United States Patent [19]

Munger et al.

[11] **3,814,416**

[45] **June 4, 1974**

[54] **PLAYGROUND CLIMBING STRUCTURES**

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[73] Assignee: **Northwest Design Products, Inc.,** Tacoma, Wash.

[22] Filed: **May 25, 1971**

[21] Appl. No.: **146,734**

[52] **U.S. Cl.** ..... **272/56.5 R,** 272/60 R, 272/85, 272/63, 182/20, 182/151

[51] **Int. Cl.** **A63b 17/04,** A63b 3/00

[58] **Field of Search** ..... 272/63, 60, 62, 85, 59 C; 46/27 X, 28 X, 29 X, 16, 17, 26; 287/52.07 X, 52.08 X, 56 X, 54 A X, 54 B X, 54 C X, 20 R, 23, 20.92 B; 182/20 X, 35 X, 178 X, 179 X, 224 X; 285/192, 194, 201, 205, 239, 330, 331; 35/18 A, 53, 60, 73

[56] **References Cited**

UNITED STATES PATENTS

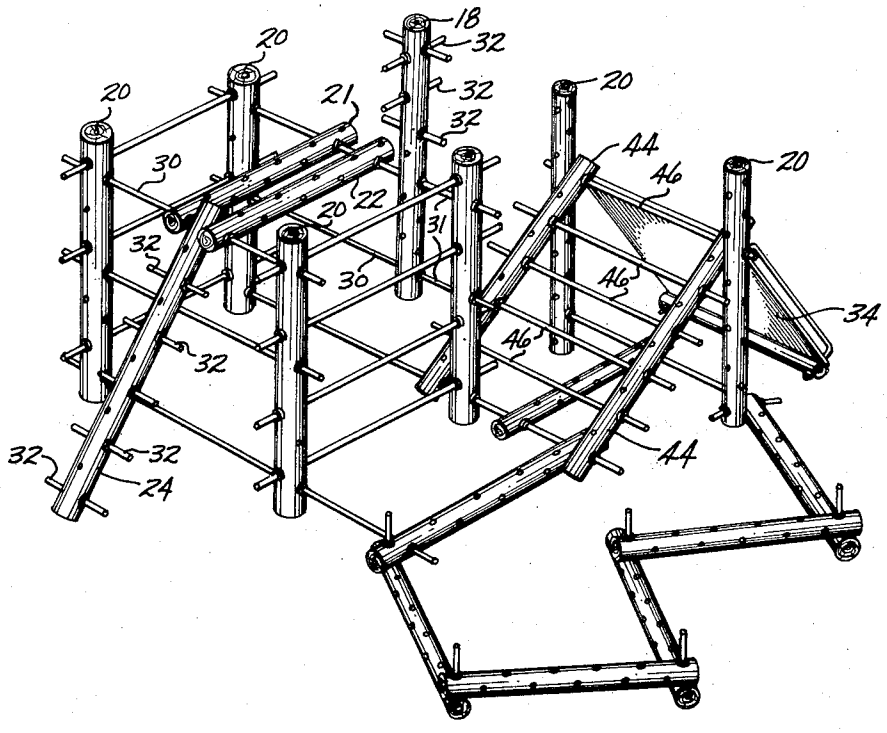
1,085,460	1/1914	Michaelis	46/29
1,171,267	2/1916	Smith	287/20 R
1,495,536	5/1924	Smith	272/62
1,855,447	4/1932	Hagstedt	285/205 X
2,052,600	9/1936	Boss	46/16 X
2,456,516	12/1948	Kidney	287/52.07 X
2,466,097	4/1949	Grave	287/52.08 X
2,709,318	5/1955	Benjamin	46/29 X
2,812,010	11/1957	Abdallah	272/63
3,207,511	9/1965	Hoffman	272/63

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[57] **ABSTRACT**

Playground equipment and climbing structures are described which may be disassembled and re-assembled into other forms by simple manipulation of parts. The structures are made up of the three basic elements, a large beam member having a plurality of throughbores along its length, a rod member adapted to be inserted within the throughbores of the beam member and, a pair of retaining collars, one positioned on each side of the beam member, to securely fasten the rod member within the through-bores of the beam member to prevent relative motion therebetween. The apparatus is constructed using one or more of the beam members in conjunction with one or more of the rod members having the required number of collars to hold the apparatus together. Individual play events, swings, climbing towers, ladders, parallel bars, inclined ramps, scaffolding and a myriad of other configurations, either individually or as interconnected events, may be constructed according to the teaching of this invention.

11 Claims, 11 Drawing Figures



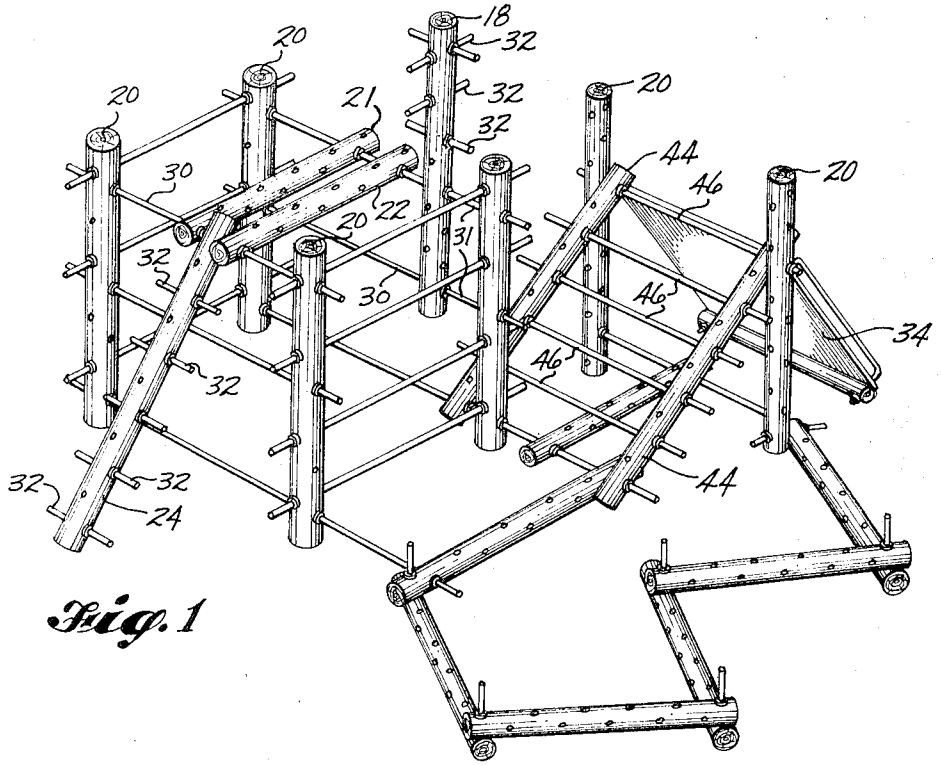
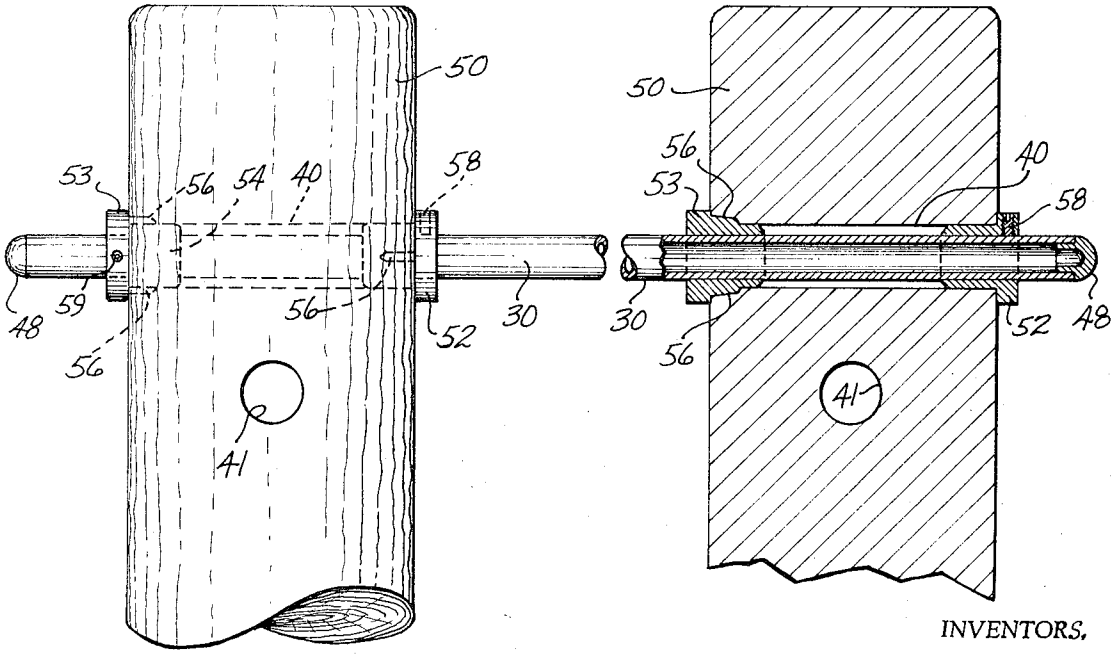


Fig. 1

Fig. 2



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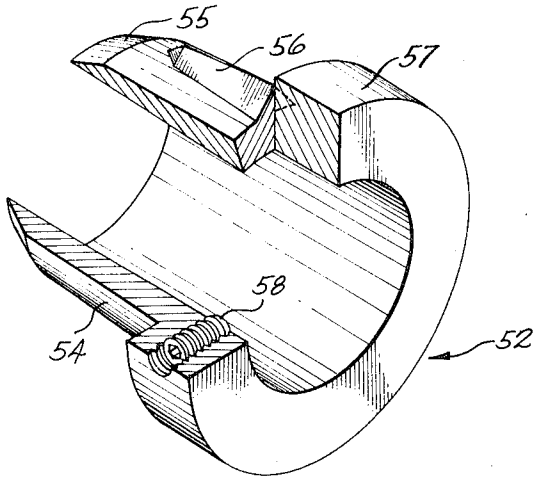


Fig. 3

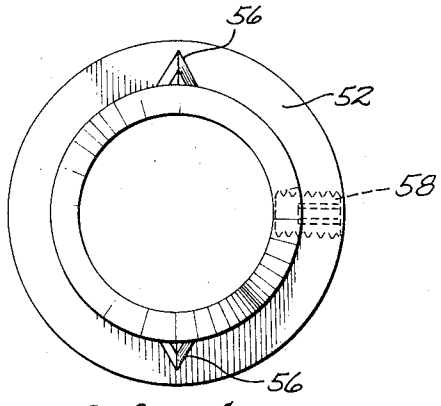


Fig. 4

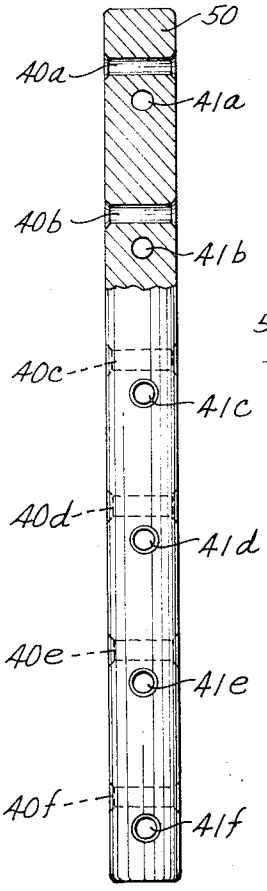


Fig. 5

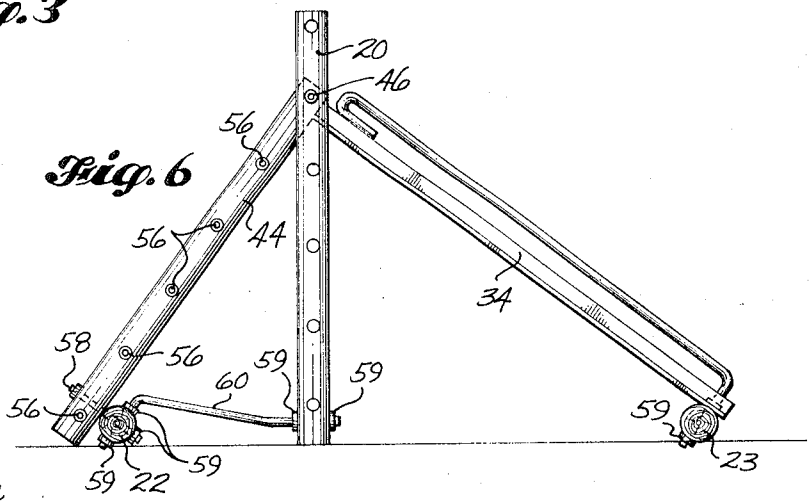


Fig. 6

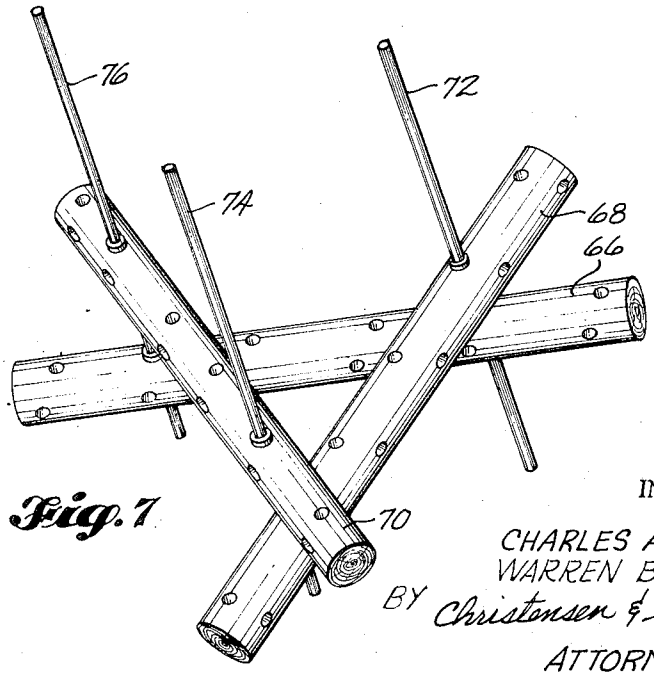


Fig. 7

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Fig. 8

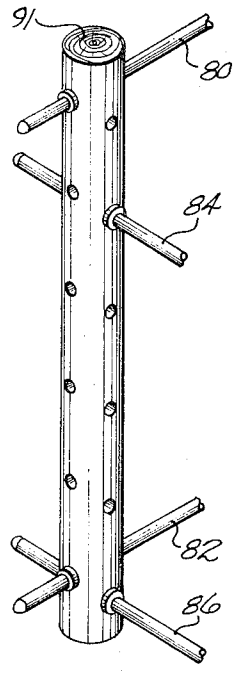


Fig. 9

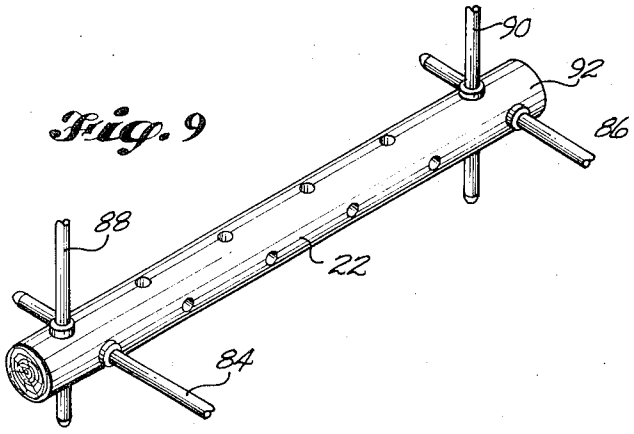
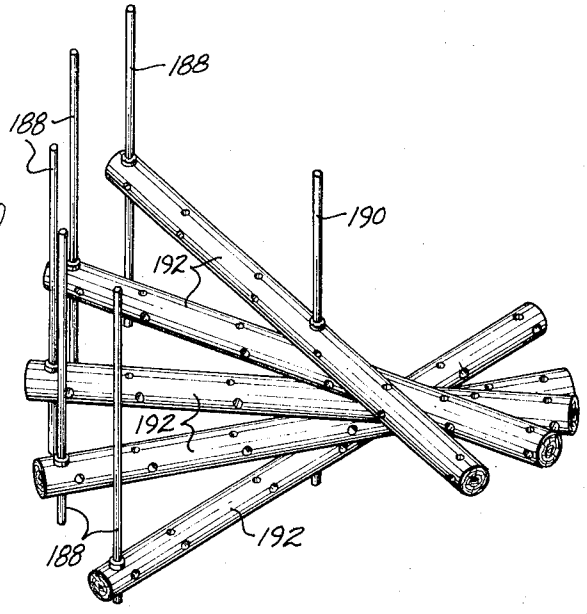


Fig. 10



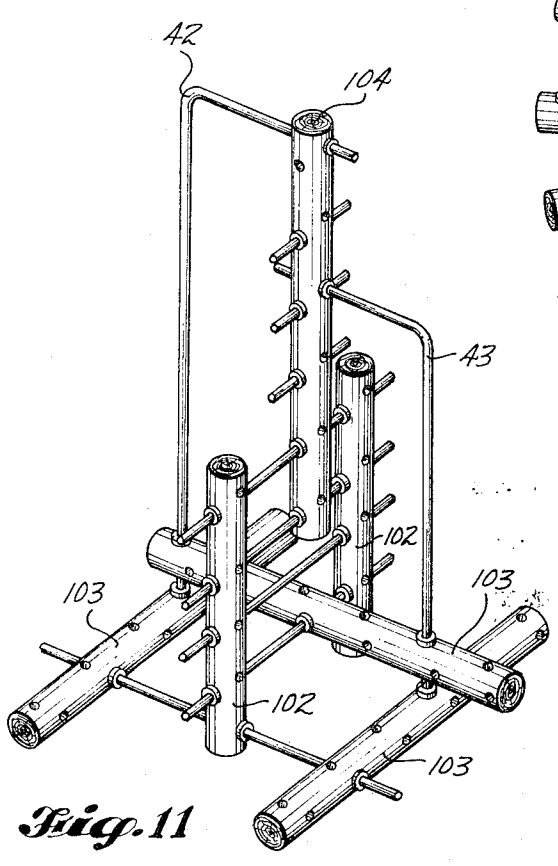


Fig. 11

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PLAYGROUND CLIMBING STRUCTURES

BACKGROUND OF THE INVENTION:

This invention relates to playground and scaffolding type apparatus and more particularly to apparatus useful in constructing many types of outdoor and indoor play equipment and climbing structures as well as other type of high strength three dimensional structural arrays.

This invention further relates to structural elements of an apparatus which may be dismantled and rearranged as desired into other types of climbing structures using various geometric relationships among the elements of the apparatus.

PRIOR ART:

Climbing apparatus for use in school and municipal playgrounds as well as in backyards for exercise and play have been well-known in the prior art. Heretofore, such apparatus was usually constructed of metal or wood in the well-known geometric relationships to form a permanently fixed three dimensional structure upon which children could climb and upon which swings, slides and other events were suspended. The prior art devices have predominantly been of a solid type of construction which limited the usage of the device to the events originally built into the apparatus. Little or no provision was made for the ingenuity of the participants in the design or function of such apparatus since structural alteration to the apparatus was difficult or impossible once construction of the apparatus was completed. Such apparatus, while occupying the time and having at least some beneficial effects on the participants, did little or nothing toward stimulating the creative thoughts and abilities of the participants. Furthermore, no provision was made to properly accommodate the changing needs of a growing family or community.

OBJECTS OF THE INVENTION:

It is, therefore, an object of this invention to provide playground equipment and climbing structures which act as a stimulus to the creativity of participants as well as providing a structure useful in climbing exercises and play functions.

A related object is to provide a simple structural joint for use in building playground equipment and climbing structures from simple elements.

A further object of this invention is to provide an apparatus which may be readily assembled by unskilled individuals and which is constructed of relatively inexpensive materials.

A still further object of this invention is to provide structural elements which may be assembled into practically unlimited forms and embodiments for use as a play apparatus, scaffolding or other climbing and exercise events.

An important object of this invention is to provide play apparatus which has the inherent capacity to be altered and re-arranged to present varying challenges to a child's growing coordination and muscular development. A related important object is to provide structural apparatus which has a sufficiently simple method of construction for the user to design and construct his own apparatus from basic elements and which may readily be dismantled and re-arranged by the user to suit particular needs.

SUMMARY OF THE INVENTION:

Accordingly, this invention provides apparatus and construction technique for use with the apparatus which enables one to construct climbing and scaffolding equipment in a myriad of thoroughly unique and novel forms using three basic structural elements. The first of three basic elements is a large dimensioned beam such as a wooden or other type of structural beam having a plurality of throughbores extending diametrically therethrough. The throughbores may be positioned on any one of a plurality of planes, may be randomly positioned in the beam member or preferably are regularly positioned upon perpendicular axial planes so that a regularly arrayed structure results. The second structural element utilized in this invention is an elongated rod member which may be of tubular or solid construction as desired which is adapted to be inserted through the throughbores of the beam member described above. The rod members may be positioned in any location within the throughbores and are held firmly in position therein by the third structural element utilized in this invention. This third structural element which is used to restrain motion of any kind between the rod means and the beam member comprises a collar means which may be securely fastened to the rod member after its insertion into the throughbore and which engages the throughbore to maintain the rod member in its particular relationship with the beam member. A pair of collar means, one positioned on each end of the throughbore, are usually used. The use of a plurality of beam members and rod members along with the requisite number of collars permits one to construct climbing apparatus in a practically infinite variety of possible shapes and forms, limited only by the creativity and the ingenuity of the participants assembling the parts of the apparatus.

In the preferred embodiment of this invention, a large wood member is utilized as the beam member described above. This wood member has a plurality of holes bored through it at certain intervals in lines along the length of the wood member and positioned substantially on a diameter of the wood member. Two series of in-line holes are provided lying upon axial planes positioned perpendicularly to each other. The holes in one axial plane are offset with respect to the holes in the other axial plane to avoid intersection thereof. The rod member is preferably tubular and of such a diameter as to be easily passed through the throughbores in the large wood member. The joining devices or collars are used in opposing pairs engaging the rod member and the throughbore of the large wood member and are of such a configuration as to be partially inserted and wedged firmly into the throughbore in the wood member. Each collar has at least one wedge element positioned on the exterior of the portion thereof inserted into the throughbore to engage the interior of the throughbores. A set screw or other rod-engaging device is provided in the collar to position the collar on the rod member and prevent motion between the rod member and the wood member. The collars have an interior diameter which is slightly larger than the rod member so that it may be easily passed through the collar.

Due to the geometric relationship of the elements utilized to construct the play apparatus described herein

as well as the unique method of constructing the joints between the elements, a high degree of structural integrity and safe, strong three dimensional structure results when the method and apparatus of this invention are used. The structural integrity achieved is due in large part to the secure junction between the rod members and beam members resulting from the positioning of the two opposing collars, one inserted into each exposed aperture of the same throughbore; both positioned upon the same rod member. The collars each engage the interior of the throughbore with at least one wedge and firmly engage the rod by means of a set screw or other suitable fastener means.

To construct the apparatus the wood members are arranged so that corresponding holes in the various wood member line up to receive the rod members inserted therethrough. The rod members are adapted to be inserted through two or more throughbores in the large wooden members. The rod members which have the appropriate number of collars positioned along their length are then inserted into corresponding throughbores in the wood members. When the desired structural relationship has been made between the wood member and the rod member, the collars are forced into the throughbores and the fastener means tightened down upon the rod member resulting in a structurally sound joint between the rod member and the wood beam member. The structure thus formed may then be positioned so that other wood members and rod members may be connected thereto in a three dimensional array to form any desired structure. Specific play events such as a swing, slide, parallel bars or the like may then be affixed to the structure as desired to become an integral part thereof.

IN THE DRAWINGS:

The objectives and attributes of this invention can be better ascertained through a detailed evaluation of the following description of several preferred embodiments with particular reference to the drawings in which;

FIG. 1 is a perspective view of a complete play apparatus of several interconnected play events assembled using the devices and concepts taught by this invention;

FIG. 2 shows an elevational view, partly in section, of the structural elements of this invention;

FIG. 3 shows a perspective view, partly in section, of the collar means used to prevent relative motion between the elements of this invention;

FIG. 4 is a front elevational view of the collar means shown in FIG. 3;

FIG. 5 is an elevational view, partly in section, of the large diameter structural element used in this invention;

FIG. 6 shows a side view of an assembly of structural elements arranged to form a climbing apparatus and slide;

FIG. 7 shows a perspective view of a skew arrangement of structural elements;

FIG. 8 shows a perspective view of one subcomponent of the play apparatus of this invention having the large diameter structural member in the vertical position;

FIG. 9 shows a perspective view of a second subcomponent of the apparatus of this invention having the large diameter structural element in the horizontal position;

FIGS. 10 and 11 each show a perspective view of one of the many possible multiple play event configurations of structural elements which may be constructed according to the teachings of this invention.

Referring more particularly to the drawings, wherein like numerals indicate like parts, there is seen in FIGS. 1 through 5 a play apparatus and the basic structural elements which are used in the construction of such a play apparatus. In FIG. 1 a three dimensional array of elements forming a play apparatus is shown having a plurality of large diameter vertical beam members 20 connected together by use of a plurality of long horizontal rod members 30, each connection established by use of a pair of collars shown in detail in FIGS. 2–4. A rigid structure is formed by the horizontal rod members 30 and the vertical beam members 20 by the bracing thereof caused by perpendicular relationship of the elements of the play structure. In FIG. 1 also is shown an inclined beam member 24 having a plurality of short horizontal rod members 32 forming a ladder apparatus, suitable for climbing by childern. At the top of the ladder, a pair of horizontal beam members 21 and 22 are shown which can be used for crawling across the top of the play apparatus or for other purposes such as suspending swings or the like. On the other side of the play apparatus, there is shown a vertical beam member 18 which is positioned above the ground level on a pair of long horizontal rod members 31. This vertical beam member 18 has a plurality of the short horizontal rod members 32 placed through it to provide additional climbing area. The inclined beam members 44 form a staircase by use of a plurality of the long vertical rod members 46 to give access to the slide 34. Various play events other than the ladders and slide may be attached if desired to the apparatus shown in FIG. 1.

The specific structure of the elements which make up this playground invention are shown in FIGS. 2 through 5. In FIG. 2, the large diameter beam members 50 are shown in the vertical position with a horizontal rod member 30 inserted through the apertures 40. The beam members 50 have a plurality of apertures extending diametrically through the center thereof. Positioned at right angles to the apertures 40 is a corresponding set of apertures 41, similarly positioned in the beam member and extending diametrically therethrough. The apertures are positioned along the axis of beam members 50 so that the rod members 30 may be inserted through corresponding apertures in two or more beam members 50 and securely fastened in position by use of collars 52 and 53.

Rigidity and structural integrity of play apparatus constructed according to this invention are due to the special relationships among the elements of this invention as shown in FIG. 2. The structural integrity is a result of the use of opposing collars 52 and 53 at the junction of each rod member 30 and beam member 50. One opposing collar 52 is inserted into one exposed aperture of throughbore 40 and the second collar 53 is inserted into the other exposed aperture of throughbore 40. Both collars 52 and 53 are positioned on rod member 30 and when fully inserted into the throughbore 40 in the position shown in FIG. 2, are firmly attached to the rod member 30 by tightening set screws 58 and 59 to prevent relative motion between the rod member 30 and the collars 52 and 53. As a result, a rigid joint is established between rod member 30 and beam member

50. The joint may, of course, be dismantled by reversing the steps set out above.

End caps 48 may be provided for each rod member 30 as desired. They may be of a flexible rubber-like material or be made of wood, plastic or metal. The end caps 48 are useful in eliminating potentially dangerous rod member end exposure and also serve to enhance the overall aesthetic effect of play equipment constructed according to this invention. Such end caps 48 are of particular utility whenever rod members 30 are of a tubular construction.

Details of the collar 52 are shown in FIGS. 3 and 4. The collar 52 is made up of a substantially cylindrical aperture penetrating portion 54 upon which at least one wedge member 56 is is positioned and a large diameter cylindrical portion 57. Wedge member 56 is constructed and arranged to engage the bore of apertures 40 or 41 in a force fit when the collar is placed about a rod member 30 and portion 54 positioined within bore 40 of the beam member 50. Screw member 58 is used to firmly position the collar 52 on rod member 30. The wedge members 56 eliminate the possibility of rotation of the collar 52 when inserted into the throughbore 40 or 41. A tapered section 55 on the leading edge of the aperture penetrating segment 54 aids installation of collar 52 within the throughbore 40 or 41 in the event that a misalignment occurs between the throughbore 40 or 41 and the rod member 30.

In FIG. 5, a detailed elevational view of the beam members used in this invention is shown, partly in section. Beam member 50 has a first set of transverse throughbores 40a through 40*f*. These throughbores are placed substantially perpendicular to the axis of the beam member 50 and extend through the beam member 50 substantially upon a diameter line. A second set of non-intersecting transverse throughbores 41*a* through 41*f* are positioned adjacent their corresponding perpendicularly oriented throughbores 40*a* through 40*f*. The transverse throughbores 41*a* through 41*f* are also placed upon a diameter line and, again, are substantially perpendicular to the axis of the beam member 50. The transverse throughbores may contain a slight countersink as shown, if desired.

In FIG. 6 one specific embodiment of the play apparatus of this invention is shown comprising a ladder and slide event. A pair of vertical beam members 20 are shown attached to a pair of inclined beam members 44 through use of the horizontal rod member 46. Several other horizontal rod members 56 placed into throughbores in the inclined beam members 44 form a stairway for access to the top of the play apparatus. At the bottom of the play apparatus, a horizontal beam member 22 is positioned next to the base of the inclined beam members 44 and is securely attached thereto with a pair of short rod members 58. A bent linkage means 60 is shown connecting the horizontal beam 22 to the bottom of the vertical beam member 20. The appropriate number of collars 59 are placed upon the rod members on each side of the beam members so as to form a rigid joint between the beam members and rod members. A slide means 34 is attached at its top end to the vertical beam members 20 at horizontal rod member 46 and engages the horizontal beam member 23 at its bottom end. Thus, a ladder and slide arrangement is provided through use of the apparatus and method taught by this invention.

In FIG. 7, a skew arrangement of beam members 66, 68 and 70 is shown in which the beam members are connected together by means of rod members 72, 74 and 76. This arrangement permits the participant to climb around on the surfaces thereof to develop coordination and balance.

In FIGS. 8 and 9, two of the basic combinations of structural elements which make up the apparatus of this invention are shown. In FIG. 8, a vertical beam member 91 is shown having the horizontally oriented rod members 80 and 82 projecting through throughbores in beam member 91 and horizontal rod members 84 and 86 extending through other throughbores positioned perpendicularly to those occupied by rod members 80 and 82. Of course, any number of rod members may be placed through the throughbores in beam member 91 to provide the desired type of structural relationship. In FIG. 9 a horizontally oriented beam member 92 is shown having horizontally oriented rod members 84 and 86 with vertically oriented rod members 88 and 90 passing through throughbores oriented perpendicular to those throughbores occupied by tubular members 84 and 86. By use of a plurality of the combinations of structural elements shown in FIGS. 8 and 9, many varieties of apparatus may be constructed utilizing the elements shown. The possibilities for construction of play devices is limited only by the ingenuity of the individual undertaking its construction.

In FIG. 10 another novel arrangement of the elements shown in FIG. 9 is presented. This arrangement permits the user to ascend a spiral staircase-like apparatus formed by the plurality of horizontally oriented beam members 192 which are rotated into various positions about the vertically oriented rod member 190. A plurality of vertically oriented rod members 188 are utilized to support the outer end of the horizontal beam members 192. Of course, the appropriate collars are utilized to maintain the spacial relationship between the vertical rod members 188 and 190 and the horizontal beam members 192.

In FIG. 11 a climbing apparatus is shown using both the horizontally oriented beam members 103 and the vertically oriented beam members 102 along with appropriate rod members necessary to provide the structure desired. An elevated vertical beam member 104 is also utilized. In this particular embodiment, a new type of rod member, not shown before, is utilized. The L-shaped rod members 42 and 43 are utilized to reduce the swaying of the upper vertical member 104 and to provide a horizontal bar-type arrangement for gymnastic use as well as a means to enable participants to slide down to the ground or climb up to the top of the apparatus.

It may be readily seen from the above discussion of the embodiments shown that a practically inexhaustible number of play equipment forms may be constructed from the elements of this invention. The practically limitless possibilities of play apparatus construction permits the users to construct their own equipment in any ingenious fashion they desire. The structure is so simple that a group of people can easily assemble a device of their choosing in a relatively short period of time yet result in an extremely durable and sturdy type of play apparatus construction. The advantages presented by this type of structure, of course, make its application to public playgrounds and schoolyards extremely desirable. The sturdy and aesthetically pleasing

structures which result from use of this invention, furthermore, are desirable for public facilities due to their low cost and durability. Many other uses for the apparatus disclosed herein will be readily apparent to one skilled in the art. For example, in addition to the play apparatus described in detail above, other structural objects may be prepared using the concepts of this invention including, but not limited to, scaffolding; furniture such as benches; tables and chairs; fences; retaining walls; bulkheads and other structural forms.

While the perpendicular relationship between rod members and beam members is preferred other angular relationships may be utilized. This may be accomplished by having the throughbores extend through the beam members on other than a diameter line or by use of rod members having bends or curves along the length thereof.

The materials of construction which have been found useful in this invention include large dimension wooden beam members and steel or iron pipe, preferably galvanized, to eliminate the problems of rusting of the rod members. The invention has found particular application in geographical areas in which large quantities of timbers of substantial size are readily available in large quantities at low prices. Of course, the beam members may be made of any suitable material of construction including, but not limited to, plastic, concrete, fiberglass reinforced polyester materials, large diameter pipe or the like. The beam members need not be cylindrical but may be square, triangular or irregular in cross sections. However, the cylindrical shape adds to the invention from the aesthetic point of view and has certain advantages in production as well as being more challenging to the developing physical abilities of participants. In addition, round members provide a more comfortable and safe play apparatus than square timbers since no flats and sharp edges are present.

The collar material is generally a metal. However, any type of strong plastic or other structural material may be utilized in forming the retaining collar. The tubular members may, of course, be made of materials other than iron, such as stainless steel, titanium, aluminum, extruded plastics, fiberglass reinforced polyester materials, wood or the like. Of course, solid rod-like members may be substituted for the tubular members if desired.

Many other modifications within the scope and spirit of this invention will be readily apparent to those skilled in the art.

What is claimed is:

1. A freestanding array of a plurality of structural units forming a rigid three dimensional climbing apparatus, each of said units comprising:

at least one beam member having a plurality of throughbores;

at least one rod member inserted into one or more of said throughbores; and

collar elements receiving said rod member axially, having rotation-resisting throughbore-engaging means positioned externally on said collar elements and projecting outwardly from the surface of said collar elements and having means to releasably engage said rod member restraining relative rotation and axial reciprocation therebetween, said collar elements being utilized in pairs, one of said collar elements positioned at each end of a throughbore having a rod member positioned therein and engaging said throughbore in a substantially cylindrical interfit, whereby said rod member is rigidly but removably positioned within said throughbore, the structural engagement of said beam members, said collar elements and said rod members resulting in said rigid, three dimensional climbing array.

2. The apparatus of claim **1** wherein said collar elements each comprise;

a first substantially cylindrical portion having a diameter greater than said throughbore and a second substantially cylindrical section having a diameter permitting insertion of said second section into said throughbore, said collar elements each having an axial bore of sufficient diameter to receive said rod member and having throughbore engaging means projecting outwardly from said second substantially cylindrical section.

3. The apparatus of claim **1** wherein said throughbores are positioned in said beam member without intersection of said throughbores in said beam member.

4. The apparatus of claim **1** wherein said throughbores extend through said beam member perpendicular to the axis thereof.

5. The apparatus of claim **1** wherein an equal number of said throughbores are positioned upon each of two perpendicular axial planes. said rod said

6. A climbing apparatus comprising a plurality of beam members each having a plurality of throughbores positioned upon each of a plurality of axial planes, a plurality of rod members inserted within said throughbores and a plurality of collar elements restraining relative motion between said beam members and said rod members, said collar elements used in opposed pairs, one of said collar elements positioned at each exposed aperture of said throughbore on saidrod member, said collar elements having throughbore engaging means externally positioned thereon and projecting outwardly from the surface of aid collar elements, said collar elements each releasably engaging both said aperture and said rod member to restrain relative rotational and reciprocative motion therebetween, said collar elements each having a substantially cylindrical portion engaging a portion of said throughbore.

7. The apparatus of claim **6** wherein said structure includes at least one beam member having a plurality of rod members passing through said throughbores, said rod members positioned perpendicular to the axis of said beam member.

8. The apparatus of claim **6** wherein said collar elements each comprise a first substantially cylindrical portion having a diameter greater than said throughbore and a second substantially cylindrical section having a diameter permitting insertion of said second section into said throughbore, said collar elements each having an axial bore of sufficient diameter to receive said rod member and having throughbore engaging means projecting outwardly from said second substantially cylindrical section.

9. The apparatus of claim **8** wherein said collar elements have rod member engaging means to fasten said collar elements to said rod members preventing relative motion therebetween.

10. The apparatus of claim **6** wherein an equal number of said throughbores are positioned upon each of two perpendicular axial planes.

11. The apparatus of claim **6** wherein said throughbores are substantially cylindrical.

* * * * *

PO-1050
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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,814,416 Dated June 4, 1974

Inventor(s) Warren B. Munger and Charles A. Kirby

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

First page of Patent text, line 2, delete the phrase "Warren B. Munger, Vashon Island;" and insert in its place the phrase --Charles A. Kirby, Gig Harbor--; line 3, delete the phrase "Charles A. Kirby, Gig Harbor," and insert in its place the phrase --Warren B. Munger, Vashon Island,--.

Column 8, line 25, after "planes.", delete the words "said rod said".

Column 8, line 35, insert a space between the words "said" and "rod".

Column 8, line 38, after the word "of", delete the word "aid" and insert in its place the word --said--.

Signed and sealed this 1st day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents