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J. M. THOMAS

3,469,339

INTERCONNECTING TUBES

Filed April 15, 1966

2 Sheets-Sheet 1

Fig. 1

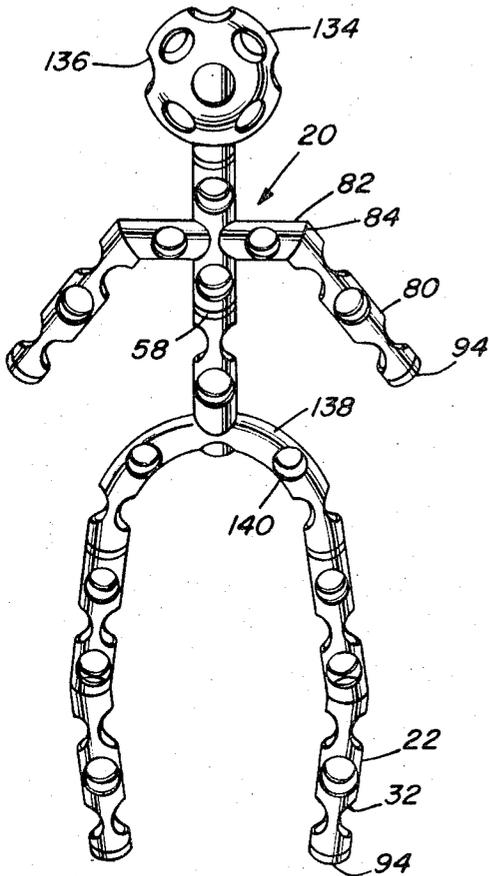


Fig. 2

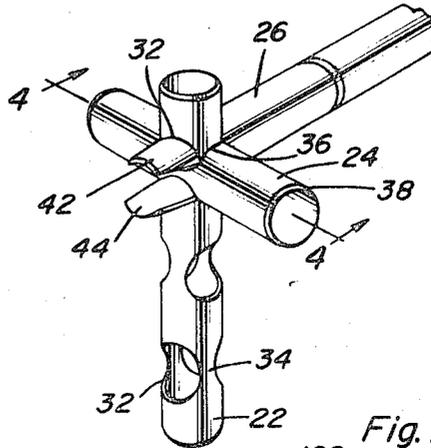


Fig. 15

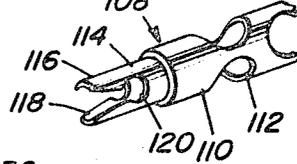


Fig. 3

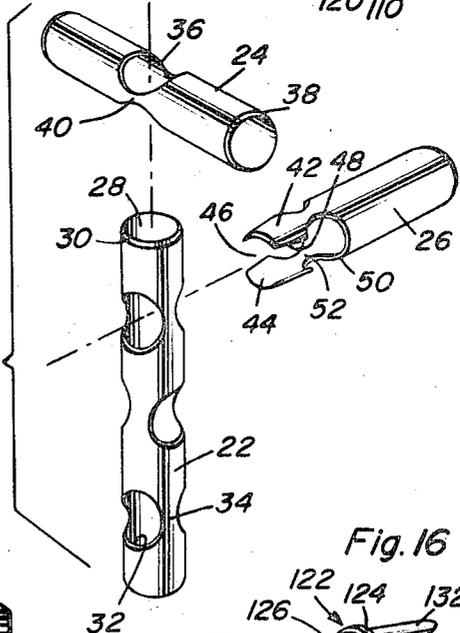


Fig. 4

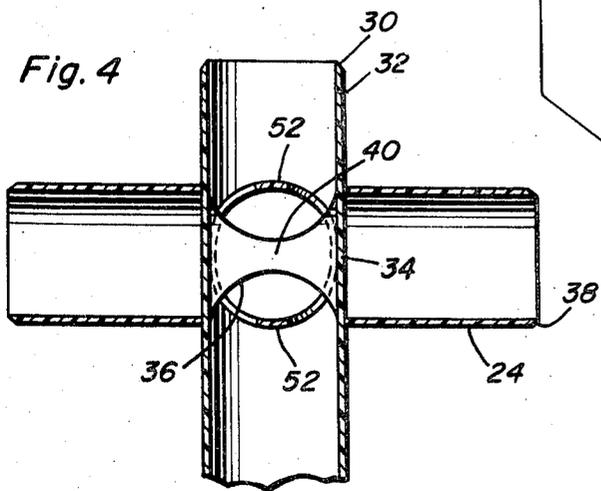
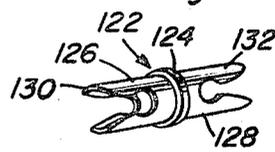


Fig. 16



John M. Thomas  
INVENTOR.

BY *Alvin A. Brown*  
*and Harvey B. Jackson*  
Attorneys

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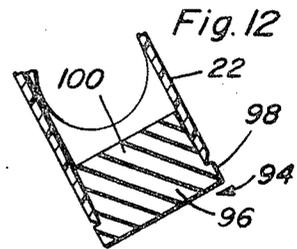
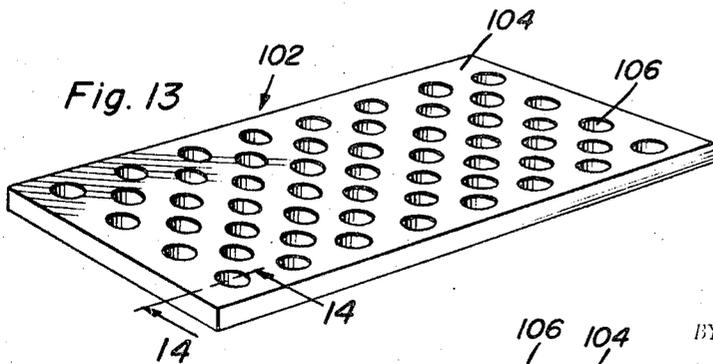
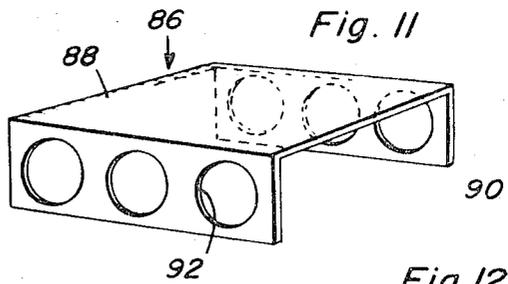
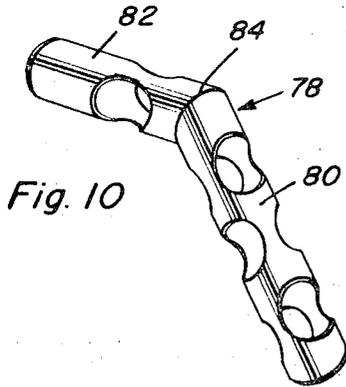
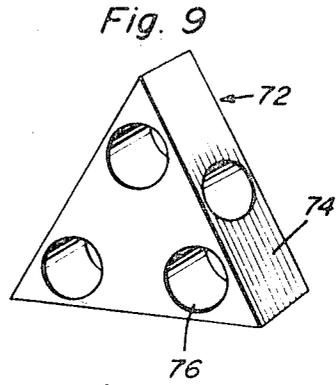
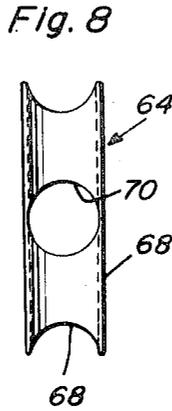
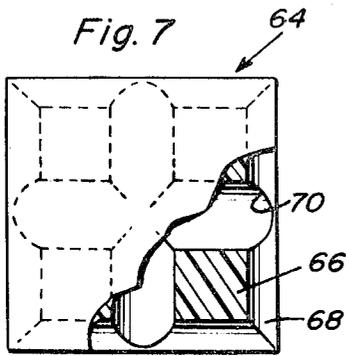
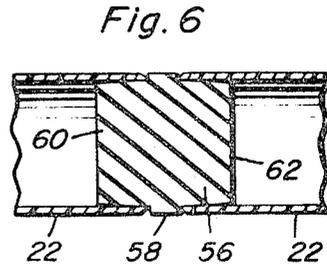
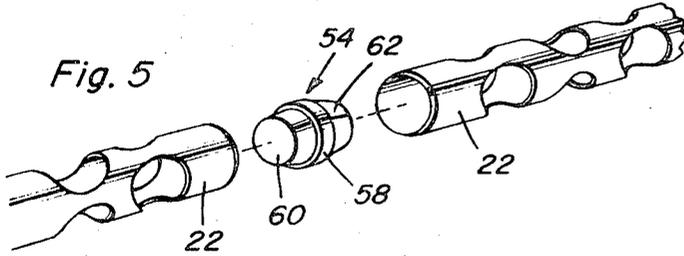
J. M. THOMAS

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INTERCONNECTING TUBES

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2 Sheets-Sheet 2



John M. Thomas  
INVENTOR.

BY *Clarence A. O'Brien*  
*and Harvey B. Jackson*  
Attorneys

1

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**INTERCONNECTING TUBES**

John M. Thomas, 631 E. Chestnut St.,  
Shamokin, Pa. 17872

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6 Claims

**ABSTRACT OF THE DISCLOSURE**

As assembly toy comprising a series of cylindrical resilient members. The first and second intersecting members include intersecting openings for receiving a bifurcated end portion of a third locking member. The bifurcated end portion is formed by inwardly tapering longitudinal slots terminating in an inward portion thereof by a transversely disposed aperture.

The present invention generally relates to a toy construction and more specifically an assembly toy in which a plurality of components may be readily assembled or built up by children especially those of preschool age with the device being so constructed and arranged that the components will always fit together thus eliminating any possibility of confusion or frustration of the child assembling the toy.

It is a significant object of the present invention to provide a building toy which is constructed of plastic material having a certain resilient and memory characteristics such as plastics or the like thus enabling the toy to be constructed at a relatively inexpensive cost thereby enabling the toy to be purchased at a minimum cost so that it will be economically feasible for families which may not be able to normally afford relatively expensive toys.

A further object of the present invention is to provide a building toy which is not only highly entertaining but will also serve to effectively teach manual dexterity and manipulative skills. In addition, the material from which the toy is constructed will provide a comfortable feel to the hands of a small child or infant and it will be safe and sanitary even though the child may place the components in his mouth which is not an unusual occurrence when a child is playing with a toy of this type.

Another very important object of the present invention which renders it unique and different is that the components of the toy may be assembled in various arrangements to form many varied objects and in order to form the framework for many toys. Thus, the toy is not only useful for small children but also provides older children with a toy from which more complicated structures may be formed.

Basically, the toy of the present invention involves plastic tubes of the same diameter which can be inserted through each other in perpendicular relation by providing holes through the tubes with there being a bifurcated end on certain of the tubes or on connectors for locking the interconnected tubes in assembled position. As an example of the varied utility of the invention, heads, arms, legs and body parts constructed of plastic can be fitted onto tubular parts to form simulated people, animals and the like. Structural parts can be used for axles and wheels can be added to make pull toys or the like.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, referenc being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of an assembled toy

2

illustrating an arrangement of components simulating a person;

FIGURE 2 is a perspective view of the manner in which the tubular components and bifurcated end portion of one of the components are assembled;

5 FIGURE 3 is an exploded perspective view of the components which are illustrated in assembled relation in FIGURE 2;

10 FIGURE 4 is a vertical sectional view taken substantially upon a plane passing along section line 4-4 of FIGURE 2 illustrating the relationship of the components employed in that assembly;

15 FIGURE 5 is an exploded group perspective view illustrating a connector for connecting the tubular components in longitudinal alignment and illustrating the relationship of the joined components;

FIGURE 6 is a longitudinal sectional view of the assembly illustrated in FIGURE 5 with the components in assembled relation;

20 FIGURE 7 is a plan view of a connector block with portions of one corner thereof broken away illustrating the structural details thereof;

FIGURE 8 is an edge view of the connector block of FIGURE 7;

25 FIGURE 9 is a perspective view of a triangular connector block;

FIGURE 10 is a perspective view of a tubular member having angulated end portions;

30 FIGURE 11 is a perspective view of a plate-like connector or panel having apertured flanges for use in constructing various items;

35 FIGURE 12 is a detail sectional view illustrating the structure of an end cap which may be inserted into a tubular component illustrating the association thereof in section;

FIGURE 13 is a perspective view of an apertured base plate or panel which may be used in constructing various devices;

40 FIGURE 14 is a detail sectional view taken along section line 14-14 of FIGURE 13 illustrating the construction of the apertured base plate;

45 FIGURE 15 is a perspective view of a bifurcated connector assembly which may be of reduced cross-sectional configuration insofar as the bifurcation thereof which may be employed for locking intersecting components together in certain instances; and

FIGURE 16 is a perspective view of another embodiment of a connector.

50 Referring now specifically to the drawings, the assembly toy of the present invention is illustrated in FIGURE 1 in a manner to simulate a person and generally is in the form of a figurine generally designated by the numeral 20. It is pointed out that the components of the assembly toy of this invention may be oriented in various associations to form numerous structures. The components of the toy assembly are constructed of a plastic material of any suitable color and of a convenient size for handling. The plastic material will be sanitary and also have a comfortable feel when grasped by children and also will have characteristics of resiliency and memory so that even if the components are deformed accidentally or intentionally, they will return to their previous shape.

55 As illustrated in FIGURES 2-4, the basic components of the present assembly toy include tubular members 22 and 24 which are oriented in perpendicular intersecting relation together with a connecting tubular member 26 which serves to lock the tubular members 22 and 24 in intersecting relation. As illustrated, the tubular member 22 is hollow throughout its length by the provision of an internal bore 28 with the end edges of the tubular member 22 being chamfered as at 30 to eliminate any sharp

edges. At longitudinally spaced points in the tubular member, transverse openings 32 are provided which are perpendicular to the longitudinal axis of the tubular member 22 and adjacent openings or holes 32 are also perpendicular to each other or at least in angular relation to each other and as will be observed, the peripheries of the openings 32 extend around a substantial portion of the periphery of the tubular member so that the connecting portion 34 which forms a portion of the tubular member 22 is relatively narrow and capable of some degree of deflections or deformations.

The tubular member 24 is the same diameter as the tube 22 and has at least a single hole or opening 36 extending therethrough which is the same size as the openings 32 in the tubular member 22. The ends of the tubular member 24 are also chamfered or beveled as at 38 to facilitate insertion of the tubular member 34 through the holes 32. The holes 32 and 36 are substantially the same diameter as the tubes 22 and 24 except for the connecting portion 34 in the tubular member 32 and a similar connecting portion 40 in the tubular member 24. However, the relatively narrow portions may be deflected outwardly to enable insertion of the tubular member 22 through the hole 36 as illustrated in FIGURE 2 or the tubular member 24 may be inserted through one of the holes 32.

The connector 26 is also a tubular member of the same diameter as the tubular members 22 and 24 and is provided with a bifurcated end portion in which the bifurcations are designated by numerals 42 and 44 and the bifurcations are formed by longitudinal slots 46 which are diametrically opposed and which have inclined edges 48 which define the slot 46. At the inner ends of the slots, the slots communicate with a transverse opening 50 which has a diameter generally equal to the openings 32 and 36 and the tubular members 22 and 24. The opening 50 thus leaves relatively narrow connecting portions 52 which connect the main portion of the tubular member 26 with the bifurcations 42 and 44 to enable a certain degree of flexing of the bifurcations 42 and 44. The remainder of the tubular member or connector 26 may be solid and tubular or it may be provided with transverse openings if desired.

As illustrated in FIGURE 2, the tubular member 22 has been inserted through the opening 36 in the tubular member 24 with the tubular member 22 and the tubular member 24 being orientated in perpendicular relation to each other but lying in the same vertical plane. The tubular connector 26 is then inserted through the uppermost opening 32 in the tubular member 22 with the tubular connector 26 being in perpendicular relation to both the tubular member 22 and the tubular member 24. The bifurcations 42 and 44 are inserted through the top and bottom portions of the uppermost opening 32 in the tubular member 22 and also inserted through the intersecting portion of the opening 36 with the connecting portions 40 defining the opening 36 being received between the bifurcations 42 and 44 and against the inner wall of the opening 50 whereas the connecting portions 34 are engaged against the longitudinally remote edges of the opening 36. The normal resiliency and memory characteristics as well as the flexibility of the plastic material from which the tubular members 22, 24 and 26 are constructed enables these elements to be interconnected and interrelated in such a manner that they will be easily assembled and will retain themselves in assembled relation and still enable easy disassembly thereof.

The tubular members may be solid or reinforced in the areas between the openings if desired and the tubular members may be of varying lengths and different colors to produce any desired pattern or variations in patterns.

FIGURES 5 and 6 illustrate a connector generally designated by numeral 54 which is used for interconnecting a pair of tubular members such as tubular members 22 in longitudinal alignment. The connector 54 includes a solid body 56 which is also may be hollow if desired and

provided with a centrally disposed annular rib 58 which abuttingly engages the tapered ends of the tubular members 22. Projecting longitudinally outwardly from each side of the rib 58, there is provided a tapered projection designated by numerals 60 and 62 respectively which decrease in diameter longitudinally outwardly from the rib 58 and guidingly and telescopically are received in the end portions of the tubular members 22 thus frictionally and releasably retaining the tubular members 22 and 24 in longitudinal alignment and in assembled relation. The resilient, flexible and memory characteristics of the material from which the tubular members and connector 54 are constructed will serve to retain the tubular members assembled in relation to the connector 54. Of course, the connector 54 may be employed to connect any of the different types of tubular members or any other members having a longitudinal hollow portion or a tubular opening together. For example, one of the projections 60 or 62 could be inserted into one of the holes such as the hole 32 in the tubular member 22 and assemble a structure in perpendicular relation thereto or for that matter in side-by-side offset relation, that is, if the two tubular members 22 were disposed in perpendicular relation to each other and in offset relation to each other, then the connector could be inserted into aligned holes 32 in the tubular members for retaining them in this assembled relation.

FIGURES 7 and 8 illustrate a connector block 64 generally in the form of a square or rectangular body or block 66 having a concave recess 68 extending around the periphery thereof which recess may be generally semi-cylindrical in configuration and having a dimension generally equal to the diameter of the tubular members. Extending inwardly from each side edge of the block 60 is a passageway or bore 70 which cross and intersect at the center thereof with the bores or passageways 70 being substantially the same diameter as the tubular members for insertion of the tubular members into the bores 70. While the bores have been illustrated as extending only inwardly from the side edges thereof, it is pointed out that additional bores may be employed in perpendicular relation to the bores or in any angular association therewith for enabling various tubular members, connectors and the like to be employed in combination therewith in assembling various toys.

FIGURE 9 illustrates a generally triangular block 72 having a block or body 74 forming a triangle such as an equilateral triangle or the like and with there being a plurality of holes or passageways 76 extending throughout both from the flat faces thereof and from the edge faces as illustrated in FIGURE 9. Each of the passageways or bores 76 has a diameter equal to the diameter of the tubular members, connectors and the like for enabling assembly of various tubular members with the triangular connecting block 72.

FIGURE 10 illustrates a tubular member generally designated by the numeral 78 which has a tubular portion 80 and a tubular portion 82 orientated in angular relation to each other and having a juncture line 84 connecting the angularly orientated tubular members 80 and 82 in a rigid manner. The angular orientation of the tubular members 80 and 82 which, in effect, become an angulated tubular member enables associational various connectors, blocks and the like to form various structures.

FIGURE 11 illustrates a generally U-shaped connecting panel or supporting panel generally designated by numeral 86 which includes a plate or panel 88 and a pair of parallel flanges 90 perpendicular thereto. Each of the flanges 90 has a plurality of openings 92 therein of the same diameter as the openings in the other components for enabling assembly of various tubular members, connectors and the like therewith. The arrangement of the openings 92 may be varied and the plate or panel 88 which is illustrated as being imperforate may also be provided with a various arrangement of openings 92 as desired.

5

FIGURE 12 illustrates an end cap generally designated by numeral 94 which includes a body 96 having a peripheral flange 98 generally equivalent to the rib 58 in the connector 54 which abuttingly engages the end of a tubular member such as tubular member 22. The body 96 also includes a tapered projection 100 which tapers longitudinally away from the flange 98 for telescoping guiding and frictional engagement with the interior of the tubular member 22 thus forming a closure for the end of a tubular member thus enabling a more finished appearance for a structure that is constructed in a manner that a tubular member has an open terminal end. The closure member 94 is in the form of a closure plug for such open tubular ends.

FIGURES 13 and 14 illustrate a base plate generally designated by the numeral 102 which includes a generally rectangular plate 104 having a plurality of openings 106 extending therethrough which are orientated in a suitable pattern or in a random arrangement for receiving various of the tubular members, connectors, plugs or the like thus enabling a device to be constructed on a supporting panel or base thus stabilizing the device to enable it to more readily stand and avoid the tendency of construction toys to fall over or be rather unstable. By employing the base plate 102, the connectors, tubular members and other elements connected thereto and supported therefrom will be supported in a stable manner which increases the utility and desirability of the toy since the device constructed by children or the like will not fall over and be unstable.

FIGURE 15 illustrates a tubular connector 108 which is provided with a tubular member 110 having openings 112 formed therein if desired and at the end of the tubular member 110, there is provided a reduced longitudinal extension 114 having bifurcated ends 116 formed by an inwardly extending slot 118 having converging edges and which terminate in a transverse opening 120 of smaller diameter than the opening 112 inasmuch as the diameter of the reduced end portion 114 is reduced. This construction enables insertion of the reduced end 114 into the end of a tubular member such as a tubular member 22 for connecting the tubular member 22 to the tubular member 110. Of course the other end of the tubular member 110 may be of the same diameter throughout its length or may be provided with a reduced extension 114, if desired.

FIGURE 16 illustrates a connector 122 which has an annular cylindrical rib 124 in the center thereof and a pair of reduced end portions 126 and 128 each of which is bifurcated as indicated at 130 and 132 in the same manner as the end of the connector 108 for connecting two tubular members such as tubular members 22 together and for serving in substantially the same manner as the connector in FIGURE 4 except that the reduced extension portion 126 engages the tubular member over a longer distance and the resiliency formed by the bifurcated end portions 130 and 132 will more securely grip the interior of the tubular members 22.

The various components may be assembled in various manners and the specific components illustrated are not all of the components provided but are representative of such components. For example, in FIGURE 1 there is provided a generally hollow spherical member 134 having a plurality of openings 136 therein which are capable of receiving the tubular members, connectors and the like curved tubular members 138 may be provided to simulate for use as the head of the figurine 20. Also arcuately curved tubular members 138 may be provided to simulate the hip region of the figurine and the arcuate member 138 may also be provided with holes 140 or the like.

As indicated previously, the various types of tubular members may be provided in various dimensions insofar as length is concerned and may be curved or angulated with the angulated portions being of equal length or unequal length.

6

The end plugs 94 may be constructed of plastic material and also may be constructed of rubber, cork or other materials and this is also true of the connector 54.

The various components may be solid or hollow as illustrated and the ends may be duplicate or one end may be provided with a connecting assembly and the other end provided with a tapered or chamfered structure. With the various tubular members being constructed of the same diameter, they can be interconnected due to the fact that the tubing is constructed of plastic material and has a resilient characteristic as well as a flexible characteristic and the holes are not quite truly round but slightly oval so that the same size tubular member will fit through the hole and provide a good smooth holding action. Various types of panels can be used in the construction set for making various structures such as buildings, bridges and the like and such panels and including the base plate provides a stability to the over-all structure. The connector block such as the block 64 with the side grooves or contours being constructed to fit over the various tubes so that a number of blocks may be interconnected by the tubes or a number of tubes may be interconnected by the blocks. Various arrangements of holes, and grooves may be provided in the blocks not only around the periphery thereof but across the surfaces thereof in various orientations thus enabling the blocks to serve as connectors between the various tubular members which are disposed in angulated intersecting relation to each other. Various of the blocks may be provided for constructing bridges, buildings, elevated roadways and the like. The various blocks may be of various colors and may have design work incorporated into them to simulate the appearance of building structures, bridge structures or the like and the blocks may be constructed of wood, plastic or similar material. The various blocks may be hollow or solid and may be constructed to receive the various tubular members and connectors as desired for increasing the utility of the device.

While the tubes are joined end to end, a connector such as connector 54 or the connectors illustrated in FIGURES 15 and 16 can be employed for securing the tubular members in assembled position.

In addition to the components mentioned, various other components may be provided for forming various special configurations. For example, in forming a figurine, there may be provided two components which simulate the hand and outer arm portion of a figurine for mounting on a tubular member which forms the remainder of the arm. Likewise, the spherical member may have markings simulating a face and a hat-like structure may be provided for mounting on the top of the spherical member to further simulate a figurine. The leg portions of the figurine may also have special elements attached thereto which simulate the feet or lower leg portion of a figurine. These devices may be special molded items which fit over the tubes and are molded around a tubular member so that the tubular members may be joined in the usual manner but a simulated figurine will be formed which is highly novel and entertaining.

Another arrangement involves the use of the various components to construct a device simulating a vehicle. In this arrangement, certain of the blocks may be formed to illustrate the front portion, central portion and rear portion of a vehicle and assemble with the tubes and spherical members or other structures which simulate a vehicular structure. Of course, various other special components may be provided in the toy assembly for enabling the toy assembly to be specifically employed for building various items. The fact that the various items may be easily fitted together to form people, animals and various items, children will be quite intrigued with the device and the assembly is quite safe and sanitary and while providing an entertaining toy, it will also teach manual dexterity and enable a small child to express his own thoughts as to constructing various structures and simulating various well known items.

What is claimed as new is as follows:

1. A building toy including a tubular member having a flexible bifurcated end portion formed by two diametrically opposed longitudinal slots extending inwardly from a first end, each of said slots having inwardly tapering confronting edges, and a transversely disposed aperture communicating with the inner ends of said slot, a pair of matching cylindrical members, said members being constructed of a flexible, resilient shape sustaining material, at least one of said members having a transverse opening therethrough having a diameter substantially equal to the outer diameter of the other member, said one member having a relatively narrow connecting portion at diametrically opposed portions of the opening for enabling slight deformation to receive the other cylindrical member therethrough for frictionally and resiliently retaining the cylindrical members in assembled relation, the bifurcated end portion of said tubular member being wedged between said pair of cylindrical members and extending transversely of said member thus forming an interlocking formation for securing the pair of cylindrical members together.

2. The structure as defined in claim 1 wherein said pair of matching cylindrical members are provided with angulated portions having the abutting ends thereof joined together.

3. The structure as defined in claim 1 together with a base plate having a plurality of apertures therethrough with the apertures being the same diameter as the cylindrical members for engaging the cylindrical members and forming a support therefor.

4. The structure as defined in claim 1 together with a spherical hollow member having a plurality of holes

therein for receiving the cylindrical members and forming a spherical projection for an existing structure.

5. The structure as defined in claim 1 together with connecting blocks having passageways extending therethrough with the passageways having a diameter substantially equal to the diameters of the holes in the cylindrical member.

6. The structure as defined in claim 5 wherein said connecting block is provided with grooves in the periphery thereof substantially one-half of the diameter of the cylindrical members for engaging the cylindrical members therein.

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