

[54] KNOCKDOWN STRUCTURAL TOYS

[72] Inventor: Stanley Light, 21 Beverly Road,
Douglaston, N.Y. 11363

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[52] U.S. Cl. 46/29

[51] Int. Cl. A66h 33/10

[58] Field of Search.....46/22, 24, 25, 26, 29; 220/97

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Primary Examiner—Louis G. Mancene

Assistant Examiner—J. Q. Lever

Attorney—Samuel Lebowitz

[57] ABSTRACT

A modular structural toy constituted by comparatively few basic elements with which may be combined a virtually limit-

less number of cylindrical members, such as waste beverage cans, for the assembly of all types of structures striking the imagination of a child or an adult. A cubical block is fitted with annular resilient retainers, preferably of flexible plastic material, on five faces thereof, wherefrom may be branched selectively in one or more desired directions, a plurality of the cylindrical members which are integrated at the juxtaposed ends by annular connectors having resilient lips which encompass the annular beads at the ends of the cylindrical members. A cylindrical projection extends from at least one face of the central block which is shaped with an annular bead resembling that on a can so that the block may be coupled closely adjacent to another block by one of the annular resilient retainers on the latter, or by one end of an annular connector. In order to compensate for differences in length of the cylindrical members or cans which may be used in the setting up of a structural assembly, annular adapters may be interspersed in the assembly, each of which may be fitted on one end thereof with a resilient annular lip for encompassing the circular bead at the end of a can while the opposite end thereof is formed with an outwardly extending rib conforming to the outline and dimension of a bead, whereby it may receive the annular lip of another adapter or an annular connector. The lengths of the adapters and/or connectors may be varied to provide an additional capability of controlling the composite length of the cylindrical structural members integrated by said adapters or connectors.

17 Claims, 19 Drawing Figures

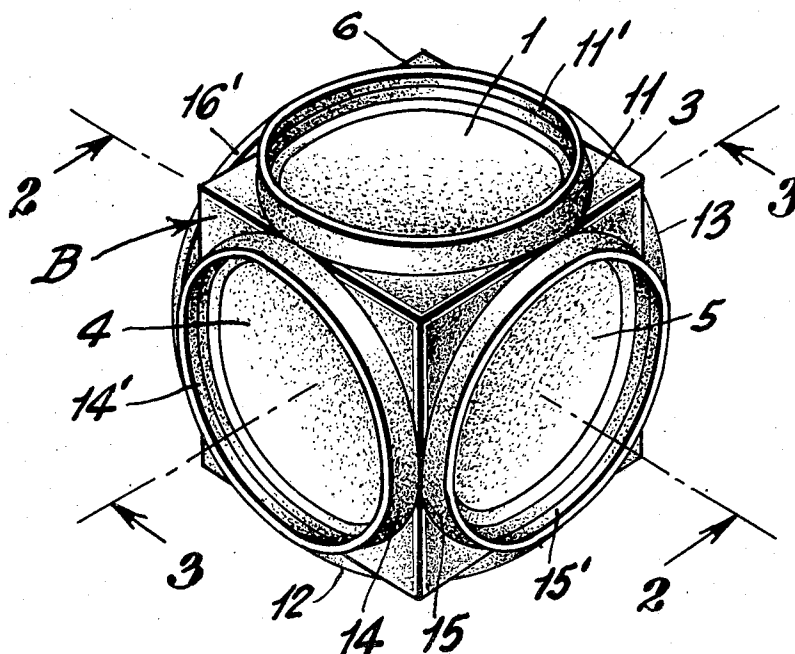


Fig. 1.

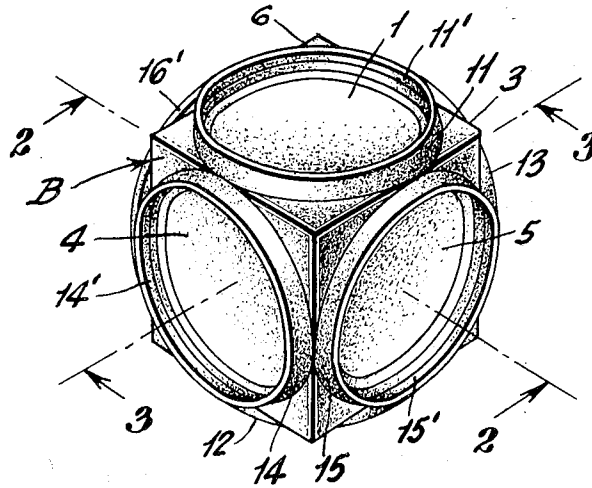


Fig. 2.

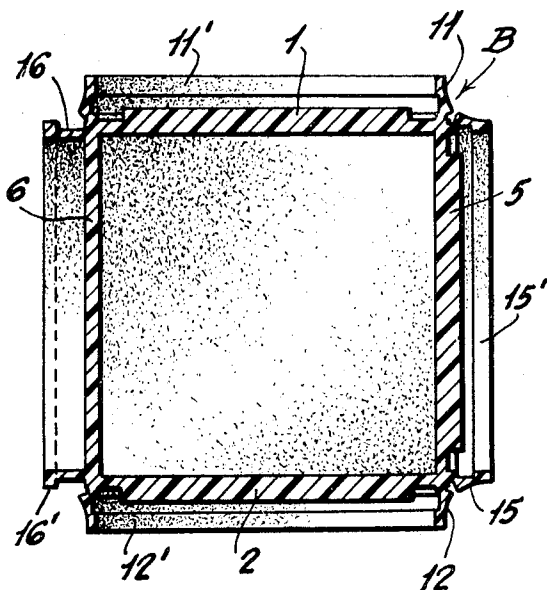
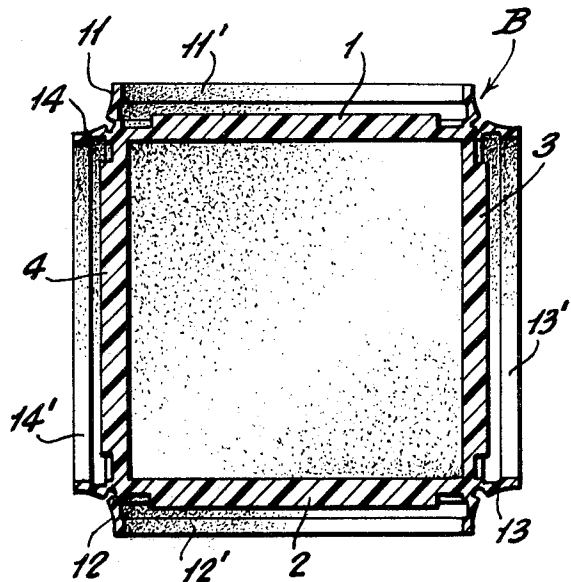


Fig. 3.



INVENTOR

STANLEY LIGHT

BY

Stanley Light

ATTORNEY

Fig. 5.

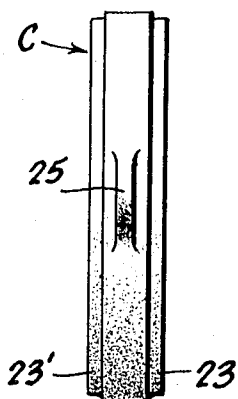


Fig. 4.

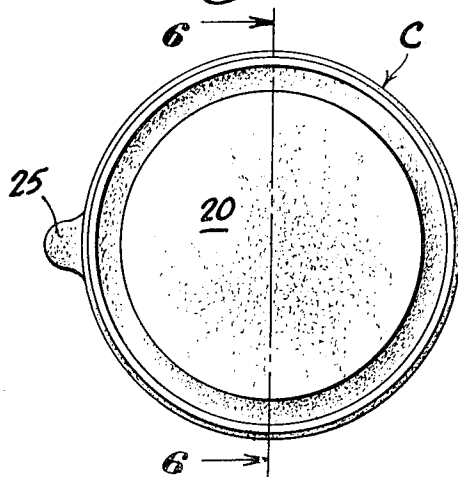


Fig. 6.

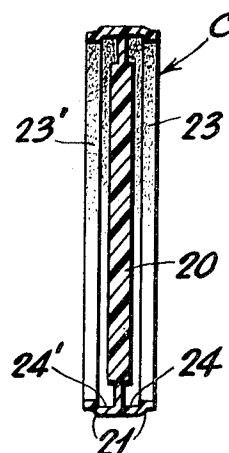


Fig. 9.

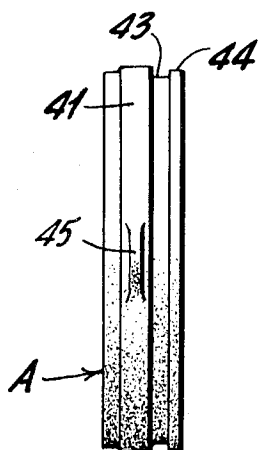


Fig. 8.

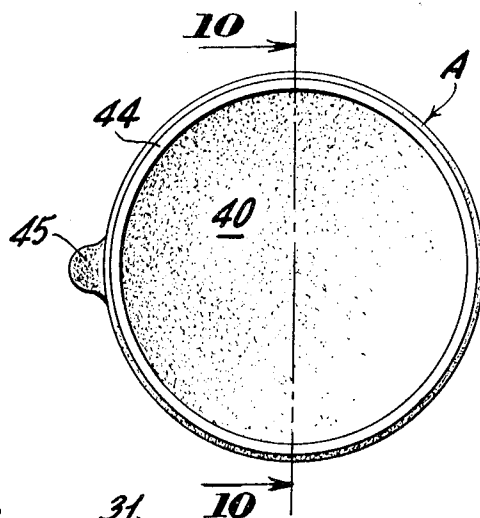


Fig. 10.

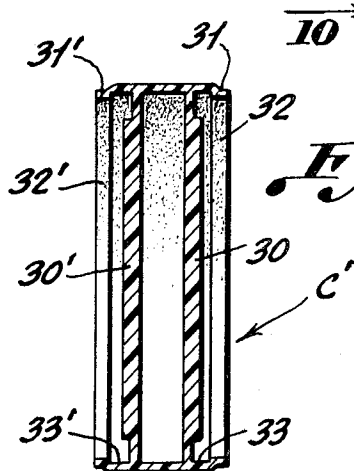
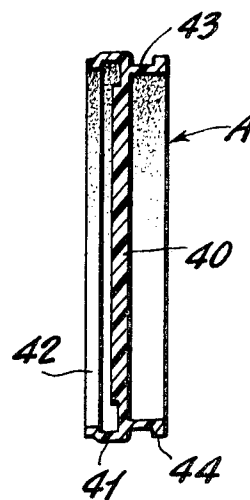


Fig. 7.

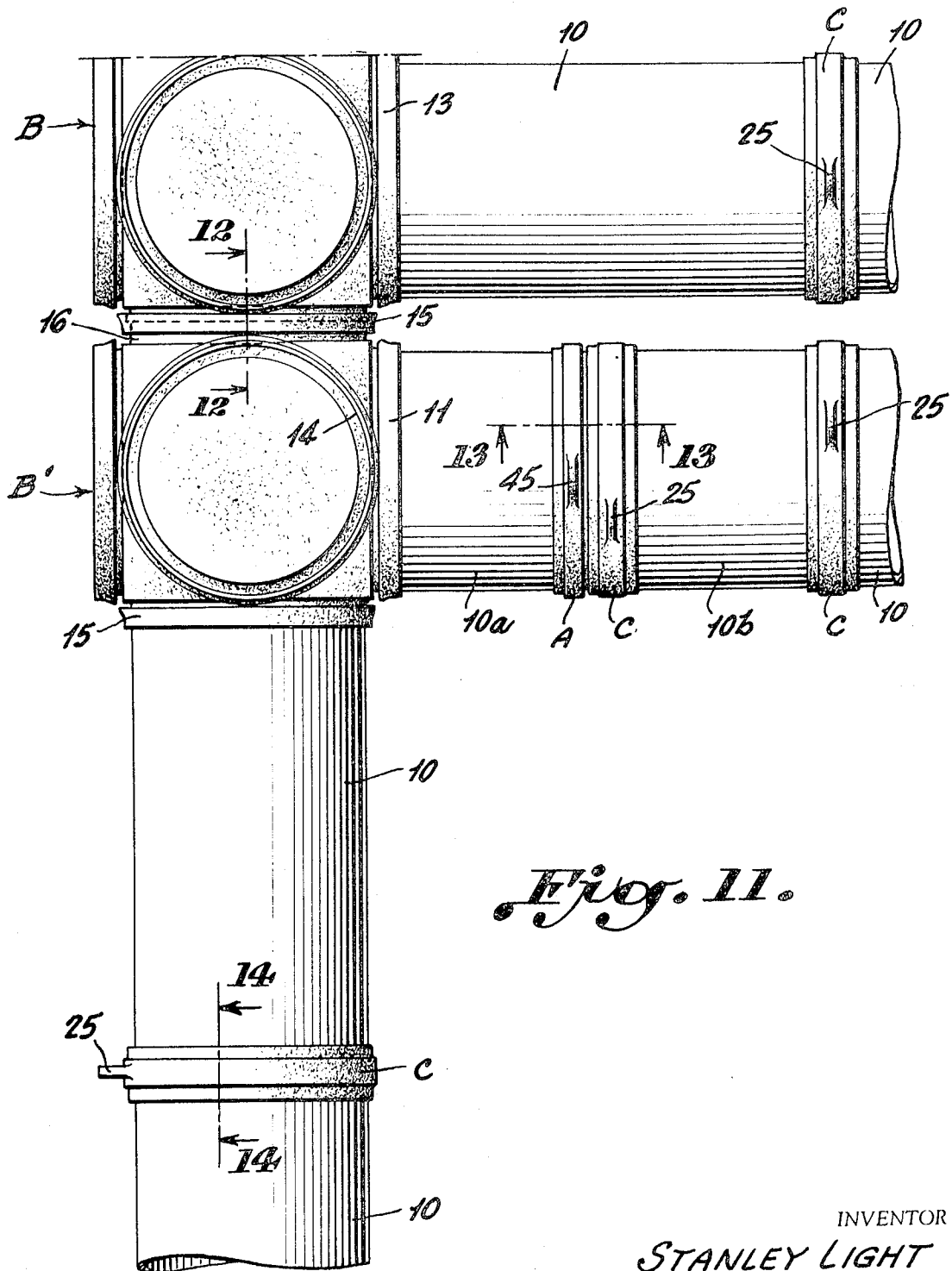
INVENTOR

STANLEY LIGHT

BY

Samuel Flom

ATTORNEY



INVENTOR

STANLEY LIGHT

BY

Samuel Belmont

ATTORNEY

Fig. 12.

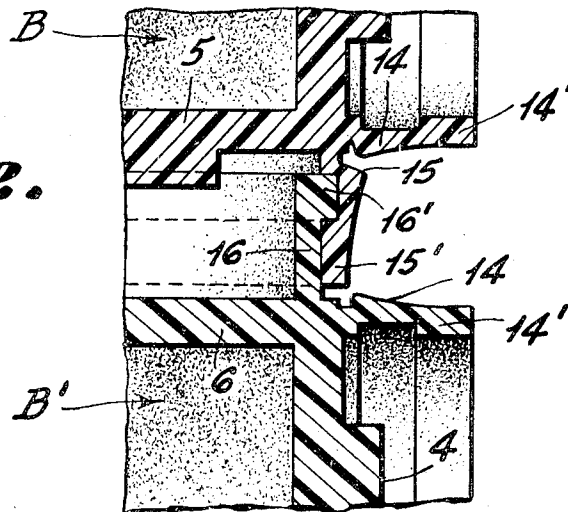


Fig. 13.

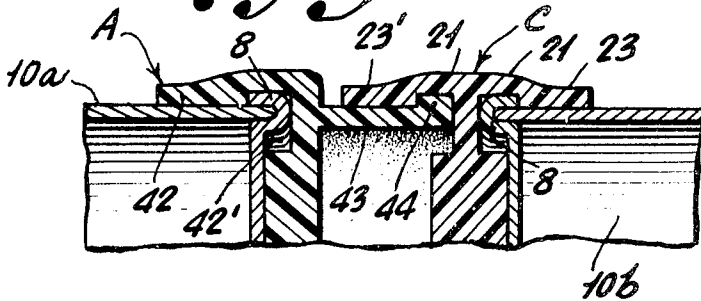


Fig. 14.

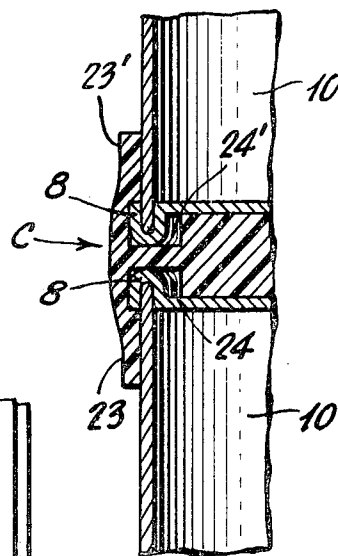
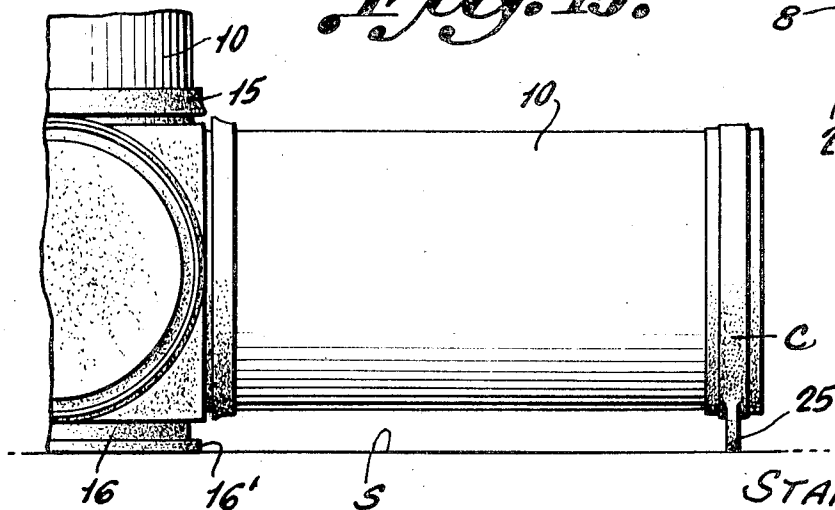


Fig. 15.



INVENTOR

BY

STANLEY LIGHT

Samuel Bloom
ATTORNEY

Fig. 16.

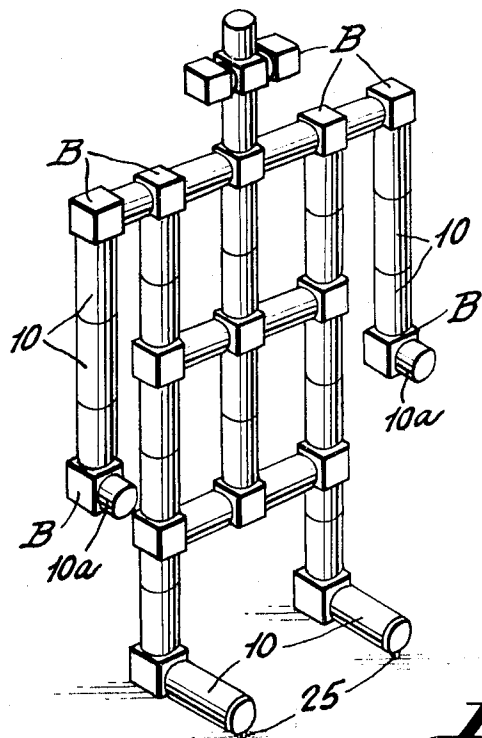


Fig. 17.

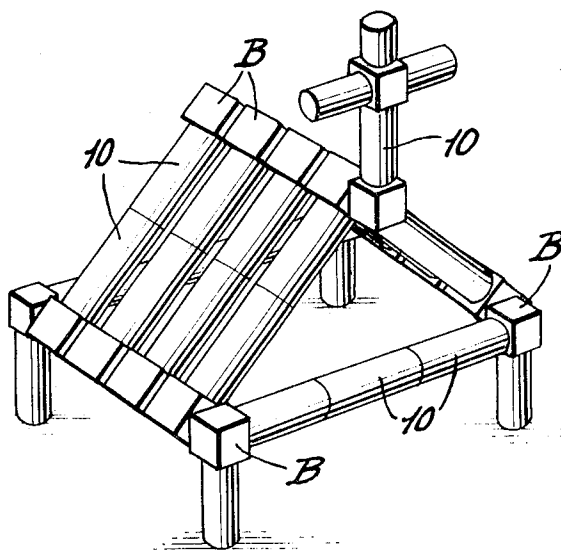


Fig. 18.

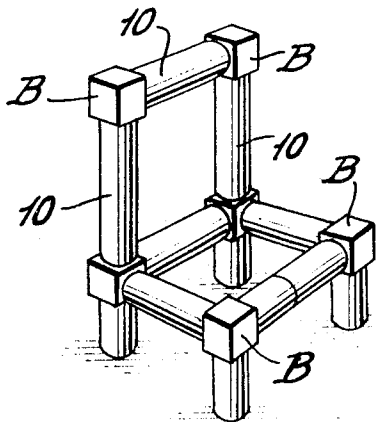
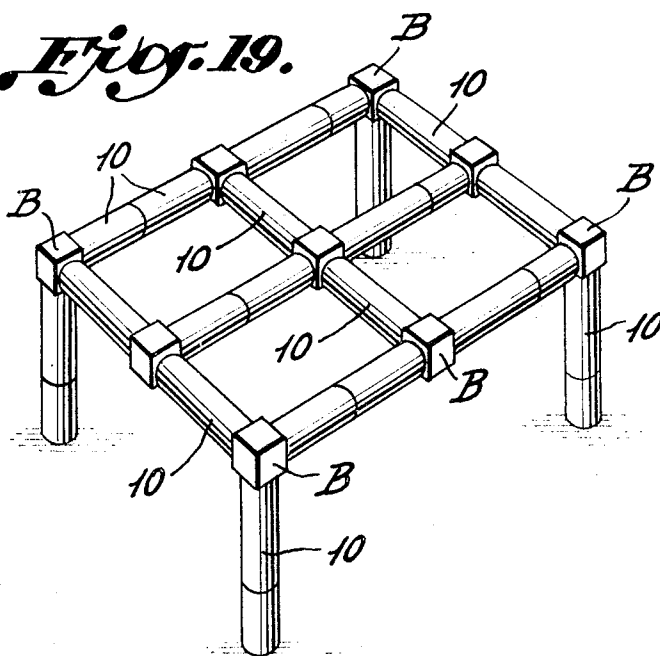


Fig. 19.



INVENTOR

STANLEY LIGHT

BY

Stanley Light

ATTORNEY

KNOCKDOWN STRUCTURAL TOYS

This invention relates to knockdown construction toys constituted by comparatively few basic modular elements with which may be combined a virtually limitless number of cylindrical members such as metallic receptacles which are employed for the packaging of beverages and other products and which normally are thrown away after their use.

It is the object of the present invention to provide a knockdown construction toy assembly of rugged and simple construction which may be fabricated at low cost and which makes possible the utilization of cylindrical members such as metal cans, which normally are considered waste.

It is another object of the invention to give free play to the imagination of children, as well as adults, in the design and construction of all types of building structures, furniture units, human and animal caricatures, etc. These may assume many forms as well as uses, so that not only may the assembly be used for the amusement and education of children, but also as a stimulating and pleasurable pastime for adults.

The invention aims to advance the art of toy designs, while simultaneously presenting a limited solution to the present antipollution problem, by providing an improved modular structural assembly making use of a large number of waste beverage cans. The invention presents an improvement over the arrangements disclosed in U.S. Pat. No. 3,422,564, Jan. 21, 1969.

Other objects and purposes will appear from the detailed description of the invention following hereinafter, taken in conjunction with the accompanying drawings, wherein

FIG. 1 is a perspective view of the modular cubical block in accordance with the invention;

FIG. 2 is a vertical sectional view along line 2—2 of FIG. 1;

FIG. 3 is a vertical sectional view along line 3—3 of FIG. 1;

FIG. 4 is a front elevation of an annular connector in accordance with the invention;

FIG. 5 is a left end view of FIG. 4;

FIG. 6 is a vertical sectional view along line 6—6 of FIG. 4;

FIG. 7 is a vertical sectional view of another embodiment of an annular connector;

FIG. 8 is a front elevation of an adapter in accordance with the invention;

FIG. 9 is a left end view of the same;

FIG. 10 is a vertical sectional view along line 10—10 of FIG. 8;

FIG. 11 is a front elevation of one illustrative embodiment of an integrated assembly of cylindrical elements or metal cans in accordance with the invention;

FIG. 12 is a vertical sectional view along line 12—12 of FIG. 11, on an enlarged scale;

FIG. 13 is a horizontal sectional view along line 13—13 of FIG. 11, on an enlarged scale;

FIG. 14 is a vertical sectional view along line 14—14 of FIG. 11, on an enlarged scale;

FIG. 15 is a partial front view of the lower end of an integrated assembly with a cylindrical member extending laterally from the modular vertical block which is maintained in a level position by the special construction of the annular connector; and

FIGS. 16, 17, 18 and 19 are diagrammatic perspective views of several illustrative structural arrangements which may be assembled in accordance with the invention.

In FIG. 1 is shown a perspective view of one of the modular cubical blocks B in accordance with the invention, which preferably is molded of rigid plastic material, and is provided on the six faces thereof with annular projections for selective coupling thereto of cylindrical structural members or other types of connector elements.

In the preferred embodiment of the invention shown in FIGS. 1 to 3, the opposite faces 1 and 2 of the cubical block B are provided with resilient annular projections 11 and 12 extending, respectively, from faces 1 and 2 which may be molded integrally with the surfaces of the block. These projections are of plastic material such as polyethylene, and have

sufficient flexibility to permit the passage of a bead at the end of a metallic cylindrical can so that the latter is detachably connected to the surface of the block and is retained in place by the flexible lip 11' and 12', respectively, which embraces the lateral wall of the can and retains the bead of the latter within a groove extending inwardly of the resilient lip.

Similar annular projections are provided on another pair of faces 3 and 4 of the cube and, as shown in FIG. 3, the annular projections 13 and 14 extend outwardly from these faces and terminate in the inwardly directed resilient lips 13' and 14', respectively, for engaging the ends of beaded cylindrical members which may be affixed thereto.

The last pair of faces 5 and 6 of the cube are constructed differently than the pairs of faces 1, 2 and 3, 4 described above. In the case of face 5 of the cube, the same is fitted with an annular projection 15 similar to annular projections 11, 12, 13 and 14, described above, and is provided with an inwardly directed resilient lip 15' for embracing the end of a beaded can or other connector. However, face 6 of the cube is provided with a cylindrical projection 16 which is molded with an outwardly directed rib 16' of a dimension and contour of the same order as that of an annular bead at the end of the can so that this rib 16' may be coupled with annular projections provided with flexible lips of the type extending from the other faces of the cube or flexible lips on different types of connectors which are described in greater detail below.

Preferably, the plastic cylindrical projections 16, 16' may be of the same rigidity as the body of the cubical block while the annular projections on other faces of the block have flexible characteristics.

Annular connectors of plastic material such as polyethylene may be used to interconnect the cylindrical member together, and one embodiment of such is illustrated in FIGS. 4 to 6. A central web or diaphragm 20 serves to impart sufficient rigidity to the connector while the annular flanges extending from both sides thereof imparts resilience to the unit so that the inwardly directed lips 23 and 23' may flex sufficiently to embrace the lateral walls of the cylindrical cans immediately adjacent to the terminal beads 8 which are received in grooves 24, 24' adjacent to the central web 20.

A tab 25 extends outwardly from the periphery of the connector, and serves not only to facilitate the manipulation of the connector relative to the beads with which the same is engaged, but in addition serves as a spacer in the setup of the construction toys, as explained in greater detail below.

The structural element or connector shown in FIGS. 4 to 6 may have a length of approximately one-half inch, but connectors of different length may be provided and such a variant embodiment is illustrated in FIG. 7 where the connector C' is of greater length and is formed of two spaced webs 30 and 30', wherefrom project the annular flanges 31, 31' terminating in flexible lips 32, 32' beyond grooves 33, 33', respectively, which receive the beaded ends of the cylindrical cans.

Such connectors as shown in FIGS. 4 to 7 may be used alternatively or in conjunction with structural elements in the form of adapters as shown in FIGS. 8 to 10, the purpose of which is to effect connections between the cubes and/or cylindrical members when variations in length of the latter are encountered. The adapters A may be formed of resilient plastic material of the type of polyethylene and other such plastics, and are provided with a transverse circular web 40 therein to impart strength thereto. An annular flange 41 at one end of the adapter terminates in an inwardly directed flexible lip 42, for the purpose of embracing the lateral wall of a cylindrical member adjacent the bead thereof or an annular rib of another adapter. The opposite end of the adapter A is fitted with a cylindrical projection 43 which terminates in an outwardly extending rib 44 of the same dimension and contour as the annular bead on a cylindrical member so that this rib may be embraced by the flexible lip of any connector C which may be coupled therewith.

In FIG. 11 is shown one of the many countless ways in which the cubical blocks may be combined with the cylindrical struc-

tural members and the connectors and adapters in the construction of a desired structural unit. Thus, two cubical members may be connected detachably by coupling the annular projection 15 extending downwardly from the upper cubical block B with the cylindrical projection 16 extending from the upper face of the lower block B'. A cylindrical can 10, of conventional length, is coupled detachably to the annular projection 13 extending laterally from the upper block, while a shorter can 10a is connected with the annular projection 11 extending laterally from the lower block. If the desired assembly requires an equalization between the cylindrical structural members, an adapter A is affixed to the right end of the structural member 10a leaving the annular rib 44 on the right thereof free for the engagement of a connector C as shown in FIGS. 4 to 6. Thereafter, another cylindrical structural member 10b may have the beaded end thereof coupled to the opposite end of the connector C to equalize the length of structural member 10 with that of the composite length of structural members 10a and 10b. Connectors C may be affixed to the right ends of the structural members extending from both the upper and lower blocks B and B' to which may be connected additional cylindrical structural members in any desired manner. Furthermore, as shown in FIG. 11, the flexible annular projection 15 extending from the lower end of the cubical block B' may have connected thereto any number of cylindrical members 10 coupled with the connectors C in any desired arrangement.

In FIG. 12 is shown in greater detail, and on an enlarged scale, the interengagement of the cylindrical projection 16 with the outwardly directed rib 16' on cubical block B' with the annular projection 15 and the inwardly directed resilient lip 15', which makes possible the close juxtaposition of a pair of cubical blocks leaving free the remaining faces thereof for the detachable connection of the cylindrical structural members in any desired direction. The engagement between blocks B and B' also permits a relative rotation between them around the axis common to projections 15 and 16.

FIG. 13 shows the juxtaposition of an adapter A with a connector C, as shown in elevation in FIG. 11. Thus, the resilient lip 42 of the adapter A is snapped over the right end of cylindrical member 10a so that the bead 8 of the latter is received within the groove 42'. The opposite end of the adapter, with the annular flange 43 and the rib 44 is coupled to the left end of the cylindrical member 10b by the engagement of the resilient lip 23' over the flange 43 and rib 44, while the opposite flange 21 of the connector 21 engages the lateral wall of the structural member 10b and the bead 8 at the end of the latter by means of the annular resilient lip 23.

FIG. 14 is an enlarged view showing the operation of the simple connector C for the purpose of coupling the juxtaposed ends of the cylindrical member 10 with the beads 8 at said ends. The flexible lips 23 and 23' encompass the ends of the lateral walls of the cans beyond the beads 8 which are seated in the grooves 24, 24'.

FIG. 15 illustrates graphically the function performed by the tabs 25 in addition to the facilitation of the manipulation of the connectors C in the course of engagement and disengagement of them with the ends of the cans. Thus, in some structural arrangements when a cubical block is set upon a surface S with the cylindrical projection 16 and the rib 16' at the free end thereof, the cubical block and the cylindrical member 10 extending therefrom would have a tendency to tilt by virtue of the higher level of the attachment of the cylindrical member relative to the free end thereof. Thus, the location of the tab 25 in the lowermost position, which is of the same height as the degree of protrusion of the cylindrical projection from the bottom surface of the cubical block, serves to level the cylindrical member relative to the supporting surface S. This results in more stable structures, particularly if the tabs 25 are oriented at all points where supports thereby are desired.

In FIGS. 16 to 19 are shown a few different structural arrangements of the many which are possible, by the selective

combination of the modular cubical blocks with the cylindrical members which may be coupled together selectively by the resilient lips on the cubical blocks, connectors and adapters with the annular outwardly directed ribs projecting from at least one face of the cubical blocks, as well as the annular outwardly directed ribs on the adapters and the annular beads on the ends of the cylindrical members. The annular construction of the lips and ribs on the cubical blocks, connectors and adapters, when used in conjunction with the beaded ends of the cylindrical members adapted to be connected thereto, makes possible relative rotary movement between the several parts when such is desired.

Thus, FIG. 16 may be considered a simulation of a robot which, incidentally, may be maintained in a level condition by the disposition of the levelling tabs 25 at the bottom of the end coupling elements, as shown on an enlarged scale in FIG. 15.

FIG. 17 illustrates a gabled roof construction simulating a church, and FIGS. 18 and 19 are simulative of a chair and table construction, respectively.

The possibilities of variation of the structural units are limitless and depend solely upon the imagination and skill of the children or adults using the assembly.

While the specific embodiments of the invention illustrated herein make possible the most universal and diversified assemblies, the objectives of the invention may be attained with modifications of the modular cubical block. Thus, cubical blocks having less than five annular projections extending from the faces thereof, or cylindrical projections with outwardly directed ribs extending from more than one face of the cube may be used.

While the invention has its maximum potential for utility and economy by the use of spent beverage cans, it is possible to use cylindrical members having beaded ends of metal or other material if such are desired and available.

The resilient flexible lips on the cubical blocks may be fabricated of any desired thermoplastic materials in addition to polyethylene mentioned above as long as they exhibit similar properties of resilience and flexibility, for example, vinyl plastics and the like.

I claim:

1. In a knockdown toy assembly,
 - a. a cubical toy block adapted to have the beaded ends of cylindrical members connected selectively to a plurality of identically dimensioned faces of said block,
 - b. at least one face of said block having a cylindrical projection permanently affixed thereto and extending outwardly therefrom and provided at its free end with an outwardly directed substantially rigid annular rib of a dimension and contour of the same order as the annular beads at the ends of said cylindrical members,
 - c. each of the remaining faces of said cubical block having an annular projection permanently affixed thereto and extending outwardly therefrom and provided at its free end with an inwardly directed annular resilient lip of flexible material adapted to yieldingly engage the annular bead projecting outwardly on the lateral wall at the end of one of said cylindrical members, and
 - d. said outwardly directed annular rib adapted to be detachably coupled to an adjacent structural element through the intermediary of an inwardly directed resilient annular lip on the latter, and said annular lips and rib permitting relative rotary movement between said cylindrical members adapted to be detachably connected to said annular lips, and said structural element adapted to be connected to said annular rib.
2. A device as set forth in claim 1, wherein said cubical block is hollow and of synthetic plastic material.
3. A device as set forth in claim 1, wherein said cylindrical members are beverage cans.
4. A device as set forth in claim 1, wherein said last-mentioned structural element is a second cubical block having an annular projection, with the appurtenant resilient annular lip, on the face thereof adjacent to said cylindrical projection on

said first-mentioned block, to bring the two of said blocks into close juxtaposition.

5. A device as set forth in claim 1, wherein said last-mentioned structural element is an annular connector of resilient and flexible plastic material having said resilient lip on one end thereof and a similar resilient lip on the opposite end thereof adapted to engage the annular bead at the end of one of said cylindrical members.

6. A device as set forth in claim 1, wherein said last-mentioned structural element is an annular adapter of flexible plastic material having said resilient lip on one end thereof and an outwardly directed rib at the opposite end thereof, said rib having a dimension and contour of the same order as those of the annular beads at the ends of said cylindrical members.

7. A device as set forth in claim 6, including an annular connector of resilient and flexible material having a flexible lip for encompassing the outwardly directed rib of said adapter.

8. A device as set forth in claim 1, including a plurality of annular connectors of plastic material having flexible lips on the opposite ends thereof adapted to engage the annular beads at the juxtaposed ends of cylindrical members.

9. A device as set forth in claim 8, wherein said annular connectors are each provided with a single radial protuberance for facilitating the engagement and disengagement thereof with the annular beads of said cylindrical members.

10. A device as set forth in claim 9, wherein said radial protuberance extends outwardly an amount corresponding to substantially the extent of the depth of said cylindrical projection on the cubical block, so that a cylindrical member extending from the latter on a substantially horizontal surface, may be leveled.

11. A device as set forth in claim 8, wherein said annular

connectors are of varying lengths for compensating for varying lengths of the cylindrical members.

12. A device as set forth in claim 8, including at least one annular adapter of flexible plastic material having a flexible lip on one end thereof and an outwardly directed rib at the opposite end thereof, said rib being of a dimension and contour of the same order as those of the annular beads at the ends of said cylindrical members, and adapted to be encompassed by the flexible lip of another juxtaposed annular adapter or annular connector.

13. A device as set forth in claim 12, wherein said annular adapter is provided with a single radial protuberance for facilitating the engagement and disengagement thereof with elements coupled therewith.

14. A device as set forth in claim 8, wherein each annular connector is provided with a circular web at substantially the midportion thereof to reenforce and to enhance the structural stability of the connector.

15. A device as set forth in claim 12, wherein said annular adapter is provided with a circular web at substantially the midportion thereof to rigidify the unit and to enhance the strength thereof.

16. A device as set forth in claim 1, wherein said cylindrical projection is provided on one face of said cubical block and said annular projections are provided on the remaining five faces thereof.

17. A device as set forth in claim 5, wherein the annular connector is of substantial length and is provided with a circular web adjacent to each resilient lip to reenforce and to enhance the structural stability of the connector.

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