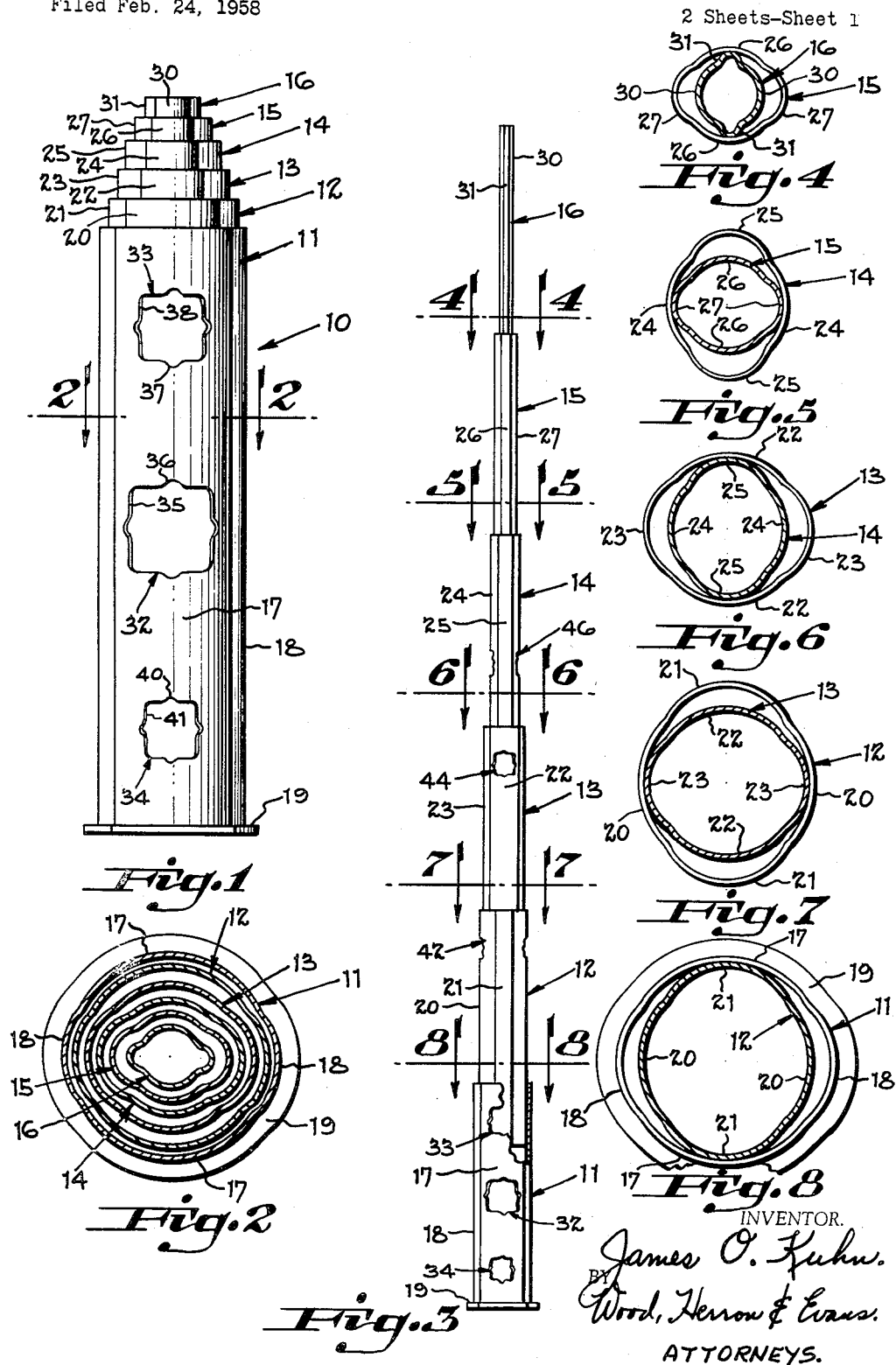


Aug. 23, 1960

J. O. KUHN
CONSTRUCTION TOY

2,949,692

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2 Sheets-Sheet 2

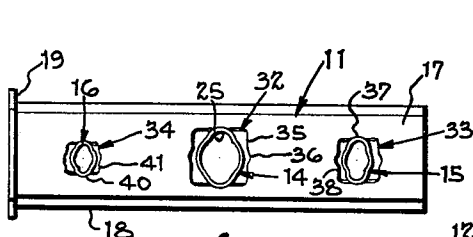


Fig. 9

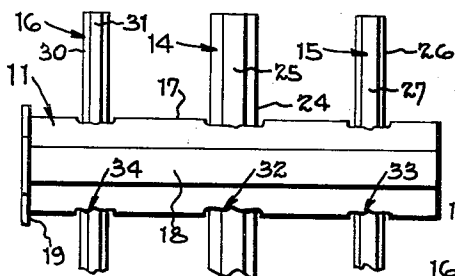


Fig. 10

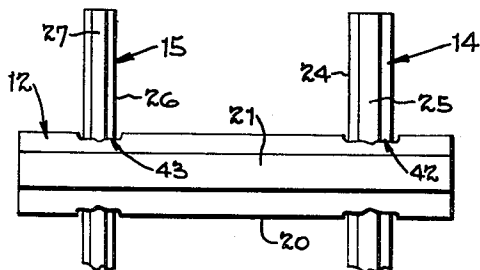


Fig. 11

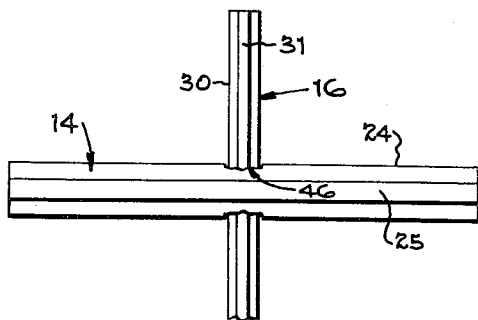


Fig. 12

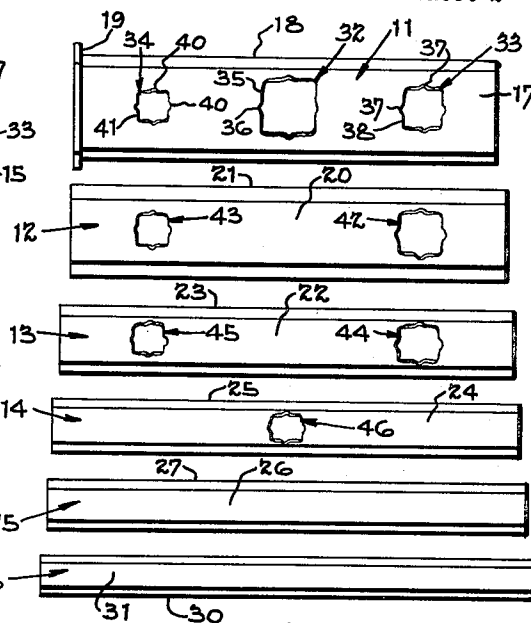


Fig. 13

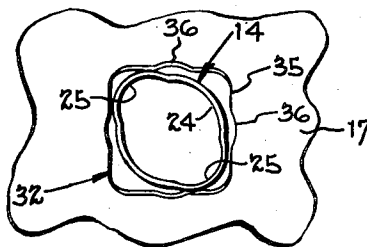


Fig. 14

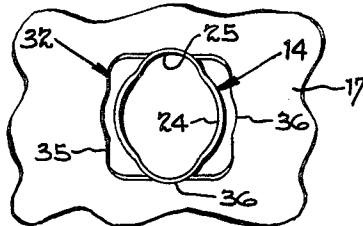


Fig. 15

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2,949,692

CONSTRUCTION TOY

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3 Claims. (Cl. 46—28)

This invention relates to toys and is particularly directed to a toy having a plurality of different members which can be selectively assembled in a large variety of shapes.

The principal object of the present invention is to provide a toy comprising a set of tubular members which can readily be assembled in various shapes by very young children. In the past, many different types of construction toys have been proposed, such as "Tinker Toys," "Erector" sets, and the like. However, it requires an appreciable amount of dexterity to assemble these toys so that they have been largely unsuitable for pre-school children.

This invention is predicated upon the concept of providing slightly compressible, or elastic, tubular members which can be joined to form axial and transverse joints by merely inserting one member into another and turning one of the members to effect a frictional lock. No tools of any kind are required to assemble the tubes and the manipulations involved can readily be performed by a three year old.

More particularly, one preferred form of toy constructed in accordance with the present invention comprises a set of elongated tubes of similar shape but of graduated cross-sectional size. Each of the elongated tubes is formed of a slightly compressible plastic such as polyethylene, polystyrene, or the like and includes two opposed arcuate walls, the walls being interconnected by arcuate lobes, or key portions. The lobes extend outwardly beyond the walls so that the width of the tubes across the lobes is greater than the dimension across the arcuate walls. These respective outside dimensions across the lobes and across the arcuate walls of each tube of the set are respectively less than the corresponding inside dimensions across the lobes and arcuate walls of the next larger tube of the set. Consequently, each tube may be telescopically inserted in the next larger tube of the set by aligning the lobes of the two tubes. However, the outer dimension across the lobes of the smaller of the two tubes is greater than the inside dimension across the arcuate walls of the next larger tube. As a result, the two tubes can be locked in position by rotating the smaller tube relative to the larger one until the lobes of the smaller tube engage the arcuate walls of the larger tube. This rotation of the smaller tube tends to slightly spread the arcuate walls of the larger tube and to cause a slight compression of the smaller tube so that a firm frictional lock is obtained even when only a short length of the small tube is inserted in the larger tube. Thus, it is possible to join two or more tubes in this manner to form an elongated pole or the like.

Additionally, certain of the tubes in the set are provided with transverse openings adapted to receive a smaller tube for forming a transverse connection. More particularly, these transverse openings are formed in aligned portions of the arcuate walls of a tube and are of generally rectangular configuration. At least one pair of opposed walls of each opening is provided with

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aligned notches, or recesses. The openings are dimensioned so that the diagonals of each opening are greater than the maximum dimension across the lobes of the tube to be received within the opening. However, the height and width of the rectangular openings are less than the maximum dimension across the lobes of the tube to be received. To form a transverse joint, the cross tube is first turned so that its lobes lie along a diagonal of the transverse apertures. The cross tube is then inserted through the apertures and is rotated approximately 45 degrees, until the lobes engage the opposed recesses. The lobes are slightly compressed in this position and a firm frictional lock is obtained.

By combining various axial and transverse joints, a young child can construct many imaginative structures such as furniture, animals, and the like.

One of the principal advantages of the present toy is that the members are extremely simple to assemble and do not require the use of any tools, small bolts, or the like which would be difficult or even unsafe for use by very young children.

A further advantage of the present toy is that it is very economical to manufacture. The tubes can be molded or fabricated by extruding a suitable slightly compressible plastic material such as polyethylene or polystyrene in the desired cross sectional form. The extruded tubes are then cut to the proper length and the transverse openings are stamped through the tubes where desired. No finishing process of any type is required, as is customary in the case of either metal or wooden toys.

A further advantage of the present set of toys is that the set forms its own container. More particularly, when the set of tubes is assembled in a nested position, the innermost tube can be rotated to wedge each of the tubes in place so that all of the tubes are frictionally locked and the largest tube serves as a container.

These and other objects and advantages of the present invention will be more readily apparent from a further consideration of the following detailed description of the drawings illustrating a preferred embodiment of the invention.

In the drawings:

Figure 1 is an elevational view of one set of tubes constructed in accordance with this invention showing the tubes in a fully nested position.

Figure 2 is a cross-sectional view taken along line 2—2 of Figure 1.

Figure 3 is an elevational view, partially broken away, of the set of tubes shown in Figure 1 assembled to form an elongated pole.

Figure 4 is a cross-sectional view taken along line 4—4 of Figure 3.

Figure 5 is a cross-sectional view taken along line 5—5 of Figure 3.

Figure 6 is a cross-sectional view taken along line 6—6 of Figure 3.

Figure 7 is a cross-sectional view taken along line 7—7 of Figure 3.

Figure 8 is a cross-sectional view taken along line 8—8 of Figure 3.

Figure 9 is a plan view showing three tubes joined at right angles to a fourth tube.

Figure 10 is an elevational view of the assembly shown in Figure 9.

Figure 11 is an elevational view similar to Figure 10 showing two tubes assembled at right angles to a third tube.

Figure 12 is an elevational view similar to Figure 10 showing two tubes joined at right angles.

Figure 13 is an elevational view of the tubes forming the nested set of tubes shown in Figure 1.

Figure 14 is an enlarged view showing two tubes assembled prior to completing a transverse joint.

Figure 15 is a view similar to Figure 14 showing a completed transverse joint between two tubes.

While various component tubes constructed in accordance with the present invention may be grouped in various ways, one preferred set especially adapted for use by very young children, is shown in Figure 1. While the set of tubes shown includes six tubes, it is contemplated that a set may include additional tubes of different sizes; or alternatively, a set may include a large number of tubes of only two or three different sizes. As shown in Figure 1, the set of tubes 10 includes an outer tube 11, intermediate tubes 12, 13, 14, 15, and a smallest, or innermost tube 16. Each of the tubes 12, 13, 14, 15, and 16 is of smaller size than the next outwardly disposed tube and is also preferably of slightly greater length. Each of the tubes 11-16 is formed of a slightly compressible plastic material such as polyethylene or a polystyrene. As best shown in Figure 2, each of the tubes 11-16 is of generally the same shape including opposed arcuate wall sections and opposed outwardly extending key portions, or lobes. The tubes can readily be produced by molding or by extruding plastic material in the cross sectional shapes shown. The pieces of extruded tubing are then cut in any suitable manner to appropriate lengths.

More particularly, tube 11 comprises two opposed arcuate wall sections 17 which are preferably arcs of circle. These arcuate wall sections are interconnected by opposed key wall portions, or lobes 18, which project radially outwardly beyond walls 17. Key wall portions 18 have a radius of curvature slightly less than the radius of curvature of arcuate wall sections 17. Tube 11 also is preferably provided with a bottom, or base wall 19 which extends across the lower end of tube 11 and includes a radially extending flange constituting a base for supporting tube 11 in an erect position. Base 19 also functions to support the tubes in their completely nested position shown in Figure 2.

Tube 12 includes arcuate wall sections 20 interconnected by lobes or key sections 21. The outside diameter, across walls 20, is appreciably less than the inside diameter across wall sections 17 of tube 11. The outside diametral dimension of tube 12 across lobes 21 is smaller than the corresponding internal dimension across lobes 18 of tube 11. That is, the maximum width of tube 12 is less than the maximum internal width of tube 11. Consequently, tube 12 can be nested within tube 11 as shown in Figure 2 by aligning the lobes of tube 12 with the lobes of tube 11. However, the outside measurement across lobes 21-21 of tube 12 is greater than the inner diameter of tube 11 taken across arcuate portions 17-17.

Thus, when tube 12 is rotated 90 degrees from its position in Figure 2 to the position shown in Figure 8, in which the lobes of tube 12 engage the arcuate wall portions 17 of tube 11, tube 12 is slightly compressed and the walls of tube 11 are slightly spread forming a firm frictional lock between tubes 11 and 12. A firm frictional lock is obtained in this manner even though tube 12 is only partially inserted in tube 11 so that only a fraction of the length of tube 12 engages tube 11 as shown in Figure 3.

Tube 13 is similar in cross-sectional shape to tubes 11 and 12. Specifically, tube 13 includes opposed arcuate wall sections 22 interconnected by lobes 23. The outside dimension of tube 13 across arcuate wall sections 22 is appreciably less than the corresponding inside dimension across wall sections 20 of tube 12. The outside dimension across lobes 23 is less than the inside dimension across lobes 20 of tube 12, but the outside dimension across lobes 23 is greater than the inside dimension across arcuate wall sections 20 of tube 12. Thus, tube 13 can readily be nested within tube 12 as shown in Figures 1 and 2 by aligning lobes 23 of tube

13 with lobes 21 of tube 12. However, when tube 13 is rotated 90 degrees to bring lobes 13 of that tube into alignment with wall portions 20 of tube 12, lobes 23 tend to force wall portions 20 apart so that a firm frictional lock is obtained between tubes 13 and 12 even when tube 13 is only partially inserted in tube 12.

In a similar manner, tube 14 includes opposed arcuate wall sections 24 and opposed lobe portions 25 interconnecting the wall portions. As in tubes 11, 12, and 13, the radius of curvature of lobes 25 is less than the radius of curvature of wall sections 24. The maximum outside dimensions of tube 14 taken across wall sections 24 and lobes 25 are respectively less than the corresponding inside dimensions taken across wall sections 22 and lobes 23 of tube 13. However, the maximum outside dimension of tube 14 across lobes 24 is greater than the inside dimension of tube 13 across wall sections 22. Therefore, tube 14 is adapted to be nested within tube 13 by aligning the lobes of the two tubes as shown in Figures 1 and 2, and tube 14 can be frictionally locked in tube 13 by rotating tube 14 to bring lobes 25 into registry with arcuate wall portions 22. As explained above, this rotation tends to expand walls 22 and compress lobes 25.

Tube 15 similarly comprises arcuate wall sections 26 and the lobes 27, the wall sections being centrally disposed relative to a first diametral line and the lobes being centrally disposed relative to a second diametral line perpendicular to the first diametral line. The outside dimension across the arcuate wall sections 26 of tube 15 is less than the inside dimension across arcuate walls 24 of wall 14 and the outside dimension across lobes 27 of tubes 15 is similarly less than the inside dimension across lobes 25 of tube 14. However, the outside dimension across lobes 17 of tube 15 is greater than the inside dimension across walls 24 of tube 14. Thus, tube 15 can be nested within tube 14 by aligning the respective lobes and arcuate walls of the two tubes; or tube 15 can be frictionally locked with tube 14 by rotating tube 15 ninety degrees to bring lobes 27 into engagement with walls 24 as shown in Figure 5.

In a similar manner, the smallest tube 16 includes arcuate wall sections 30 and key wall portions 31, the key wall portions 31 interconnecting wall portions 30 and extending outwardly beyond the wall sections. The diameter of tube 16 across wall sections 30 is less than the inside diameter of tube 15 across wall sections 26, while the width of tube 16 across lobes 31 is less than the inside dimension of tube 15 across lobes 27 but is greater than the inside dimension of tube 15 across wall sections 26. Thus, tube 16 is freely nestable within tube 15 as shown in Figure 2; and can be locked with tube 15 by rotating tube 16 so that its keys 31 engage arcuate walls 26 of tube 15 as shown in Figure 4.

In addition, it is contemplated that one or more of the tubes may be provided with transverse openings adapted to receive other tubes aligned at right angles to the first tube so that transverse joints may be formed.

More particularly, as shown in Figures 9, 10, 14, 15, tube 11 is provided with three sets of transverse apertures 32, 33, and 34. Each set of apertures includes two aligned openings formed in opposite arcuate walls 17 of the tube. These apertures form an opening through which one of the smaller tubes can be extended. These apertures 32 are adapted to receive tube 14, the axis of tube 14 being perpendicular to the axis of tube 11. Each aperture 32 is of generally rectangular cross section; the diagonal of the aperture being greater than the maximum dimension of tube 14 along lobes 25. Thus, as shown in Figure 14, tube 14 can be inserted through apertures 32 by turning tube 14 until lobes 25 lie along a diagonal of opening 32. The height and width of aperture 32, however, are less than the outer dimension of tube 14 across lobes 25. The walls 35 of apertures 32 are provided with recessed areas or keyways 36 adapted to re-

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ceive key portions, or lobes 25 of tube 14. Recesses 36 are dimensioned so that the total distance across the ends of opposed recesses 36 is still less than the maximum dimension across lobes 25 of tube 14. Thus, when tube 14 is rotated 45 degrees to bring lobes 25 into registry with a pair of recesses 36 as shown in Figure 15, the lobes 25 snap into the recesses. However, lobes 25 are slightly compressed so that a firm frictional lock is obtained.

Openings 33 and 34 are similar to openings 32 but are of graduated size, openings 33 being smaller than apertures 32 and openings 34 being smaller in turn than apertures 33. Each aperture 33 is dimensioned to receive tube 15 when that tube is placed in apertures 33 with the lobes 27 of the tube lying along diagonals of the apertures. However, the height and width of each aperture 33 and the size of recesses, or keyways 37 formed in the walls 38 of the apertures are such that when tube 15 is rotated 45 degrees its lobes snap into recess 37, so that tube 15 is slightly compressed and frictionally held in place.

Openings 34 are similarly dimensioned to receive tube 16, the tube originally being inserted in the apertures by aligning lobes 31 of the tube with a diagonal of openings 34 and thereafter rotating tube 16 forty-five degrees to bring lobes 31 into registry with a pair of opposed recesses 40 formed in the walls 41 of the openings.

As shown in Figures 11-13, arcuate wall portions 20 of tube 12 are provided with pairs of apertures 42 and 43 respectively defining transverse openings for receiving tubes 14 and 15. These apertures are respectively dimensioned relative to tubes 14 and 15 so that the tubes can readily be inserted within the apertures and then rotated to form a frictional lock with the lobes of the inserted tubes being in engagement with recesses formed in the aperture walls as explained above. Tubular member 13 is similarly provided with pairs of transverse openings 44 and 45 dimensioned to receive and frictionally support tubes 15 and 16 in the same manner as explained above. Tube 14 is provided with a pair of opposed transverse openings 46 dimensioned to receive and support tube 16 as shown in Figure 12.

It is apparent that a cross tube may be supported in the transverse openings of a longitudinal tube in any of four positions. In two of these positions the lobes of the cross tube extend parallel to the axis of the longitudinal tube and in the other two positions the lobes of the cross tube extend transversely of the axis of the longitudinal tube. By selectively positioning the cross tube within the transverse openings, many different shapes can be built-up; since in one position of the cross tube, a second cross tube in turn inserted in the transverse openings of the first cross tube will be parallel to the main longitudinal tube and in another position of the first cross tube, the second cross tube carried by the first cross tube will extend perpendicular to the longitudinal tube.

It will readily be appreciated from the foregoing description that even a very young child can use the tubular toy in many different entertaining ways. For example, a child can stack the tubes inside of one another to form a nested set of tubes as shown in Figure 1. This presents a greater challenge to the child than nesting rectangular blocks or the like since the child must not only select the proper order for inserting the tubes but in addition must properly orient the tubes so that their lobes are in alignment. It will be noted that the tubes constituting the set are of descending diameters and increasing lengths. Thus, when the tubes are completely nested, as shown in Figure 1, each tube extends upwardly beyond the next outwardly disposed tube. This facilitates the arrangement of tubes in their proper telescopic relationship and also facilitates the removal of a tube from a nested set.

It has been determined that the play value of the toy is greatly enhanced by constructing the tubes of the set so that their order of size is readily discernible to even

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a very young child. Accordingly, in the preferred set of tubes 10, there is a substantial graduation in tube sizes. This is emphasized by the fact that each of the tubes can be frictionally locked only in the next larger tube of the set but cannot be frictionally locked with any of the other larger tubes. Thus for example, tube 14 can be frictionally locked with tube 13 but cannot be frictionally locked with tubes 11 or 12.

When the tubes are completely nested, as shown in Figure 1, they can readily be locked in position by grasping the outermost tube 11 and innermost tube 16, and rotating tube 16 until the tubes are wedged together.

In addition to stacking the tubes, a child may assemble them in various manners, for example, to form the pole shown in Figure 3. This pole is formed by inserting the endwise portion of each tube into the endwise portion of the next larger tube and rotating the tubes to form a frictional lock as explained above. A child may also assemble various tubes to form transverse joints by inserting one tube in the transverse openings of a larger tube as shown in Figures 9-12. These two types of joints can also be readily combined by a child to simulate many things such as animals, furniture, and the like.

From the foregoing disclosure of the general principles of the present invention and the above description of a preferred embodiment, those skilled in the art will readily comprehend various modifications to which the invention is susceptible. Thus, the transverse walls and key portions of the tubes may be of many different non-circular configurations. Also, while six tubes are shown as comprising a set, more or less tubes may be provided, as desired. Additionally, it is contemplated that the tubes can be fabricated from other materials than those specified, provided that the tube walls are sufficiently elastic to provide a frictional lock.

Having described my invention, I claim:

1. In a child's toy, the combination of two elongated tubular members adapted to be joined end to end in telescopic frictional engagement with one another, each of said tubular members being formed of a slightly yieldable plastic material, the first of said tubular members being configured to form in cross-section a pair of opposed arcuate wall sections of a first radius and a pair of opposed lobes of a radius smaller than the first radius, said lobes interconnecting said wall sections and extending outwardly therefrom, the outside dimension of said tubular member across said wall sections being less than the outside dimension of said tubular member across said lobes, the second of said tubular members being configured to form in cross-section a pair of opposed arcuate wall sections of a first radius and a pair of lobes of a radius smaller than the first radius, said lobes interconnecting said wall sections and extending outwardly therefrom, the outside dimensions of said second tubular member across said arcuate wall sections and across said lobes being respectively less than the inside dimensions of said first tubular member across said arcuate wall sections and across said lobes, the outside dimension across the lobes of said second member being greater than the inside dimension of said first member across said arcuate wall sections, whereby said second member can be nested within said first member by aligning the respective lobes of said members, and said second member can be frictionally locked within said first member by effecting relative rotation of said members to bring the lobes of said second member into engagement with the arcuate walls of said first member.

2. In a child's toy the combination of two elongated tubular members adapted to form a transverse joint, each of said members being formed of a slightly yieldable plastic material, the first of said members having a transverse opening formed therein for receiving and frictionally engaging the second of said tubular members, said transverse opening being of generally rectangular cross-section and having two opposed recesses formed therein,

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the second of said tubular members being configured to form in cross-section a pair of opposed arcuate wall sections and a pair of opposed lobes interconnecting said arcuate wall portions, the outside dimension of said second tubular member across said lobes being less than the distance across the diagonal of said opening and slightly greater than the length of one side of the opening, whereby the second tubular member can be inserted in the first member by aligning the lobes of the second member with the diagonal of the opening and the second tubular member can be frictionally secured in place by effecting relative rotation of the second tubular member to bring the lobes of said second tubular member into registry with said recesses.

3. A child's toy comprising a plurality of hollow, elongated tubular members, each of said tubular members being formed of a slightly elastic material and having a pair of opposed arcuate wall sections of a first radius and a pair of lobes of a radius smaller than the first radius and extending outwardly from said wall sections, said lobes being interposed between said wall sections, the tubes of said set being of progressively smaller trans-

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verse dimensions, whereby said tubes are nestable one within the other, the transverse dimension across the lobes of each tube being greater than the inside dimension across the arcuate walls of the next larger tube of said set, whereby each of the tubes of said set can be rotated relative to the next outwardly disposed tube of the set to effect a frictional lock between the tubes of said set so that the outermost tube forms a container for the remaining tubular members, said outermost tube having a transverse base extending across one end thereof and extending outwardly beyond the walls of said tube.

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