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3,422,565

TUBE, PLUG AND RESILIENT LINK CONSTRUCTION DEVICE

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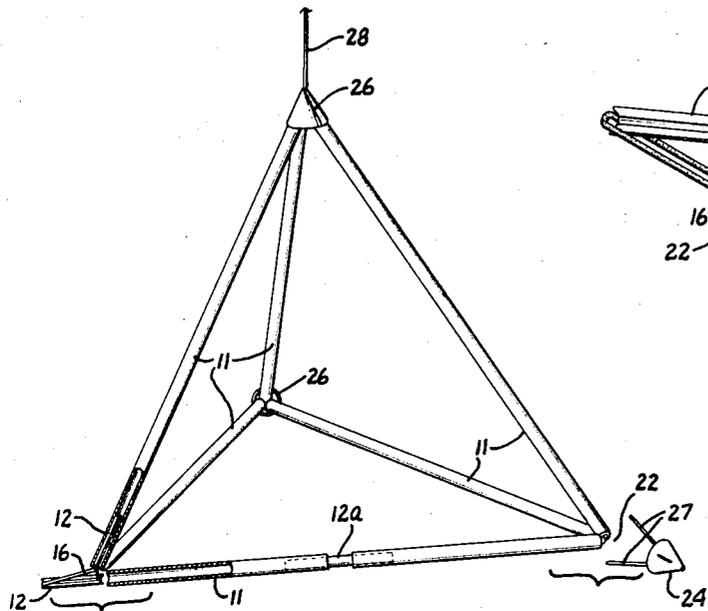


FIG. 1.

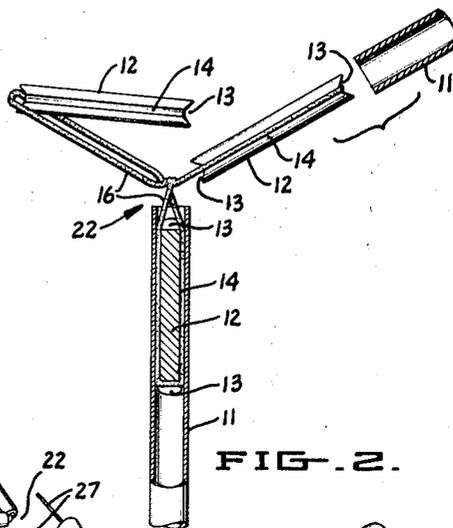


FIG. 2.

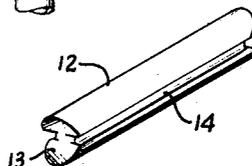


FIG. 3.



FIG. 4.



FIG. 5.

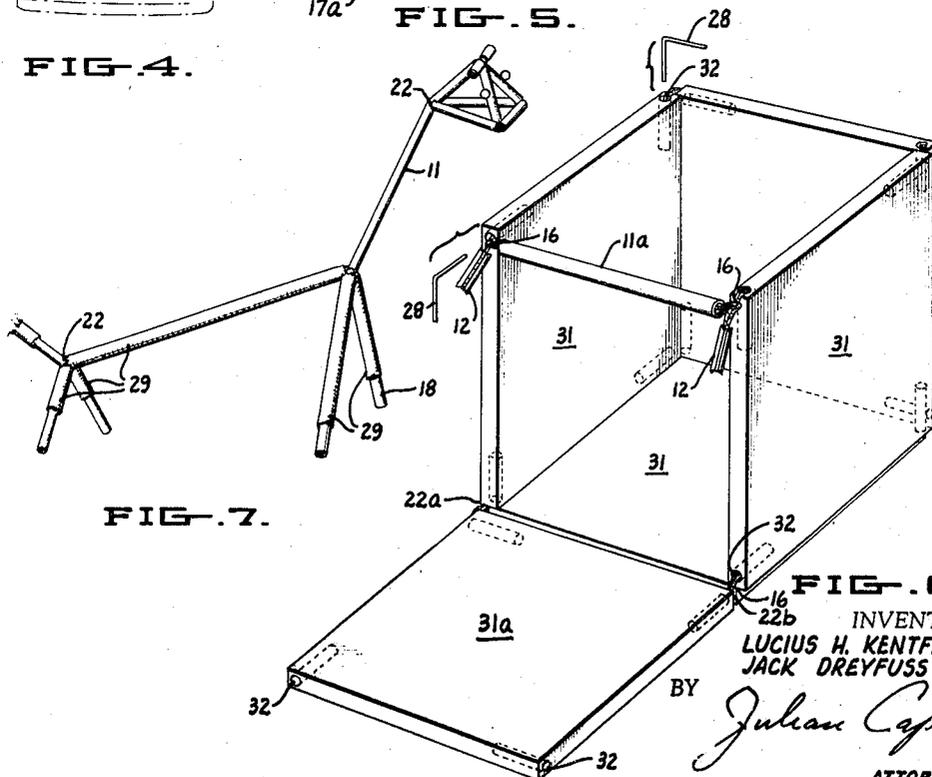


FIG. 7.

FIG. 6.

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## TUBE, PLUG AND RESILIENT LINK CONSTRUCTION DEVICE

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13 Claims

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### ABSTRACT OF THE DISCLOSURE

A plurality of construction members having openings, plugs fitting into the openings, adjacent plugs are joined by elastic links which thus flexibly connect the members to form various geometrical shapes. The angles may be rigidified by inserting rigid angled pins in the joints.

This invention relates to a new and improved construction toy or game having both amusement and educational values.

Essentially the present invention employs a plurality of tubes such as soda straws which may be linked together end to end in various patterns. The patterns may be simple or intricate and may be recognizable or abstract in form. Further, they may be two or three dimensional. In preferred forms of this invention the structures are sufficiently light in weight so that they may be suspended as mobiles. However, it will be understood that the invention can also be used as a toy similar to various other construction toys presently available. Ornamental features may be enhanced by hanging such ornaments as Christmas tree balls, icicles, tinsel, and the like from various parts of the forms produced.

A particular feature of the invention is the use of groups of elastic bands or links together with short plugs which fit inside the tubing to form the joints where the ends of tubing meet. The diameter of the plugs is slightly less than the inside diameter of the tubing, and these plugs are suitably grooved so that rubber bands may be stretched longitudinally of the plugs prior to their being slipped into the ends of the tubing. The various bands are joined together and hence if one band and one plug is slipped into the end of each tube which meets at a corner, all of the ends are joined together. To rigidify the joint where necessary a metal pin may also be slipped into the ends of the abutting tubes, the pin being bent at an angle to accommodate the angle at which the tubes meet. This arrangement provides versatility in the numerous patterns which can be formed and permits the tubes to assume angles relative to each other of far greater versatility than in other construction toys of this general character.

To promote the ornamental effect of the structures produced, the tubing may be initially fabricated in various colors or the tubes may be painted by the user. Alternatively, fabric sleeves may be slipped over the tubes to improve the appearance thereof for certain purposes. Plain or colored sheets of paper foil or plastic can be glued or otherwise adhered as panels to the forms produced.

A still further feature of the invention is the provision of sides which are recessed to receive the clips heretofore mentioned to construct boxes and other shapes having regularly shaped flat sides.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a perspective view of a tetrahedron formed

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in accordance with this invention, this shape being illustrative of but one form which can be constructed.

FIG. 2 is an enlarged perspective view showing schematically the manner in which a joint between adjacent tubes is constructed.

FIG. 3 is a perspective view of a clip used in the joint.

FIG. 4 is a perspective view of one form of elastic link.

FIG. 5 is a perspective view of another form of elastic link.

FIG. 6 is a perspective view of a box constructed in accordance with this invention, one side of the box being hinged, and the top being removed.

FIG. 7 is a perspective view of a giraffe-like form which may be constructed in accordance with the invention.

One essential construction element which forms a principal member in accordance with this invention is a tube 11 similar in shape to a soda straw but preferably formed of plastic material, clear or colored, metal or paper and having end opening passages. In one form of the invention, tube 11 is preferably of an inside diameter of about  $\frac{3}{16}$ " , but different sizes of tubes may be used and in some instances the smaller tubes may be telescoped into the ends of the larger tubes. When desired, the user may paint the tubes to achieve ornamental effects. Preferably, the tubes are furnished in various lengths and where a particular length is unsatisfactory the user may cut to size.

A plurality of plugs 12 is provided dimensioned to fit inside the end of a tube 11. Plugs 12 are preferably cylindrical, about 1" in length with a  $\frac{3}{16}$ " outside diameter, but where different size tubes are used corresponding plugs are also provided. Transverse, diametric notches 13 are formed in each end of plug 12 and longitudinal grooves 14 are formed on the cylindrical portion communicating with notches 13.

Flexible elastic links 16, best shown in FIG. 4, are also used in the invention. Suck links are preferably of a closed loop rubber band type material and flattened tubular in shape, having  $\frac{1}{32}$ " wall thickness and an expanded diameter of about  $\frac{3}{8}$ ". Tubing 17 is sliced into individual links each about  $\frac{1}{16}$ " wide by transverse slices 18, but the tubing is not sliced completely through but one end 19 (an element of tube 17) is left uncut so that in normal usage the adjacent links are joined together along longitudinal element 19. Any number of separate links 16 may be thus joined, depending upon the number of tubes 11 which meet in a given corner, and it is of course apparent that links 16 may be sliced apart by the user to reduce the number in a group.

As shown in FIG. 5, links 16a are formed from double tubing 17a, that is rubber tubes joined longitudinally at the middle 21. The slices 18a, 18b that make the individual links are sliced inwardly toward the central joint or middle 21 from each side, thus joining the links at middle 21.

As the first step in assembly of a corner 22, such as that shown in FIG. 2, a number of plugs 12 is chosen for the number of tubes 11, which meet at the corner, and a group of links 16 joined at element 19 or middle 21 is selected having at least as many members as the tubes 11 to be together. Each plug 12 is slipped endwise into one of links 16 or 16a, the links fitting along longitudinal grooves 14 and also across notches 13 at either end of the plug. Each plug 12 is then pushed into the end of a tube 11 and holds frictionally in place once it is positioned, the links and plugs together serving as connecting means. Because the links 16 are joined together the tubes 11 are likewise joined together. The joints 22 may be concealed by caps 26 consisting of conical sheet material having flexible wire legs 27 fixed thereto, which fit into the ends of the tubes and the conical cap conceals the joint where the tubes meet. In three dimensional figures rigidification of

the joint is usually not required. However, where necessary or desirable rigid pins 28, such as metal wire, bent at various angles as required may be slipped into the joints to hold a precise angularity.

Where a tube 11 is not of sufficient length, two pieces may be spliced together by inserting a plug 12a having a single rubber link around each end into the ends of adjacent tubes to make up the desired length (see bottom of FIG. 1).

FIG. 7 illustrates how a representative figure, such as a giraffe, may be built up of a plurality of tubes 11 meeting at odd angles. Sleeves 29 of fabric may be slipped over some of the tubes 11 to improve the ornamental effect.

FIG. 6 shows a further modification of the invention. Principal members in the form of sides 31 of clear plastic or of colored material are provided at each cone with socket 32 shaped to receive a plug 12. Pluralities of plugs 12 may be joined together by plural links 16 or 16a to form the joints and the joints may be rigidified by pins 28 where desired. In the form of the invention shown in FIG. 6, a tube 11a is incorporated into the structure of the sides to interconnect the upper ends of two walls 31. A hinged door 31a is provided by eliminating the use of a rigid pin at the two corners marked 22a, 22b, and the elastic links 16 provide the hinge.

It is apparent that only the ingenuity of the user limits the two and three dimensional shapes, which may be constructed. Because of the light weight of the material used, figures may be suspended as mobiles. On the other hand, figures may be constructed rugged enough to be handled as toys. Geometric and organic chemical demonstration models may readily be assembled.

Although the foregoing invention has been described in some detail, by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be practiced within the spirit of the invention and scope of the appended claims.

What is claimed is:

1. A device comprising a plurality of principle members having end-opening passages, connecting means for joining said members, said connecting means including a plurality of plugs each shaped to fit within one of said passages, said means further including a flexible elastic linking member having a plurality of resilient closed loops joined together and each said loop shaped to stretch over the ends of and fit longitudinally around one of said plugs being adapted to frictionally fit said passages in order to join said principal members.

2. A device according to claim 1 in which said loops are formed by thin, parallel slices transverse to the axis of a tubular length of resilient material, said slices terminating short of severing the loops from said length, said loops joined along a longitudinal element of said length.

3. A device according to claim 1 in which said loops are formed from a length of double tubes joined down the middle where said tubes abut, said loops defined by thin parallel slices of said tubes, said slices terminating short of severing the loops from said middle, said loops joined at said middle.

4. A device according to claim 1 in which each said plug is formed with longitudinal grooves to receive said loops.

5. A device according to claim 1 in which each said plug is formed with substantially diametric notches at either end to receive said loops.

6. A device according to claim 1 in which each said plug is formed with longitudinal grooves and a diametric notch at each end communicating with the said grooves to receive said loops extending longitudinally around the ends of said plug.

7. A device according to claim 1 which further comprises a cap dimensioned to conceal said joint and having prongs fitting into at least one said principal member to secure said cap in place.

8. A device according to claim 1 which further comprises a pin bent at an angle and slipped into ends of at least two of said passages in adjacent ones of said principal members to rigidify the angle between said members.

9. A device according to claim 1 which further comprises a decorative sleeve slipped over at least one said principal member prior to insertion of said plug in said principal member.

10. A device according to claim 1 wherein one of said principal members comprises a substantially planar member formed at corners with recesses each shaped to receive one of said plugs.

11. A device according to claim 1, in which at least two said principal members are adjacent each other and comprise planar sheets, one said end opening passage formed adjacent a corner of each of said sheet.

12. A figure according to claim 11 which further comprises at least one pin bent at an angle and having its opposite ends fitting within said passages to rigidify the angle between adjacent members in which said passages are formed.

13. A figure comprising a plurality of tubular members having end-opening passages meeting in at least one corner, connecting means for joining said members, said connecting means including a plug fitting within one of said passages, said means further including a flexible elastic linking member having a plurality of resilient closed loops joined together and each said loop stretching endwise over one said plug and inside one said passage, said connecting means frictionally securing said tubular members in assembled proximity.

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F. BARRY SHAY, *Primary Examiner*.

U.S. Cl. X.R.

35—34; 46—31, 23, 29; 161—13; 287—54, 86, 189.36