United States Patent

Morrison et al.

[15] **3,645,038**

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[54] FIGURE TOYS

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[21] Appl. No.: **6,795**

[52] **U.S. Cl.** **46/151**

[51] **Int. Cl.** **A63h 3/00**

[58] **Field of Search** 46/115, 119, 120, 135, 146, 46/147, 151, 159, 162, 163, 173, 156; 3/12.3

[56] **References Cited**

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[57] **ABSTRACT**

A toy including a portion formed of corrugated plastic tubing which is capable of being contracted and expanded in length and of being curved in an arc, and which will retain any length and/or curvature given to the tubing. The tubing is formed by providing a series of hinge sections along its length forming a continuous series of grooves having sides of unequal length, and by heat treating the plastic to provide a setting of the plastic at the hinges to eliminate elasticity between the hinge connected sections.

5 Claims, 10 Drawing Figures

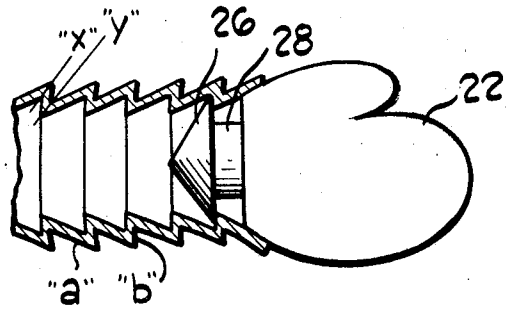


Fig 1

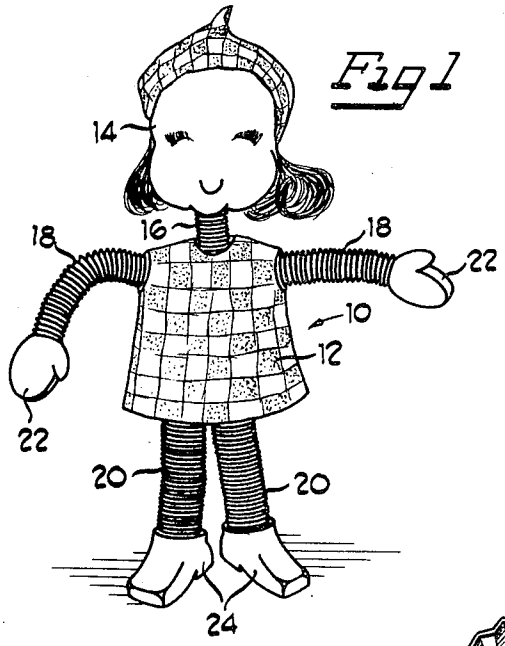


Fig 2

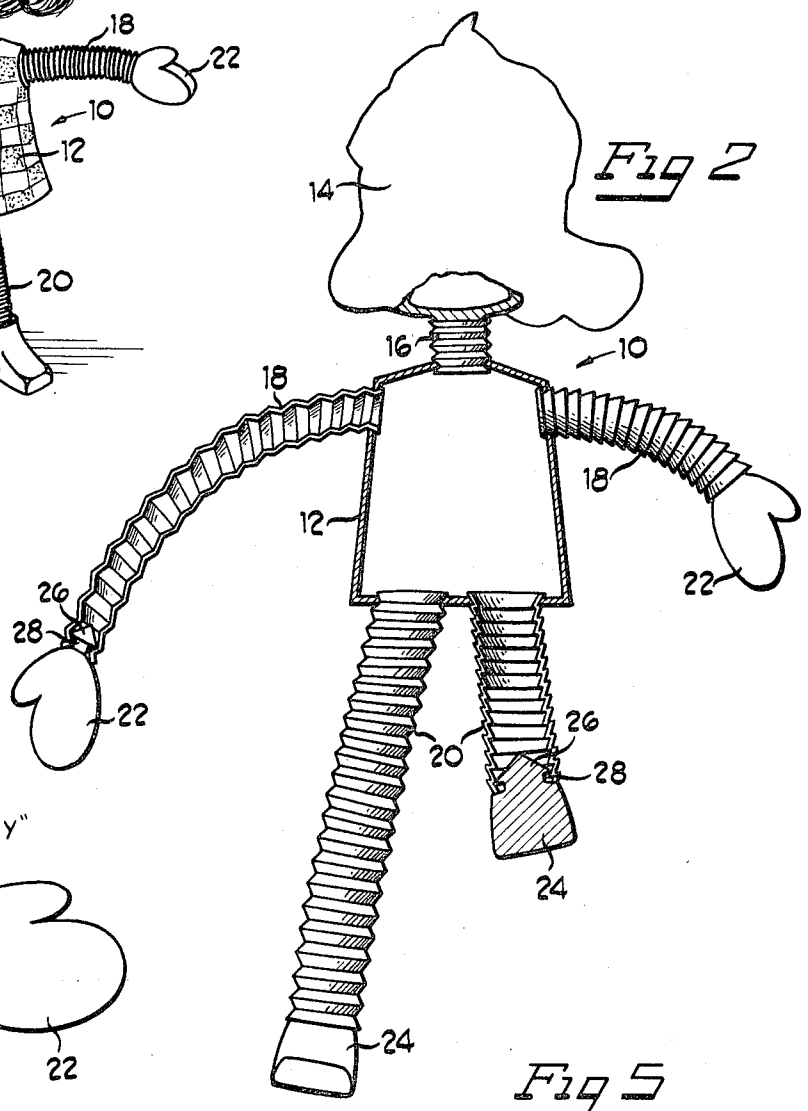
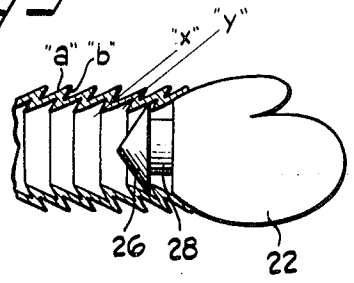


Fig 3



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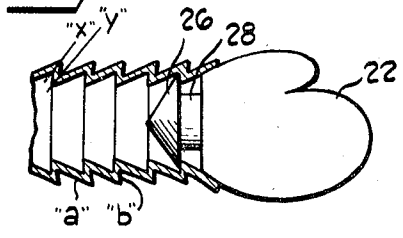

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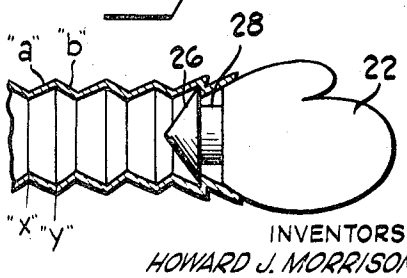

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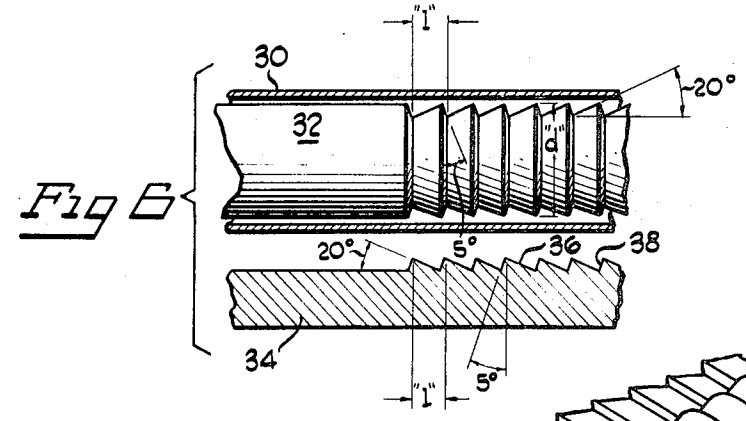
Fig 6



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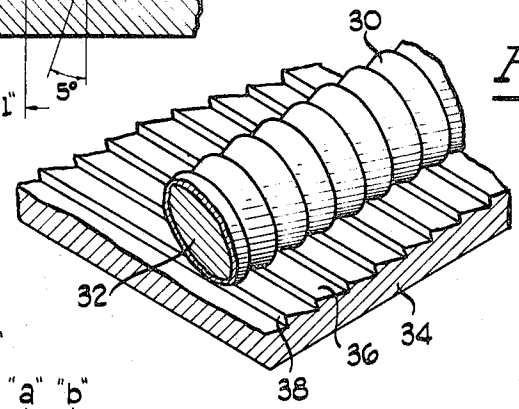

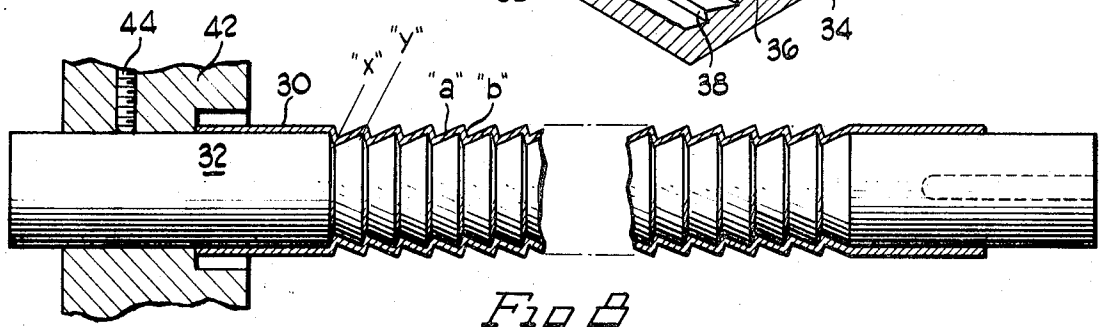

Fig 8

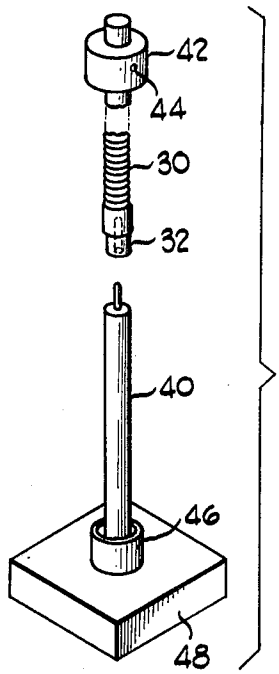

Fig 9

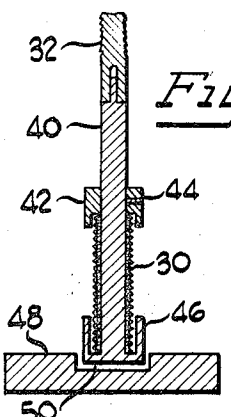

Fig 10

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FIGURE TOYS

The present invention relates generally to toys, and is more particularly directed to figure toys having movable body portions.

Figure toys such as dolls, toy animals and the like have been very popular with children heretofore, and many such toys have included movable body portions which have permitted the child to pose the toy figure in any of several positions. Furthermore, the prior art has included dolls having telescoping body sections which permit extension and contraction of such portion to simulate growing of the toy figure. The present invention is particularly directed to novel means whereby the child may selectively extend or contract portions of the body, such as the arms and legs, and also move such extendable portions in almost any desired direction to pose the figure.

It is a primary object of the invention to provide a novel form of corrugated plastic tubing which is used to simulate a body portion in a figure toy, which can be contracted or extended as desired, and which will retain any shape into which it is bent. A further object of the invention is to provide a figure toy having body portions thereof formed of corrugated plastic tubing, wherein the length of such body portion can be selectively changed and the curvature of such portion varied, and the body portion will retain its length and/or curvature until manipulated to a different length or curvature.

Other objects and advantages will become apparent from the following description of the preferred embodiment illustrated in the drawings, wherein:

FIG. **1** is a view of a doll incorporating arms, legs and a neck portion made in accordance with the present invention;

FIG. **2** is an enlarged front plan view of the doll, with portions broken away and in section in order to illustrate details of the structure;

FIG. **3** is an enlarged fragmentary cross-sectional view of one of the doll arms, showing the corrugated plastic tubing in its collapsed or shortened condition;

FIG. **4** is similar to FIG. **3** but illustrates the corrugated tubing in its intermediate position;

FIG. **5** is a view similar to FIGS. **3** and **4**, but showing the corrugated tubing in its fully extended position;

FIG. **6** is a sectional view of the mandrel tubing and corrugation-forming block used in making of the corrugated tubing;

FIG. **7** is a perspective view of the mandrel and forming block showing the formation of corrugations in a length of tubing disposed on the mandrel;

FIG. **8** is a fragmentary, longitudinal sectional view of the tubing in place on the mandrel after the corrugations have been formed therein;

FIG. **9** is an exploded perspective view of structure used in the formation of the tubing, and;

FIG. **10** is a longitudinal sectional view of a portion of the structure seen in FIG. **9**, together with a section of compressed, corrugated tubing.

With reference particularly to FIGS. **1–5** of the drawings, it will be seen that the figure toy **10** embodying the present invention comprises a doll having a generally hollow body portion **12** and a head **14** supported on the upper part of the body portion by a corrugated plastic tubular neck **16**. A pair of arms **18** and a pair of legs **20** are also formed of the corrugated plastic tubing and secured to the body portion. The corrugated tubing portions of the doll are formed of a suitable thermoplastic material, such as polypropylene, and are made in a novel manner which substantially eliminates any springback of the plastic tubing and permits posing of the doll's arms, legs and head in any of a variety of positions. Further, the corrugations in the plastic tubing are formed so that the tubing may be extended and compressed through a substantial distance and will maintain the length selected. The extension or contraction of the tubing may be along its longitudinal axis or at angle thereto.

More particularly, and as noted in FIGS. **3–5**, the corrugated plastic tubing portions of the doll are formed or provided with well defined annular hinge sections, designated as "*x*" and "*y*", which afford axial movement of the individual corrugations as well as relative angular movement therebetween. The hinge sections "*x*" and "*y*" are formed with the characteristics of the familiar plastic "living hinge", which permits free flexing of the two sections joined together at each of the hinge lines, and wherein the flexing of the plastic along the "living hinge" line increases the strength of the plastic at the hinge line. The corrugations are formed with sides "*a*" and "*b*" of unequal length, and compression of the corrugated tubing causes the shorter side "*b*" to nest within the longer side "*a*". Further, the hinge arrangement permits bending of the corrugated tubing relative to its longitudinal axis. When the tubing is compressed, the individual corrugations snap into a nested relation (FIG. **3**) and maintain such arrangement until a force is applied to draw the corrugations out of their nested positions. Consequently, the corrugated body portions will retain any length desired between the totally compressed condition and the totally extended condition. Similarly, when the corrugated tubing is curved or bent to any position, within the limits defined by the angular relationship between the long sides "*a*" and the short sides "*b*" of the corrugated sections, the tubing will retain such bent configuration until forces are exerted thereon to change the configuration of the tubing.

It will be seen, therefore, that the corrugated tubing used to provide arms, legs and a neck for the doll can be bent to pose the doll in any of numerous positions. Further, the corrugated body portions can be extended or contracted as desired to alter the length of the limbs and position of the head, and such portions will retain any selected length until altered through further manipulations of the tubing. As noted particularly in FIGS. **2–5**, the corrugated tubing provides end sections which are readily inserted in the openings of the doll body and head and which provide a frictional engagement therewith to either removably retain the connected tube and body portions together or the two can be secured together with a suitable adhesive. In the case of the hands **22** and feet **24**, each of the latter are provided with a conical part **26** having a reduced shoulder **28** so that the hands and feet can be readily inserted on the end of the corrugated tubing.

A method of forming the corrugated plastic tubing is illustrated in FIGS.**6–10** of the drawings. In the formation of the corrugated plastic tubing, a hollow piece of thermoplastic tubing **30** of the desired length is placed over a metal mandrel **32** having circumferential or annular corrugations formed thereon along its length, with the maximum outside diameter "*d*" (FIG. **6**) of such corrugations being preferably slightly less than the inside diameter of the cylindrical tubing **30**, so as to permit slipping of the tubing over the mandrel. The plastic tubing **30** has a relatively thin wall section and is of a sufficiently resilient material to permit stretching or distortion of the tubing during formation of the corrugations therein. In this respect, satisfactory results have been achieved through the use of a polypropylene tubing having a wall thickness of 0.008 inches and an inside diameter of 0.250 inches. In such example, the mandrel was provided with a series of double bevelled, similar annular portions, each having an axial length "1" of 0.100 inches and provided with a bevel of 20° with respect to the longitudinal axis along the length of the annular portion and a face angle of 5° relative to the transverse axis, as illustrated in FIG. **6** of the drawings. The maximum outside diameter was 0.240 inches at both the corrugated and plain cylindrical portions of the mandrel. The forming block **34** was provided with transverse serrations complimentary in length, depth and angles to the annular beveled portion on the mandrel, and each of the transverse serrations on the forming block therefore also have a length of 0.100 inches, with the major face **36** of the serrations disposed at 20° relative to the plane of the block and the minor face **38** disposed at 5° with respect to a plane normal to the block.

In the formation of the corrugated tubing, the plain cylindrical polypropylene tubing **30** was placed on the forming mandrel **32** and heated in a preheated oven at 240° F. for 15–20 minutes. The heated mandrel with tubing was then placed on

the forming block **34** with the annular beveled portions of the mandrel **32** indexed to mate with the serrated portions of the block, and the mandrel supported tubing was rolled back and forth across the block under manual pressure until the tubing **30** was distorted to conform with the beveled portions of the mandrel, as generally illustrated in FIG. **8**. The mandrel **32** was then placed in axial alignment with a plane cylindrical mandrel **40** (FIG. **9**) having an outside diameter identical with the maximum diameter of the corrugated mandrel **32**, as seen in FIG. **9**, and a collar portion **42** at the upper end of the corrugated mandrel **32** was forced downwardly to force the formed corrugated tubing onto the plane mandrel **40** and into a collapsed condition (FIG. **10**). The collar **42** includes a set screw **44**, so that the tubing could be held in its collapsed position by tightening of the set screw. A cylindrical cup **46** was fixed to the lower end of the smooth mandrel **40** in order to hold the collapsed corrugated tubing on the smooth mandrel for further processing and a metal block **48** provided with a cylindrical recess **50** served to hold cup **46** and mandrel **40** in position during the transfer of the corrugated tubing to mandrel **40**. The collapsed corrugated tubing and mandrel **40** was then placed in a preheated oven at about 240° F. for about 15–20 minutes. After such further heating, the mandrel **40** and corrugated tubing **30** was removed from the oven and cooled to room temperature. The collapsed tubing was then removed from the mandrel **40** and was ready for use in the formation of the figure toy **10** or the like.

The preheating of the plain plastic tubing **30** at the beginning of the process conditions the polypropylene for distortion along its length to conform with the corrugations on the mandrel **32**. The heating of the collapsed or compressed tubing, after the formation of the corrugations, provides for a setting of the polypropylene along the two hinged lines "*x*" and "*y*" (FIG. **8**) formed during the corrugations process. The resulting corrugated tubing was thereby provided with two annular hinge sections "*x*" and "*y*" which perform in the well-known manner of a "living hinge" wherein the molecular structure of the plastic along the hinge lines increases in strength with each longitudinal movement of the tubing portions at opposite sides of the hinge line. Further, the described treatment eliminates any resiliency or springback characteristic of the polypropylene, so that the tubing will retain substantially any axial or angular position it is placed in.

While the described structure and the formation of the corrugated tubing served to produce the desired results, it will be apparent that other uses might be found for the corrugated plastic tubing and that other means might be employed to carry out the process for forming the corrugated tubing without departing from the principles of this invention.

What we claim is:

1. A figure toy including relatively movable body portions formed at least in part by a corrugated plastic tubing, said corrugated plastic tubing being formed with a series of well defined circumferential hinge sections joined by an essentially linear hinge and forming a plurality of circumferential grooves, with each groove having sides of unequal length joined at one of said linear hinge so that the shorter side section is nestable within the longer side section.

2. A figure toy as set forth in claim **1**, wherein said plastic tubing is of a length sufficient to permit selective positioning of the body portion at various lengths and positions by expansion and contraction of the tubing and by bending the tubing.

3. A figure toy as set forth in claim **2**, wherein said grooves are formed so as to eliminate elasticity of the connected grooves, so that the tubing will maintain a length or curvature provided through manipulation of the corrugated tubing.

4. A toy including two members joined together by a length of corrugated plastic tubing, said tubing being formed with a series of circumferential hinge sections along its length defining grooves having sides of unequal length and joined along an essentially linear hinge so that the shorter side section is nestable within the longer side section, and each of said two members is provided with means affording removable connection with an end of said tubing.

5. A toy as set forth in claim **4**, wherein said hinge sections and linear hinge are formed so as to eliminate resiliency of the connected sides of said grooves, whereby the tubing maintains any length or curvature provided through manipulation of the tubing.

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