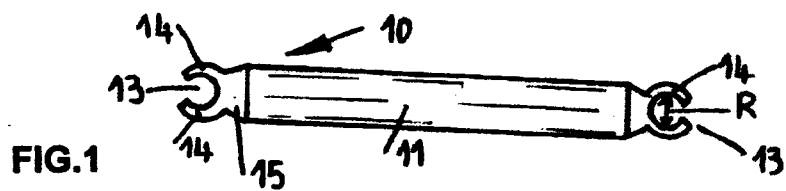
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A construction toy set comprising a plurality of first rod or block elements having a torus at one or both ends, a plurality of second rod elements having a C-shaped gripping clip at both ends and a plurality of third rod or block elements having a torus connecting element at one end and a c-shaped gripping clip at the other end. These rod and brick elements are assembled in a combination of different ways to create two and three dimensional structures.

Related U.S. Application Data

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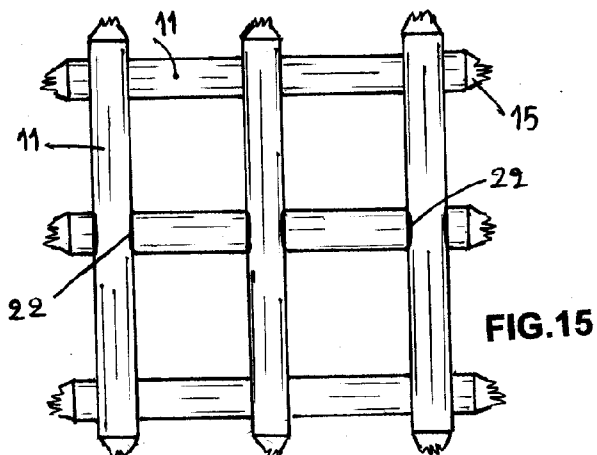
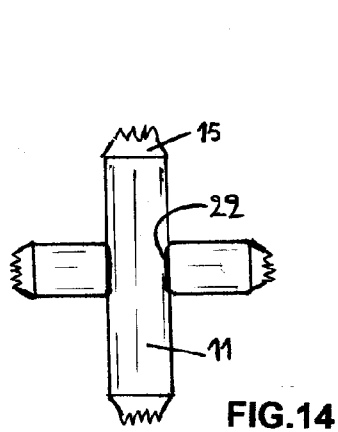
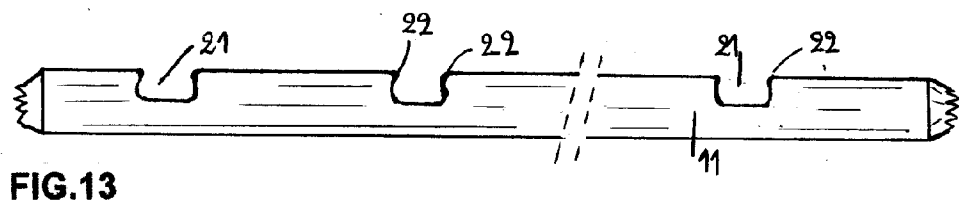
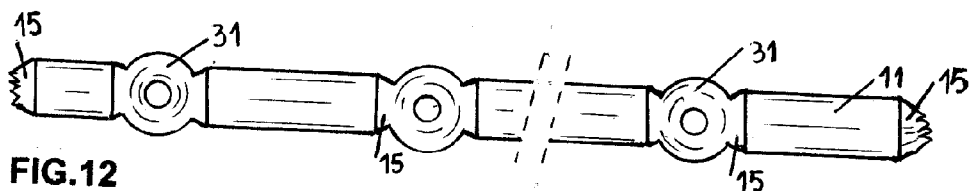
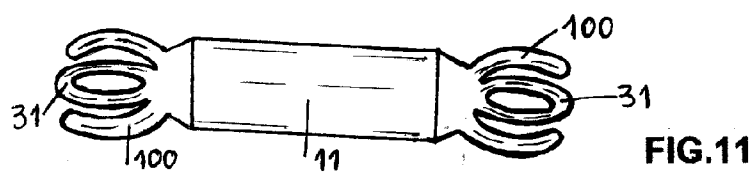
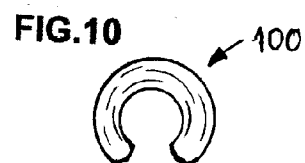
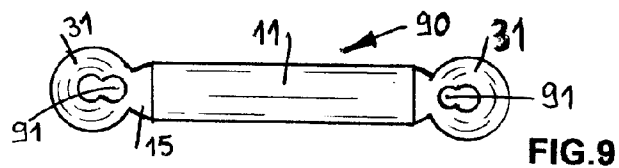
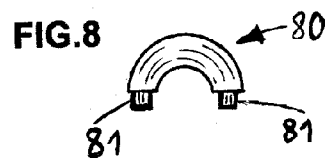
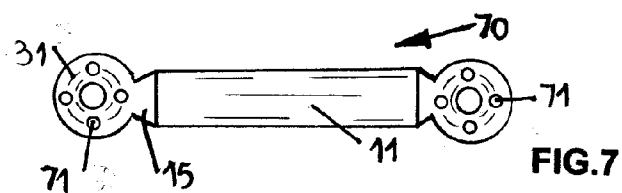


FIG.16

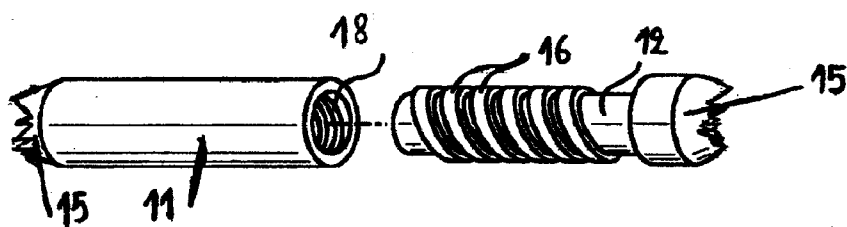


FIG.17

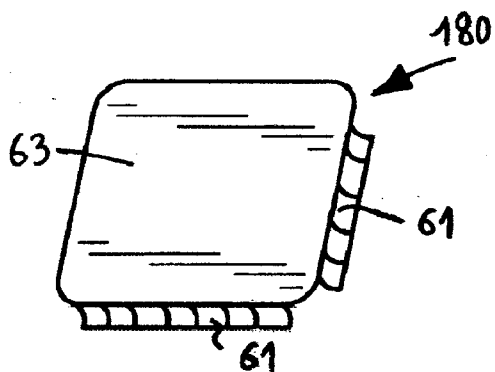
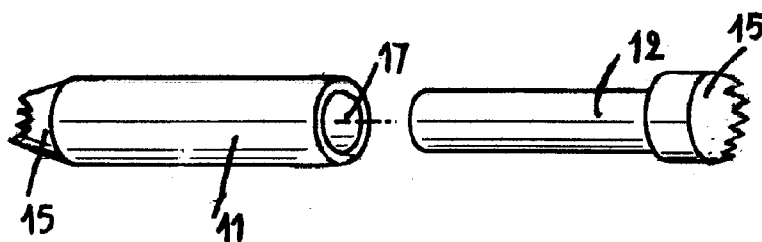


FIG.18

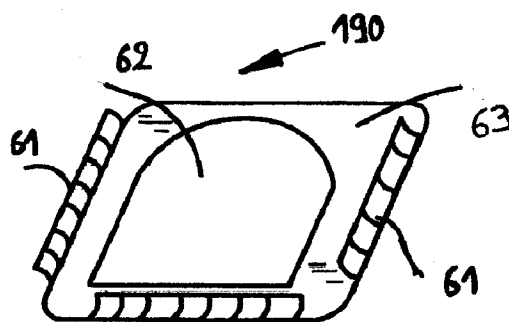


FIG.19

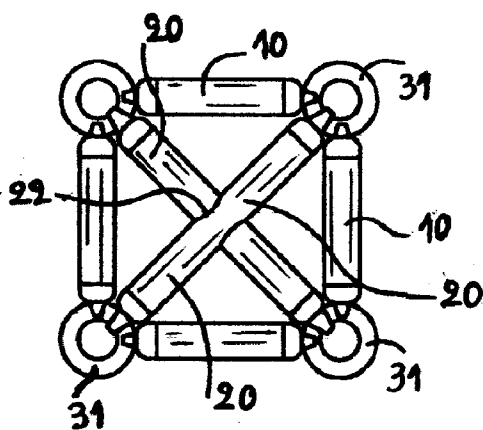


FIG.20

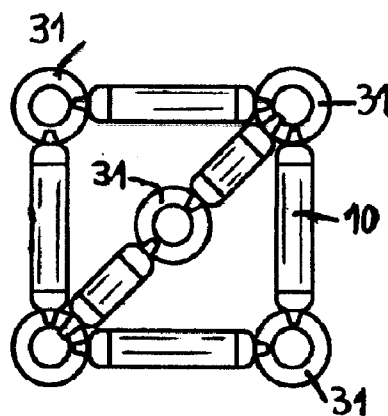


FIG.21

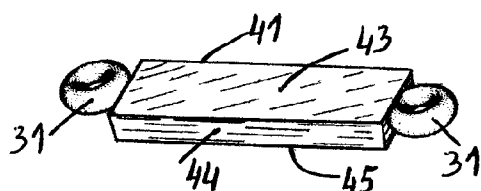


FIG. 22

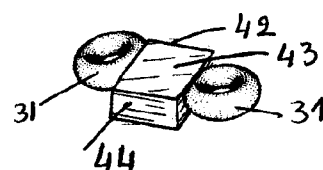


FIG. 23

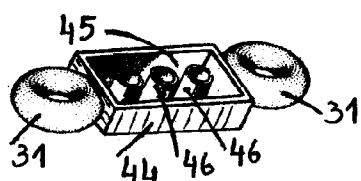


FIG. 24

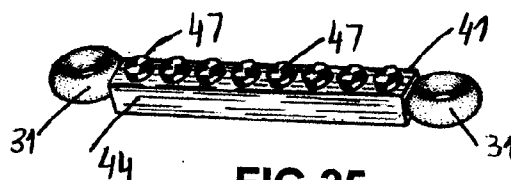


FIG. 25

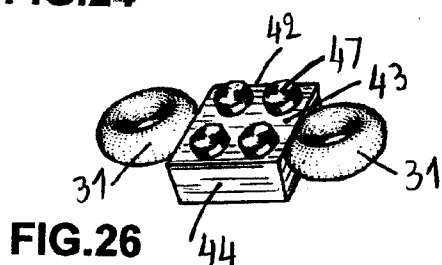


FIG. 26

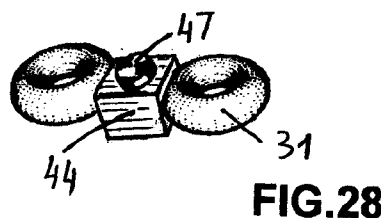


FIG. 28

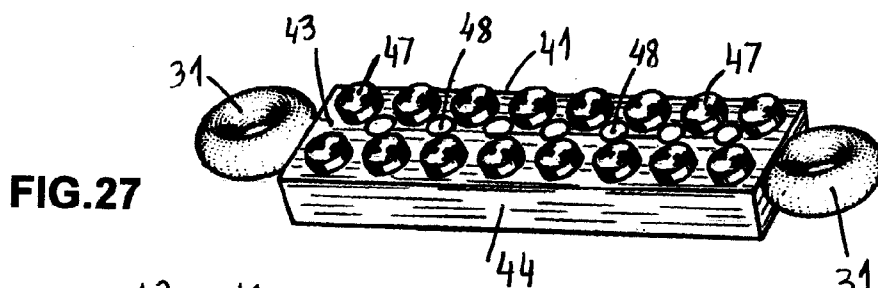


FIG. 27

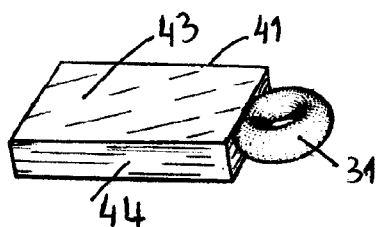


FIG. 29

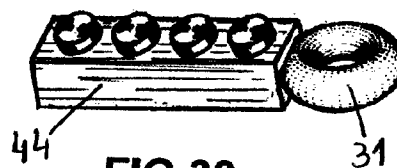


FIG. 30

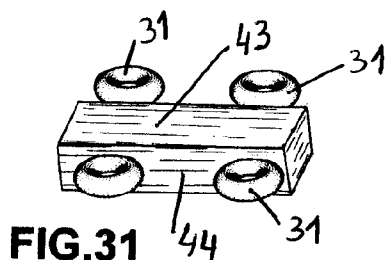


FIG. 31

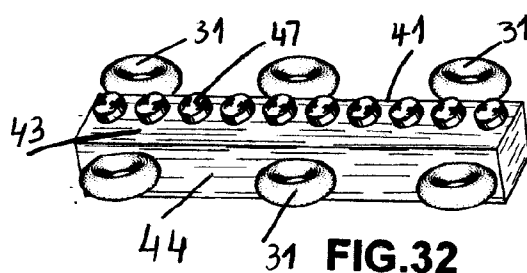


FIG. 32

CONSTRUCTION TOY

BACKGROUND

[0001] The present invention relates to a construction toy set for building two and three dimensional structures.

[0002] These construction sets are known which are formed of a plurality of rod or block elements having a C-shaped clip attached at both ends and a plurality of torus connecting elements, which are combined together to form structures.

[0003] These existing construction toy sets have shortcomings as they require a large number of parts to build structures.

[0004] The device of the present invention, while being known includes advantageous features which greatly enhance its performance and reduce significantly the number of parts used to build basic and complex structures. The construction toy set of the present invention comprise a plurality of first type of rod or block elements having a torus element attached at one or both ends; a plurality of second type of rod elements having a C-shaped gripping clip attached at both ends and a plurality of third type of rod or block elements having a torus attached at one end and a C-shaped gripping clip attached at the other end. Still according to the present invention, at least one of any said rod element include one or more torus connecting element between its ends. Still according to the present invention, at least one of any said rod element include one or more U-shaped gripping sockets between its ends so that two or more such rod elements can be connected by snap fit connection to form cruciform or grid composite structures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Other objects and advantageous features of this present invention will be more apparent on the description carried out in accordance to the drawings included, in which;

[0006] FIGS. 1 to 3 show a front view of rod elements having a C-shaped gripping clip at each end.

[0007] FIG. 4 is a top view, at an enlarged scale, of a part of a rod of FIGS. 1 to 3.

[0008] FIGS. 5, 7 and 9 illustrates rod elements having a torus element at each end.

[0009] FIG. 6 shows another rod element having a C-shaped gripping clip at one end and a torus connecting element at the other end.

[0010] FIGS. 8 and 10 show torus segments that may be used in this present invention.

[0011] FIG. 11 shows another rod element according to the present invention.

[0012] FIG. 12 shows a body of an elongated rod element, in cross section, having a plurality of torus connecting elements between its ends.

[0013] FIG. 13 shows a body of an elongated rod element, in cross section, having one or more U-shaped gripping sockets between its ends.

[0014] FIG. 14 shows a cruciform composite structure formed with rods of FIG. 13.

[0015] FIG. 15 shows a grid composite structure formed with rod elements of FIG. 13.

[0016] FIGS. 16 and 17 illustrate a body of a rod element, in cross section, formed in two parts.

[0017] FIGS. 18 and 19 illustrate plate panel that may be used in this present invention.

[0018] FIGS. 20 and 21 show composite structures built with elements of this invention.

[0019] FIGS. 22-32 illustrate connecting blocks according to this present invention.

DETAILED DESCRIPTION

[0020] Referring to the drawings; FIG. 1 illustrates a rod element 10 formed with a body portion 11. The distal ends of the rod element are formed with a tapered portion 15 in which a C-shaped gripping clip 13 is integrally connected so that to snap and detachably connect into the torus connecting elements 31 of the rod elements of FIGS. 5, 6, 7 and 8.

[0021] The C-shaped gripping clip 13 is formed with two symmetrically opposed gripping jaws 14 which extend parallel to the longitudinal axis of the rod element 10 as shown in FIG. 1. The internal diameter R of the C-shaped gripping clips 13, as shown in FIG. 1, is slightly smaller than the cross section of the torus elements 31 of the rod elements so that the jaws 14 can slightly extend to snap and firmly hold the torus elements 31 and its disassembly is made in the reverse order.

[0022] FIG. 2 shows the embodiment of a second rod element 20, similar to the one of FIG. 1. Here the jaws 14 of the C-shaped gripping clip extend perpendicularly to the longitudinal axis of the rod element 20 to allow a lateral snap fit connection between the rod elements, so that the center to center distance of a pair of torus of rod elements does not have to be distorted and enlarged in order to receive a C-shaped clip of another rod element.

[0023] FIG. 3 illustrates a rod element 30 which is another alternative to the rod elements of FIGS. 1 and 2. Here the rod element 30 is formed with one C-shaped gripping clip similar to the one of rod element of FIG. 1 and the other similar to the one of rod element of FIG. 2. The first end A of the rod element 30 can be assembled from any angular position, then the other end B is swiveled for a radial connection and its disassembly is made in the reverse order.

[0024] As shown from FIG. 4, at an enlarged scale, each jaw 14 of the rod elements is symmetrically tapered reducing the width W of the jaw towards its distal end to make a generally smaller pointed end 19. The jaws 14 could be formed as not tapered.

[0025] FIG. 5 shows another rod element 50 according to the present invention which has a torus connecting element 31 attached at both ends.

[0026] FIG. 6 shows another rod element 60 according to the present invention having a torus connecting element 31 at one end and a C-shaped gripping clip 13 at the other end. The jaws 14 of the C-shaped clip could extend similarly to the ones of the rod element of FIG. 1 or be similarly to the ones of FIG. 2.

[0027] FIG. 7 illustrates another rod element 70 similar to the rod element 50 of FIG. 5.

[0028] Here the torus connecting elements 31 are provided with diametrically opposed transverse holes 71. The holes 71 are made to receive and retain torus segments 80 of FIG. 8 by friction fit, thereby creating a rod element of FIG. 11 having a sphere like connecting element at one or both ends. The torus segment 80 of FIG. 8 has a shape of half a torus formed with a stem 81 at each end to frictionally fit into the holes 71 of the rod elements of FIG. 7.

[0029] FIG. 9 illustrates another rod element 90 similar to the one of FIG. 5. Here as well the torus connecting elements 31 of the rod element 90 are provided with one through hole 91 at the tapered end of the rod element to receive and retain

the torus segment **100** of FIG. **10** by friction fit, thereby creating the rod element shown in FIG. **11**.

[0030] FIG. **11** shows a rod element having each end formed with a sphere-like connecting element. Each sphere-like element is formed with a main torus connecting element **31** into which a torus connecting segment **100** is connected.

[0031] The rod element of FIG. **11** is used to create complex structures, as it allows more rod elements to be connected therein.

[0032] The torus element **31** of the rod element of FIG. **6** may be provided with holes **71** or **81** similar to the ones of respectively FIGS. **7** and **8** for the same purpose.

[0033] The rod elements of the present invention can be formed elongated and having one or more torus connecting elements **31** between their ends, as shown in FIG. **12**. The torus elements **31** between the ends of rod element of FIG. **12** may be formed with holes **71** or **91** similar to the ones of respectively FIGS. **7** and **9** for the same purpose.

[0034] The rod elements of the present invention may be elongated and having one or more U-shaped gripping sockets **21** between their ends as shown from FIG. **13** to receive and retain such rod elements by snap fit connection, thereby creating cruciform or grid composite structures as shown in FIGS. **14** and **15**. Each U-shaped socket **21** is formed with gripping lips **22** to receive and retain such U-shaped socket **21**. The elongated rod elements of FIGS. **12** and **13** can be formed in rigid, flexible or semi flexible but tough plastic material. The rods of FIG. **12** may be formed with both torus elements **31** and U-shaped sockets **21**.

[0035] In FIG. **16**, a generally cylindrical or polygonal body of the rod elements of the present invention is illustrated having adjustable length. Here the rod element is formed in two sections one having a stem **12** formed with an external screw thread **16**, the other being formed with an internal screw thread **18** to accommodate the external screw thread.

[0036] In FIG. **17**, a generally cylindrical or polygonal body of the rod elements of the present invention is illustrated having adjustable length. Here as well the body of the rod element is formed in two sections one having a generally cylindrical or polygonal stem **12**, the other being formed with a bore **17** in which the stem **12** is received and removably retained by friction, thereby creating a composite rod element of variable length.

[0037] FIG. **18** shows a top perspective view of a planar plate panel **180**, made from resilient plastic material, having two or more flanges **61** extending on the edges of the panel. The panel is used to fit into the body of the rod elements of built structures by snap fit connection. The panel is shown square but can be made from any polygonal shape.

[0038] FIG. **19** shows a bottom perspective view of another panel **190** similar to the one of FIG. **18** having an opening **62** on its surface **63**. The opening **62** can be made from any geometrical or decorative shape. The surface **63** of the panels **180** and **190** may be molded with architectural designs so that built structures are made to resemble to prototypes of buildings, monuments and towers at a reduced scale. The panels can also be made for decorative and aesthetic purposes.

[0039] The rod elements having C-shaped clips at both ends may be provided in first rods having first length and second rods having second length. The first length of second rods is chosen equal to the diagonal of a square formed of four first rod elements as sides, coupled each other in correspondence of the corners of the square by four torus elements as shown in FIG. **20**.

[0040] Still according to the present invention, the second length of second rods is equal to half of the diagonal of a square formed of four first rod elements as sides, coupled each other in correspondence of the corners of the square by four torus elements, minus the external radius of the torus element as shown in FIG. **21**. The cross section of the body **11** of the rod elements of the present invention may be formed approximately equal to the cross section of the torus connecting elements **31** so that a C-shaped gripping clip **13** of one rod element can be connected to the body **11** of a second rod element.

[0041] Basic torus connecting elements may be added the construction set of the present invention to enhance its versatility and its performance. The rod elements of the present invention may be provided with curved shapes so that circular and curved structures can be built. The rod elements of this present invention are made from a suitable plastic material and may include different lengths and the rod elements can be made in different size scales so that to be suitable for all different ages.

[0042] This construction set may also be used in outdoor playground equipment, where the rod elements are made in large sizes which are blow molded for weight 25 purposes. The construction set of the present invention is provided with elements having a plurality of interconnections which allow a wide range of angular orientations between the rod elements and it may include wheels so that dynamic structure, such as vehicles, can be built.

[0043] The different rod elements of the present invention can be combined in different ways to form a combination of different construction toy sets as it is not necessary to use all of the different rod elements, at the same time, in order to create a construction toy set. A simple set of rod elements of FIG. **3** and FIG. **5** can be combined to form a construction set.

[0044] Also, it is contemplated that the present invention can be a platform for other toys which resemble to real life objects such as animals, humans, plants, or robots or action figures where the body **11** of the rod elements is shaped to resemble to arms, legs, wings, bodies, robot parts or other structures.

[0045] Although this invention is preferably designed for use as a construction toy set but it can be used as an education set for demonstrating and explaining education principles or can be used for architectural or engineering purposes.

[0046] The body **11** of the rod element **50** of FIG. **5** may be formed in a shape of square or rectangular blocks **41** and **42** as shown from FIGS. **22** and **23**. The blocks are formed with a top surface **43**, peripheral side walls **44** and bottom base **45**. The bottom base **45** of at least some of the blocks **41** and **42** are formed hollow and the base of least some of the hollow bases are formed with clamping means **46** as shown in FIG. **24**.

[0047] Here in FIG. **24**, the clamping means **46** are shown having a shape of cylindrical tubes but they may be formed in any other shape and any other configuration. The top surface **43** of the blocks **41** and **42** may be formed with one or more rows studs **47** protruding therefrom as shown in FIGS. **26** and **27**. Here as well, in FIGS. **26** and **27**, the studs are shown cylindrical but they may be formed in any other shape or any other configuration. The rows of the studs **47** may be formed with one or any other number of studs **47**. The torus **31** of the blocks of FIGS. **25** and **27** may be formed in the longest peripheral side walls **44** of the blocks. The blocks **41** and **42** of FIGS. **22**, **23**, **24**, **25** and **26** may be formed with through

holes 48 as shown from the block illustrated in FIG. 27. The blocks 41 and 42 may be formed in cylindrical, oval or any other shape which are formed with a hollow base and having one or more stud 47 on their top surface.

[0048] The cylindrical tubes 46 of the hollow bases of the blocks are formed to have a clamping effect on the cylindrical studs 47 of the top surface 43 of the blocks. The blocks of this present invention may also be formed with a plurality of connecting torus elements 31 at their peripheral side walls 44 as shown in

[0049] FIGS. 31 and 32. Here as well the plurality of the torus elements 31 can be formed in only one side wall 44 and the top surface 43 of the blocks may be formed with more than one row of studs 47 and the top surface 43 of the blocks 41 may also be formed with one or more through holes 48 similar to the one of FIG. 27. The bottom base of the blocks of FIGS. 31 and 32 are also formed hollow with cylindrical tubes 46 similar to the ones of FIG. 24 for the same purpose. The connecting torus elements 31 of the blocks of FIGS. 22 to 32 may be formed with holes 71 similar to the ones of FIG. 7 for the same purpose.

[0050] In a particular embodiment the blocks are formed to interface to Lego® bricks.

[0051] The present invention has been disclosed for illustrative but not limitative purposes, it will be obvious that modifications and changes may be introduced.

What is claimed is:

1. A construction toy set, comprising: at least one of a first type of construction element and at least one of a second type of construction element, wherein the first type of construction element has a central body portion with a torus portion at one or both ends of the body portion, and the second type of construction element has a central body portion with a C-shaped gripping clip at both ends of the body portion, wherein the C-shaped gripping clip is configured to detachably grip a torus portion of a construction element of the first type.

2. A construction toy set according to claim 1, wherein the body portion of at least one of the first or second type of construction element comprises a block portion formed with a top surface, peripheral side walls and a bottom base.

3. A construction toy set according to claim 1, further comprising at least one of a third type of construction element having a central body portion with a torus portion at one end of the body portion and a C-shaped gripping clip at the other end of the body portion, the C-shaped gripping clip being configured to detachably grip a torus portion of a construction element of the first or third type, and wherein the C-shaped gripping clip of the second type of construction element is configured to detachably grip a torus portion of a construction element of the first type and the third type.

4. A construction toy set according to claim 2, wherein the at least one bottom base is formed hollow and with one or more cylindrical tubes extending from the inner face of said hollow bottom base.

5. A construction toy set according to claim 2, wherein the at least one top surface is formed with one or more rows of one or more cylindrical studs projecting upwardly from the top surface.

6. A construction toy set according to claim 1, wherein at least one of any said construction elements includes at least one torus element and/or at least one U-shaped gripping socket between its ends.

7. A construction toy set according to claim 1, wherein the body portion of at least one construction element is formed in two sections, one section having a stem formed with external screw threads, the other section being formed with internal screw threads to accommodate the said external screw threads so that the length of said construction element can be adjusted.

8. A construction toy set according to claim 1, wherein the body portion of at least one of said construction elements is formed in two sections, one section having a generally cylindrical stem, the other section being formed with a bore in which the said stem is received and removably retained by friction, thereby creating a composite construction element of variable length.

9. A construction toy set according to claim 1, wherein the body portion of at least one said construction elements has a cross section approximately equal to the internal diameter of the said C-shaped gripping clip so that a C-shaped gripping clip of one construction element can be connected and be detachably retained by the body of another construction element.

10. A construction toy set according to claim 1, wherein two sets of said second type of construction elements are provided, the first set having a first length and the second set having a second length.

11. A construction toy set according to claim 10, wherein said second length equals the diagonal of a square formed of four first construction elements of the first length as sides, coupled with each other in correspondence of the corners of the square by four torus elements.

12. A construction toy set according to claim 10, wherein said second length equals half of the diagonal of a square formed of four first rod elements of the set length as sides, coupled with each other in correspondence of the corners of the square by four torus elements, minus the external radius of the torus element.

* * * * *