SPECIFICATION

Improvements in or relating to interconnecting toy blocks

This invention relates to toy blocks such as hollow blowmolded plastic blocks.

Toy blocks have long been fabricated from many different materials. Wood, ceramics, metals, and plastics have all been used. Various different interlocking or interconnecting arrangements have also been utilized to allow the blocks to be interconnected with each other and removed from each other. Such arrangements include tongues and grooves, notches of various types, pin arrangements, protusions and protusion accepting apertures having various configurations, and the like.

Toy blocks, in general, are designed for children to entertain, educate, and aid in the development of improved physical dexterity. Many of the above different interconnecting combinations are specifically designed to appeal to children having particular age and mental development levels. Difficult interconnecting combinations generally appeal to older and more educationally developed children. However, simpler interconnecting arrangements are required for younger children, since, in the case of younger children, it is very important to provide toys which challenge the child but do not frustrate the child to the point that the child rejects the toys. The small fingers, lack of physical strength, and limited manual dexterity of younger children impose constraints on the design and fabrication of interconnecting toy blocks. Such toy blocks for such younger children must, therefore, be comparatively easy to connect together and disconnect. Such ease of interconnection and removal enhances the play value of the blocks. Further, it is also required that such blocks, when interconnected, are able to withstand the rigors and stresses normally associated with the use of the blocks without inadvertent disconnection.

Additionally, the blocks should also be able to provide a level of complexity and sophistication sufficient to maintain the interest of older children, or even adults, in order to extend the play life and utility thereof. These conflicting requirements have not, heretofore, been achieved in interconnecting toy block arrangements.

The development of plastics has allowed the molding of toy blocks in many new and more complex shapes. Plastics have also lowered the cost of production of the blocks. The lowest cost method of manufacturing of suitable plastic items is blowmolding. Blowmolding is a technique wherein a tube of hot plastics is extruded, inserted in a mold, and inflated with a gas forcing the walls of the tube to conform to the contours of the mold. One advantage of blowmolded plastics is that softer plastics may be utilized than can be utilised in injection molding techniques, thus allowing the product, for example, to be much softer than a comparable injection molded product. Another advantage of blowmolded products is that they tend to deflect easily upon being subjected to force and, at the same time, they tend to return to their original shape. However, attempts at using blowmolded plastics for children's toy blocks have not proven to be satisfactory because of the relatively close tolerances required to allow the toy blocks to interlock with each other satisfactorily. In addition, the blowmolded plastics block tend to be too soft to avoid being deflected beyond the point from which they can regain their original shapes and/or inadvertently disconnected when subjected to the substantial forces which children impose on their toys during the normal play time activities therewith.

Thus, the above, often conflicting, desiderata have not heretofore been achieved and, in particular, have not been achieved in blowmolded interconnecting toy block arrangements.

According to the invention, there is provided an interconnecting toy block, comprising a body means having a first predetermined flexibility and a plurality of wall members unitarily fabricated and having external surfaces and internal surfaces defining a body cavity, a first of the wall members having first internal walls defining a first aperture therethrough and a second of the wall members having second internal walls defining a second aperture therethrough aligned with the first aperture, there being provided a first female coupler means having a second predetermined flexibility less than said first predetermined flexibility and comprising a first female coupler member and a second female coupler member, each of the first and second demale coupler members having an outer end, an inner end spaced a first predetermined distance from the outer end and positioned within the body cavity, internal wall surfaces defining a male coupler receiving aperture extending from the outer end toward the inner end thereof, and external wall surfaces, the inner ends of the first female coupler member and the second female coupler member being connected together, the first female coupler member being positioned in the first aperture and the second female coupler member being positioned in the second aperture, there being provided retention means for retaining the outer end of the first female coupler member at the first wall member of the plurality of wall members and the outer end of the second female coupler member at the second wall member of the plurality of wall members.

It is possible to provide comparatively inexpensively fabricated toy block arrangements.

It is also possible to provide interconnecting toy blocks fabricated of comparatively soft materials in order to decrease the chance of injury to small children.

It is further possible to provide a means for strengthening the internal structure of a hollow toy block such as a blowmolded interconnecting toy block, so that deformation thereof does not exceed the condition wherein the block will not return to its original configuration.

It is also possible to provide interconnecting toy blocks which may be comparatively easily connected together and disconnected by young children, yet resistant to inadvertent disconnection and still provide a comparatively high level of inherent

sophistication for older children and/or adults.

It is further possible to provide an interconnected toy block arrangement which, through its utilization, improves the manual dexterity of the user.

In the preferred embodiment of the present invention, there is provided a unitarily fabricated, hollow, blow-molded plastics body means having a plurality of wall members. A pair of aligned apertures are provided in at least two opposed wall members. A female coupler means is positionable within the pair of aligned apertures is fabricated, such as by injection molding, from a material, such as plastics, that is less flexible than the body means. The female coupler means extends through the hollow body means and is retained therein by engagement of the outer ends thereof with the wall members of the pair of aligned apertures. The comparatively rigid female coupler means thus provides structural support to the hollow body means. The female coupler means is fabricated from first and second female coupler members which are joined together inside the hollow body means. Each construction of the female coupler means allows provision of a collar on each outer end for engagement with the wall members of the body means. If desired, more than one pair of aligned apertures may be provided in the same opposed wall members of the body means or in other opposed wall members of the body means and female coupler means provided for retention in each such pair of aligned apertures.

One or more male couplers may also be provided on the body means. Such interconnecting toy blocks may be fabricated in different configurations to provide an enhanced play value and interest. However, each of the blocks is provided with at least one of the above described female coupler means and may, if desired, be provided with one or more male couplers.

The male couplers may be unitarily fabricated with the body means during, for example, the blowmolding and extend outwardly from one of the wall members thereof. Thus, the male couplers are also hollow of the same degree of flexibility as the body means.

The male coupler of a first toy block may be arranged to be detachably interconnected into a matching aperture in the female coupler means of a second toy block. In order to provide the desired ease of connection and removal of the male coupler means, one or more slots may be provided at the outer extremities of the female coupler means. Since the dimensional tolerances of a blowmolded male coupler may vary to a much greater extent that an injection molded female coupler means, the provision of the slots allows molding of the female coupler means to a slightly smaller dimension than the smallest anticipated male coupler. Upon insertion of the male coupler into the aperture of a female coupler means, the slots allow a resilient expansion of the female coupler means to provide the detachable interconnection between the toy blocks by the frictional engagement therebetween, regardless of the dimensional variations encountered in manufacturing the male coupler.

Further, in some applications it has been found advantageous to provide a plurality of ridges in the apertures of the female coupler means for providing the frictional engagement with the male coupler. Such ridges allow a more precise control, as well as a reduction of the frictional forces between the male coupler and the female coupler means. Such structure is particularly advantageous in those applications where the toy blocks, and corresponding male couplers, are of a comparatively large size, though such structure may also be advantageously utilized in any size toy blocks.

The wall members of the body means may be planar, singly curved and doubly curved, and the blocks may be fabricated in any desired geometrical configuration, including the conventional rectangular parallelepiped as well as other more unconventional shapes. Similarly, the male coupler, and matching aperture in the female coupler means may have any desired cross sectional geometry such as circular, rectangular, polygonal, square, or the like.

The present invention will be further described, by way of example, with reference to the accompanying drawings, wherein similar reference characters refer to similar elements throughout, and in which:

Figure 1 is a perspective view of an interconnecting toy block arrangement constituting a preferred embodiment of the present invention;

Figure 2 is a sectional view of the embodiment of Figure 1 taken along the line 2-2 of Figure 1;

Figure 3 is an enlarged view of a portion of the embodiment shown in Figures 1 and 2;

Figure 4 is a sectional view similar to Figure 3, of another embodiment of the present invention;

Figure 5 is a sectional view similar to Figures 3 and 4 of another embodiment of the present invention;

Figure 6 is a plan view of another embodiment of the present invention showing the outer end of a female coupler means having internal ridges;

Figure 7 is a plan view of the inner end of the female coupler means shown in Figure 6;

Figure 8 is a sectional view of the embodiment of Figure 6 illustrating the detachable interconnection between two toy blocks;

Figure 9 is a perspective view of the embodiment of the present invention shown in Figure 6;

Figure 10 is a sectional view of the embodiment shown in Figure 9 taken along the line 10-10;

Figure 11 is a sectional view similar to Figure 10, of another embodiment of the present invention;

Figure 12 is a perspective view of an embodiment of the present invention having one female coupler means and no male coupler means;

Figure 13 is a perspective view of another embodiment of the present invention having one female coupler means and one male coupler;

Figure 14 is a perspective view of another embodiment of the present invention having one female coupler means and two male couplers which are prependicular to each other;

Figure 15 is a perspective view of another embodiment of the present invention having two female coupler means and four male couplers;

Figure 16 is a perspective view of another embodiment of the present invention having five planar surfaces, one female coupler means, and one male

coupler;

Figure 17 is a perspective view of another embodiment of the present invention having a singly curved wall member, one female coupler means and one male coupler;

Figure 18 is a sectional view of Figure 16 taken along the line 18-18; and

Figure 19 is a sectional view of the embodiment shown in Figure 17 taken along the line 19-19.

There is illustrated in Figures 1, 2 and 3 an interconnecting toy block arrangement 10 constituting an embodiment of the present invention. In the embodiment 10 there is provided a body means 12 fabricated of a blowmolded semi-flexible plastics material having a first predetermined flexibility. Body member 12 is unitarily fabricated of a plurality of wall members – first wall 14, second wall 16, third wall 18, fourth wall 20, fifth wall 22, and sixth wall 24, and each of the walls 14, 16, 18, 20, 22, and 24 have external surfaces such as first wall external surface 26, second wall external surface 28, fifth wall external surface 30, and sixth wall external surface 32, and internal surfaces such as first wall internal surfaces 34, second wall internal surface 36, fifth wall internal surface 38, and sixth wall internal surface 40, said internal surfaces defining body cavity 42. First male coupler 44 is located on third wall 18 and second male coupler 46 is located on fourth wall 20. Both first male coupler 44 and second male coupler 46 have cylindrical configurations.

First wall 14 is also provided with first internal walls 48 defining a first aperture 50 therethrough and second wall 16 has second internal walls 52 defining a second aperture 54 therethrough aligned with said first aperture 50.

A first female coupler means 56 is fabricated of injection molded plastics having a second predetermined flexibility less than first predetermined flexibility of the body means 12 and is comprised of first female coupler member 58 and second female coupler member 60. First female coupler member 58 has an outer end 62, an inner end 64 spaced a first predetermined distance from said outer end 62 and positioned within said body cavity 42, internal wall surfaces 66 defining a male coupler receiving aperture 68 extending from the outer end 62 toward the inner end 64, external wall surfaces 70, interlocking means 72 on the inner end 64 for interlocking the first female coupler member 58 to the second female coupler member 60, and retention means 74 for retaining the outer end 62 of the first female coupler member 56 at the first wall 14. Second female coupler member 60 has an outer end 76, an inner end 78 spaced a first determined distance from said outer end 76 and positioned within said body cavity 42, internal wall surfaces 80 defining a male coupler receiving aperture 82 extending from the outer end 76 toward the inner end 78, external wall surfaces 84, interlocking means 86 on the inner end 78 for interlocking the second female coupler member 60 to the first female coupler member 58, and retention means 88 for retaining the outer end 76 of second female coupler member 60 at the second wall 16. Second female coupler member 60 is positioned in the second aperture 54 and first female coupler member 58 is positioned in the first aperture 50 of body member 12. As shown, first male coupler member 44 and first and second apertures 50 and 54 have cylindrical configurations. It will be appreciated that other geometric configurations may be used.

Figures 3, 4, and 5 illustrate various structural configurations of interlocking means 72 and 86. Figure 3 is an enlargement of embodiment 10 shown in Figures 1 and 2. First female coupler member 58 has an insertion portion 90 and a second female coupler member 60 has an insertion portion receiving aperture 92 defined by internal wall surfaces 80. Insertion portion 90 of first female coupler member 58 is positioned within insertion portion receiving aperture 92 of second female coupler member 60 and is frictionally retained therein. Insertion portion 90 has a first peripheral shoulder 94 and a first peripheral groove 96 on external wall surfaces 70 and insertion portion receiving aperture 92 has a second peripheral shoulder 98 and a second peripheral groove 100 on internal wall surfaces 80. First peripheral shoulder 94 is positioned in second peripheral groove 100 and second peripheral shoulder 98 is positioned in first peripheral groove 96 for interlocking retention therebetween first female coupler member 58 and second female coupler member 60.

It will be appreciated that in addition to the frictional interlocking engagement provided by interlocking means 72 and interlocking means 86, first female coupler member 58 and second female coupler member 60 may be permanently coupled to each other by the addition of a bonding agent such as glue between interlocking means 72 and 86.

Figure 4 is a sectional view of another embodiment 102 similar to the sectional view shown in Figure 3 of embodiment 10. Interlocking means 72*a* of first female coupler member 58*a* has an insertion portion 90*a* on inner end 64*a*. Interlocking means 86*a* of second female coupler member 60*a* has an insertion portion receiving aperture 92*a* defined by internal wall surfaces 80*a*. Insertion portion 90*a* of first female coupler member 58*a* is positioned within insertion portion receiving aperture 92*a* of second female coupler member 60*a*. Insertion portion 90*a* and insertion portion receiving aperture 92*a* are fabricated in the manner shown in order to allow greater surface contact between inner end 64*a* and inner end 78*a* than would be possible with a butt fit. If desired, a bonding agent such as glue may be utilised to bond the two female coupler members 58*a* and 60*a* together. In addition, the configuration of embodiment 102 provides internal wall surfaces 66*a* of first female coupler member 58*a* and internal wall surfaces 80*a* of second female coupler member 60*a* in an aligned position.

Figure 5 is a sectional view of another embodiment 104 of the present invention similar to embodiment 102 of Figure 4 and embodiment 10 of Figure 3. Inner end 64*b* of first female coupler member 58*b* abuts against inner end 78*b* of second female coupler member 60*b*. Connection therebetween is achieved by bonding or, if desired, by welding inner end 64*b* to inner end 78*b*. The welding may utilise ultrasonic sound generated by an ultrasonic welding

apparatus (not shown) located adjacent inner ends 64*b* and 78*b* to excite the molecules of first female coupler member 58*b* and second female coupler member 60*b* at this location causing them to fuse together. Alternatively, the welding may be achieved by a spinning technique which spins second female coupler member 60*b* relative to first female coupler member 58*b* thereby generating heat in the inner ends 64b and 78*b* causing the molecules located therein to fuse with each other when the spinning ceases. It will be appreciated that other welding techniques may achieve the same effect and, as noted, that bonding agents such as glues may also be used to secure the female coupler members to each other when the inner ends simply abut against each other.

Returning now to Figure 2, retention means 108 on outer end 62 of first female coupler member 58 retains outer end 62 at first wall 14 of body means 12. Likewise, retention means 110 on outer end 76 of second female coupler member 60 retains the outer end 76 at second wall 16. Retention means 108 has a collar 112 on outer end 62 of first female coupler member 58 with an inner edge 114 at internal wall surfaces 66 and an outer edge 116 spaced from external wall surfaces 70. Also, retention means 108 comprises a collar accepting indentation 118 in first wall 14 defined by first internal wall 48 such that the insertion of first female coupler member 58 into first aperture 50 provides outer surface 120 of collar 112 substantially flush with first wall external surface 26. The retention means 108 also comprises sleeve 122, also defined by first internal wall 48 of first wall 14, which extends into body cavity 42 to frictionally engage the external wall surfaces 70 of first female coupler member 58.

Likewise, retention means 110 has a collar 124 having an inner edge 126 at internal wall surfaces 80 and an outer edge 128 spaced from external wall surfaces 84. In addition, retention means 110 also comprises a collar accepting indentation 130 in second wall 16 defined by second internal walls 52 to allow collar outer surface 132 to be substantially flush with second wall external surface 28 when second female coupler member 60 is inserted through second aperture 54 into body cavity 42. Retention means 110 also comprises sleeve 134 defined by second internal walls 52 or second wall 16 and extends into body cavity 42 to frictionally engage external wall surfaces 84 of second female coupler member 60.

Figures 6, 7, 8, 9, and 10 illustrate another embodiment, generally designated 136, of the present invention. Figure 6 is a plan view of embodiment 136 showing the outer end 76*c* of second female coupler member 60*c*. Embodiment 136 is similar to embodiment 10 of Figures 1, 2, and 3. Body means 12*c* is identical to body means 12. First female coupler means 56*c* of embodiment 136 is, however, different from first female coupler means 56 of embodiment 10. Figure 6 illustrates two of the differences. Outer end 76*c* of second female coupler member 60*c* is shown having relief means 138 in the form of slots 140 extending from inner edge 126*c* of collar 124*c* toward outer edge 128*c*. The slots 140 increase the second predetermined flexibility of second female coupler means 60*c*. Thus, when a male coupler such as first male coupler 44 of Figure 1 illustrated by the phantom circular line is inserted in second aperture 54*c*, the ease of insertion and removal are enhanced because the slots 140 will allow the diameter of second female coupler member 60*c* to expand more readily than another female coupler member not having the slots.

The second modification of first female coupler means 56*c* is the addition of internal ridges 142. Internal ridges 142 serve the purpose of satisfactorily frictionally engaging male couplers 44 having a greater range of diameters d, than would a second female coupler member 60*c* not having internal ridges. Because of the blowmolding technique used to form first male couplers 44, the diameter, d, of male couplers 44 may vary significantly between different toy block arrangements. In order to frictionally engage as many different sizes of first male couplers 44 as possible, the diameter between internal ridges 142 is selected to be slightly smaller than the minimum diameter, d, found in male couplers 44 as determined by manufacturing experience. Internal diameter, d', between internal wall surfaces 80*c* shown in Figure 7 of second female coupler member 60*c* is preferably made larger than any diameter, d, of a first male coupler 44. Thus, second female coupler member 60*c* having internal ridges 142 is capable of frictionally engaging a large range of various diameter first male couplers 44. For those first made couplers 44 having diameters larger than diameter, d, internal ridges 142 may indent into first male couplers 44 at the four points where they exist on internal wall surfaces 80*c*. Because the blowmolded plastics is a relatively soft material, this indentation of first male couplers 44 is easily achieved. If, however, the internal ridges 142 were not present, diameter, d', would have to expand by virtue of relief means 138 to match the diameter, d, of first male couplers 44. If neither internal ridges 142 or relief means 138 are present, first male couplers 44 must be compressed. The force and dexterity required to achieve this expansion and/or compression is much greater than the force required to indent the first male couplers 44 along only the four points of internal ridges 142.

In those embodiments wherein the internal ridges 142 are combined in a female coupler member with the relief means 138, an even wider range of variations in male coupler diameters may be accommodated due to the added resilient expansion of the female coupler in addition to compression of the male coupler.

Since the ridges 142 have less surface area contact with an inserted male coupler, the frictional force therebetween is less than the embodiments wherein no internal ridges are provided and less force and a lower level of strength and/or manual dexterity is required for interconnection and removal of one block from another.

It will be appreciated that these objectives are achieved without sacrifice of play interest or sophistication level of the toy block arrangement, and are achieved in various degrees by provision of either or

both the internal ridges 142 and relief means 138 in the female coupler members. Thus, the frictional force required during the interconnection and removal of one block from another is much more precisely controllable than heretofore in prior toy block arrangements.

Figure 7 is a plan view of second female coupler member 60*c* viewed from inner end 78*c*. Figure 7 illustrates the third change from embodiment 10 shown in Figures 1, 2, and 3. External ridges 144 on external wall surfaces 84*c* provide the same function in relation to sleeves 134*c* (Figure 8) as do internal ridges 142 in relation to first male couplers 44, as described above. Because sleeves 134*c* are fabricated of blowmolded plastics the diameters thereof vary over a large range in much the same manner as do the diameters of first male couplers 44. Diameter d" is selected to correspond to a value slightly smaller than the maximum diameter of the sleeves 134*c* as determined by manufacturing experience. External ridges 144 thereby aid in retaining second female coupler member 60*c* within sleeve 134*c*, regardless of dimensional variations encountered. Thus, female coupler member 60*c* is retained within sleeve 134*c* by the frictional engagement of ridges 144 with sleeve 134*c*. The ridges 144 thereby allow both easier assembly of a toy block as well as greater manufacturing efficiency and less cost since the dimensions of the various elements need not be as precisely held and a greater variation in dimension is permissible.

Figure 8 is a sectional view of embodiment 136 which is similar to embodiment 10 of Figure 2 except that embodiment 136 has internal ridges 142 on internal wall surfaces 80*c* of second female coupler member 60*c* and internal ridges 146 on internal wall surfaces 66*c* of first female coupler member 58*c*. A second body means 12*d* with first male coupler 44*d* is shown above body means 12*c* and with first male coupler 44*d* inserted into second female coupler member 60*c* in order to show the relationship between first male coupler 44*d* and internal ridges 142 and internal wall surfaces 80*c* of second female coupler member 60*c*. Body means 12*d* is thus frictionally retained in the position shown in relation to body means 12*c*.

Figure 9 is a perspective view of embodiment 136 positioned to show the nature and extent of internal ridges 142 and slots 140.

Figure 10 is a sectional view of embodiment 136 along line 10-10 of Figure 9. Section line 10-10 is directly through the middle of two of the slots 140. Slots 140 do not extend all the way through collar 124*c* of second female coupler member 60*c* as can be seen at 148. Identical slots 150 are located in the first female coupler member 58*c*. Again slots 150 do not extend all the way through collar 112*c* as is shown at 152.

Figure 11 is a sectional view of another embodiment, generally designated 154, of the present invention which has slots 140*a* and 150*a* which do extend all the way through collars 112*e* and 124*e*, respectively. Collars 112*e* and 124*e* thus expand more readily than collars 112*c* and 124*c*.

Figures 12, 13, 14, 15, 16, 17, 18, and 19 illustrate other embodiment of the present invention. In each of the embodiments there is provided at least one female coupler means. Each of the female coupler means may be any of the various structural configurations of female coupler means described above.

Figure 12 is a perspective view of another embodiment, generally designated 156, of the present invention. Body means 12*f* has first female coupler means 56f and no male couplers.

Figure 13 is a perspective view of another embodiment, generally designated 158, of the present invention. Body means 12*g* has first female couplers means 56*g* and third wall 18*g* has a first male coupler 44*g* extending outwardly therefrom.

Figure 14 is a perspective view of another embodiment, generally designated 160, of the present invention. Body means 12*h* has first female coupler means 56*h*, third wall 18*h* having first male coupler 44*h*, and sixth wall 24*h* having second male coupler 46*h*. First male coupler 44*h* and second male coupler 46*h* are perpendicular to each other in embodiment 160.

Figure 15 is another embodiment, generally designated 162, of the present invention. Body means 12*i* has third wall 18*i* having first male coupler 44*i* and third male coupler 164, fourth wall 20*i* having second male coupler 46*i* and fourth male coupler 166, first male coupler 44*i* and second male coupler 46*i* being in alignment with each other and third male coupler 164 and fourth male coupler 166 being in alignment with each other, second wall 16*i* having fourth internal walls (not shown) defining a fourth aperture 168 in the second wall 16*i*, first wall 14*i* (not shown) having third internal walls (not shown) defining a third aperture (not shown) in the first wall, a first female coupler means 56*i*, and a second female coupler means 170 located in the fourth aperture 168 and the third aperture. Fourth aperture 168 and the third aperture are in alignment with each other. First male coupler 44*i*, second male coupler 46*i*, third male coupler 164, and fourth male coupler 166 are substantially identical to each other. First female coupler means 56*i* and second female coupler means 170 are substantially identical to each other. Second female coupler means 170 has third female coupler member (not shown) and fourth female coupler member 172. The third female coupler member is positioned in the third aperture and the fourth female coupler member 172 is positioned in fourth aperture 168.

Figure 16 is a perspective view of another embodiment, generally designated 174, of the present invention. Body means 12j has a first female coupler means 56j and a first male coupler 44j. All of the previous embodiments including 10, 102, 104, 136, 154, 156, 158, 160, and 162, have had planar walls which are either parallel or perpendicular to each other. These embodiments have also had six walls. Embodiment 174 has planar walls but there are only five; first wall 14j, second wall 16j, third wall 18j, fifth wall 22j, and sixth wall 24j. Fifth wall 22j and sixth wall 24j thus become triangular in shape instead of square or rectangular as in the above embodiments.

Figure 17 is a perspective view of another embodi-

ment, generally designated 176, of the present invention. Body means 12k has a first female coupler means 56k and a first male coupler 44k. Embodiment 176 is unlike any of the above embodiments because it has a second wall 16k which is curved. Each of the other walls is planar, first wall 14k, third wall 18k, fifth wall 22k, and sixth wall 24k.

Figure 18 is a sectional view of embodiment 174 along line 18-18 of Figure 16. First female coupler member 58j has a smaller axial length than the first female coupler member 58 of Figure 2. Second female coupler member 60j differs from second female coupler member 60 of Figure 2 in that the plane of outer end 76j is not perpendicular to the axis of second female coupler member 60j.

Figure 19 is a sectional view of embodiment 176 along the line 19-19 of Figure 17. First female coupler member 58k has a smaller axial length than first female coupler member 58 of Figure 2. The outer end 76k of female coupler member 60k is curved to conform to the curvature of second wall 16k.

It will be appreciated that the male couplers and male coupler receiving apertures may have other geometric configurations including arcuate or those having rectangular, polygonal, or square cross sections.

CLAIMS

1. An interconnecting toy block, comprising a body means having a first predetermined flexibility and a plurality of wall members unitarily fabricated and having external surfaces and internal surfaces defining a body cavity, a first of the wall members having first internal walls defining a first aperture therethrough and a second of the wall members having second internal wall defining a second aperture therethrough aligned with the first aperture, there being provided a first female coupler means having a second predetermined flexibility less than said first predetermined flexibility and comprising a first female coupler member and a second female coupler member, each of the first and second female coupler members having an outer end, an inner end spaced a first predetermined distance from the outer end and positioned within the body cavity, internal wall surfaces defining a male coupler receiving aperture extending from the outer end toward the inner end thereof, and external wall surfaces, the inner ends of the first female coupler member and the second female coupler member being connected together, the first female coupler member being positioned in the first aperture and the second female coupler member being positioned in the second aperture, there being provided retention means for retaining the outer end of the first female coupler member at the first wall member of the plurality of wall members and the outer end of the second female coupler member at the second wall member of the plurality of wall members.

2. A toy block as claimed in Claim 1, wherein the inner end of the first female coupler member has an insertion portion and the inner end of the second female coupler member has internal wall surfaces defining an insertion portion receiving aperture, the insertion portion of the first female coupler member being positioned within the insertion portion receiving aperture of the second female coupler member, so as to connect together the first and second female coupler members.

3. A toy block as claimed in claim 2, wherein the insertion portion of the first female coupler member is frictionally retainable in the insertion portion receiving aperture of the second female coupler member.

4. A toy block as claimed in claim 3, wherein the insertion portion further comprises a first peripheral shoulder and a first peripheral groove on the external wall surfaces of the first female coupler member, the insertion portion receiving aperture further comprising a second peripheral shoulder and a second peripheral groove on the internal wall surfaces of the second female coupler member, the first peripheral shoulder being positioned in the second peripheral groove and the second peripheral shoulder being positioned in the first peripheral groove for interlocking retention therebetween.

5. A toy block as claimed in claim 2, wherein the insertion portion of the first female coupler member is bondable to the insertion portion receiving aperture of the second female coupler member.

6. A toy block as claimed in claim 1, wherein the inner ends are welded to each other so as to connect together the first and second female coupler members.

7. A toy block as claimed in any one of the preceding claims, wherein the retention means comprises a collar at the outer end of each of the first and second female coupler members having an inner edge at the internal wall surfaces and an outer edge spaced from the external wall surfaces, the collars abutting the first and second wall members, respectively, of the body means.

8. A toy block as claimed in claim 7, wherein the first and second wall members of the body means each have a collar accepting indentation to allow each of the collars to be substantially flush with the outer surfaces of the first and second wall members of the body means.

9. A toy block as claimed in any one of claims 1 to 8, wherein the retension means comprises a sleeve on each of the first and second walls of the body means at the first and second apertures extending into the body cavity for frictionally engaging the first and second female coupler members.

10. A toy block as claimed in claim 9, wherein each of the first and second female coupler members comprises a plurality of external ridges on the external wall surfaces thereof extending a predetermined distance from the outer end toward the inner end for frictionally engaging the sleeve.

11. A toy block as claimed in any one of the preceding claims, wherein the internal wall surfaces defining the male coupler receiving aperture have an arcuate configuration.

12. a toy block as claimed in claim 11, wherein the arcuate configuration is cylindrical.

13. A toy block as claimed in any one of claims 1 to 10, wherein the internal wall surfaces defining the male coupler receiving aperture have a polygonal cross sectional shape.

ment, generally designated 176, of the present invention. Body means 12k has a first female coupler means 56k and a first male coupler 44k. Embodiment 176 is unlike any of the above embodiments because it has a second wall 16k which is curved. Each of the other walls is planar, first wall 14k, third wall 18k, fifth wall 22k, and sixth wall 24k.

Figure 18 is a sectional view of embodiment 174 along line 18-18 of Figure 16. First female coupler member 58j has a smaller axial length than the first female coupler member 58 of Figure 2. Second female coupler member 60j differs from second female coupler member 60 of Figure 2 in that the plane of outer end 76j is not perpendicular to the axis of second female coupler member 60j.

Figure 19 is a sectional view of embodiment 176 along the line 19-19 of Figure 17. First female coupler member 58k has a smaller axial length than first female coupler member 58 of Figure 2. The outer end 76k of female coupler member 60k is curved to conform to the curvature of second wall 16k.

It will be appreciated that the male couplers and male coupler receiving apertures may have other geometric configurations including arcuate or those having rectangular, polygonal, or square cross sections.

CLAIMS

1. An interconnecting toy block, comprising a body means having a first predetermined flexibility and a plurality of wall members unitarily fabricated and having external surfaces and internal surfaces defining a body cavity, a first of the wall members having first internal walls defining a first aperture therethrough and a second of the wall members having second internal wall defining a second aperture therethrough aligned with the first aperture, there being provided a first female coupler means having a second predetermined flexibility less than said first predetermined flexibility and comprising a first female coupler member and a second female coupler member, each of the first and second female coupler members having an outer end, an inner end spaced a first predetermined distance from the outer end and positioned within the body cavity, internal wall surfaces defining a male coupler receiving aperture extending from the outer end toward the inner end thereof, and external wall surfaces, the inner ends of the first female coupler member and the second female coupler member being connected together, the first female coupler member being positioned in the first aperture and the second female coupler member being positioned in the second aperture, there being provided retention means for retaining the outer end of the first female coupler member at the first wall member of the plurality of wall members and the outer end of the second female coupler member at the second wall member of the plurality of wall members.

2. A toy block as claimed in Claim 1, wherein the inner end of the first female coupler member has an insertion portion and the inner end of the second female coupler member has internal wall surfaces defining an insertion portion receiving aperture, the insertion portion of the first female coupler member being positioned within the insertion portion receiving aperture of the second female coupler member, so as to connect together the first and second female coupler members.

3. A toy block as claimed in claim 2, wherein the insertion portion of the first female coupler member is frictionally retainable in the insertion portion receiving aperture of the second female coupler member.

4. A toy block as claimed in claim 3, wherein the insertion portion further comprises a first peripheral shoulder and a first peripheral groove on the external wall surfaces of the first female coupler member, the insertion portion receiving aperture further comprising a second peripheral shoulder and a second peripheral groove on the internal wall surfaces of the second female coupler member, the first peripheral shoulder being positioned in the second peripheral groove and the second peripheral shoulder being positioned in the first peripheral groove for interlocking retention therebetween.

5. A toy block as claimed in claim 2, wherein the insertion portion of the first female coupler member is bondable to the insertion portion receiving aperture of the second female coupler member.

6. A toy block as claimed in claim 1, wherein the inner ends are welded to each other so as to connect together the first and second female coupler members.

7. A toy block as claimed in any one of the preceding claims, wherein the retention means comprises a collar at the outer end of each of the first and second female coupler members having an inner edge at the internal wall surfaces and an outer edge spaced from the external wall surfaces, the collars abutting the first and second wall members, respectively, of the body means.

8. A toy block as claimed in claim 7, wherein the first and second wall members of the body means each have a collar accepting indentation to allow each of the collars to be substantially flush with the outer surfaces of the first and second wall members of the body means.

9. A toy block as claimed in any one of claims 1 to 8, wherein the retension means comprises a sleeve on each of the first and second walls of the body means at the first and second apertures extending into the body cavity for frictionally engaging the first and second female coupler members.

10. A toy block as claimed in claim 9, wherein each of the first and second female coupler members comprises a plurality of external ridges on the external wall surfaces thereof extending a predetermined distance from the outer end toward the inner end for frictionally engaging the sleeve.

11. A toy block as claimed in any one of the preceding claims, wherein the internal wall surfaces defining the male coupler receiving aperture have an arcuate configuration.

12. a toy block as claimed in claim 11, wherein the arcuate configuration is cylindrical.

13. A toy block as claimed in any one of claims 1 to 10, wherein the internal wall surfaces defining the male coupler receiving aperture have a polygonal cross sectional shape.

14. A toy block as claimed in claim 13, wherein the polygonal cross sectional shape is a square.

15. A toy block as claimed in any one of the preceding claims, wherein each of the first and second female coupler members further comprises relief means in regions adjacent the outer end for increasing the second predetermined flexibility.

16. A toy block as claimed in claim 15, wherein the relief means on each of the first and second female coupler members comprises slots extending from the internal surfaces to the external wall surfaces.

17. A toy block as claimed in claim 16, wherein each of the first and second female coupler members further comprises a collar at the outer end having an inner edge at the inernal wall surfaces and an outer edge spaced from the external wall surfaces, the slots extending into the collar from the inner edge toward the outer edge.

18. A toy block as claimed in claim 16, wherein each of the first and second female coupler members further comprises a collar at the outer end having an inner edge at the inernal wall surfaces and an outer edge spaced from the external wall surfaces, the slots extending through the collar from the inner edge to the outer edge.

19. A toy block as claimed in any one of the preceding claims, wherein the internal wall surfaces defining the male coupler receiving aperture comprise internal ridges extending from the outer end toward the inner end therof.

20. A toy block as claimed in any one of the preceding claims, in which a third of the wall members has a first male coupler extending outwardly therefrom for detechable coupling with a female coupler means of another toy block.

21. A toy block as claimed in claim 20, in which a fourth of the wall members has a second male coupler substantially identical to the first male coupler.

22. A toy block as claimed in claim 21, wherein the first and second male couplers are in alignment with each other.

23. A toy block as claimed in claim 21, wherein the first and second male couplers are perpendicular to each other.

24. A toy block as claimed in claim 22, further comprising a third male coupler substantially identical to the first male coupler on the third wall member, a fourth male coupler substantially identical to the first male coupler on the fourth wall member and in alignment with the third male coupler, third internal walls defining a third aperture in the first wall member, fourth internal walls defining a fourth aperture in the second wall member in alignment with the third aperture, and a second female coupler means substantially identical to the first female coupler means and comprising a third female coupler member and a fourth female coupler member, the third female coupler member being positioned in the third aperture and the fourth female coupler member being positioned in the fourth aperture.

25. A toy block as claimed in any one of the preceding claims, wherein each of the plurality of wall members of the body means is substantially planar.

26. A toy block as claimed in any one of claims 20 to 24, wherein the second wall member is curved and each of the other wall members is planar.

27. A toy block as claimed in any one of claims 20 to 24, wherein the plurality of wall members comprises five wall members and each of the plurality of wall members is planar.

28. A toy block as claimed in any one of the preceding claims, wherein the body means is fabricated of blow moulded plastics.

29. A toy block as claimed in claim 28, wherein the female coupler means is fabricated of injection moulded plastics.

30. An interconnecting toy block substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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