STRUT MEMBERS AND CONNECTOR RINGS WITH IMPERFORATE PIERCEABLE WALLS

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References Cited
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2,765,580 10/1956 Herrschaft 46/29 X
2,052,457 8/1936 French 46/29 UX

FOREIGN PATENTS OR APPLICATIONS
3,455,049 7/1969 Dyer et al. 46/29 X
3,224,136 12/1965 Moryl 46/31 X
3,432,960 3/1969 Bombaci 46/29

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ABSTRACT
A construction kit embodying both elongate struts and ring shaped connectors enabling the construction of various designs and model structures. The connector rings are of a pliable material permitting the elongate struts to be conveniently inserted therein with the strut being subsequently positionable with respect to its angular relationship with the connector. Connector rings may be used in a combined manner for achieving further connector flexibility.

3 Claims, 9 Drawing Figures
STRUT MEMBERS AND CONNECTOR RINGS WITH IMPERFORATE PIERCEABLE WALLS

BACKGROUND OF THE INVENTION

The present application is a continuation-in-part of my copending U.S. patent application Ser. No. 105,054 filed Jan. 8, 1971, now abandoned.

The present invention relates generally to a construction kit comprising elongate structural members with flexible ring shaped connectors provided to enable the user to construct a wide variety of three dimensional designs or model structures. Well-known in the art are construction kits having wooden strut components with the connectors therefor being in the form of multi-apertured wooden discs with construction restricted to definite angular relationships between adjacent struts. Further, the number of struts joined by the connectors is limited.

Additionally within the prior art are kits having flexible tubular connectors with pre-formed openings therein. The preformed openings again limit the user to the number and angular disposition of the interconnected struts. Such tubular connectors are seen in the U.S. patent to Bombaci, U.S. Pat. No. 3,432,960 and the French patent to Majour, No. 832,726.

Additionally, connectors disclosed by the prior art all require costly forming dies or other costly equipment for their manufacture resulting in construction kit production incurring considerable production costs and concomitant substantial retail price.

SUMMARY OF THE INVENTION

The instant invention is embodied within a construction kit having pliable connector rings permitting the joining of the kits strut members in most any desired angular relationship. Accordingly, a wide variety of small scale structures and designs may be assembled. Geometric designs, scale models as well as geodesic structures may be readily assembled from the instant kit. Each elongate strut member is securely retained in place by engagement at its ends with the connector resulting in a rigid structure when completed without the undesirable use of glue or other adhesive. Accordingly, the inserted ends of the kits strut members may be repeatedly engaged with a connector as many times and at various angles as is necessary to achieve the current design or structure being assembled. The nature of the material used for the ring-like connectors lends itself to being easily penetrated or pierced by the strut ends with the same being retained by the gripping action of the penetrated connector material. Further, the inserted strut may thereafter be angularly adjusted with respect to the longitudinal axis of the connector. Points of the strut end member contacting strut engagement with an awl component of the kit being included for use in forming of a pilot opening in the connector.

It is an important object of the present invention to provide a construction kit capable of serving educational as well as recreational purposes. Students throughout a wide range of ages find the kit highly convenient for the forming of both geometric and geodesic forms for school projects as well as for their own enjoyment. Still others find the present construction kit useful in that it provides an outlet for the exercise of creative talents by reason of the many structural forms possible with the kit components.

DESCRIPTION OF THE DRAWING

In the accompanying drawing:

FIG. 1 is a view of a fragmentary portion of a geodesic structure constructed from the present kit.

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1 showing a typical arrangement of ring shaped connectors and struts.

FIG. 3 is a side elevational view of a connector ring.

FIG. 4 is a view similar to FIG. 3 showing a connector ring receiving strut ends and illustrating the versatile capability of the connector.

FIG. 5 shows an awl component of the kit.

FIG. 6 is a side elevational view of a modified form of connector and strut.

FIG. 7 is an elevational view of a pair of ring connectors one of which is collapsed for retention within an outer ring connector.

FIG. 8 is an elevational view of joined connector rings, and

FIG. 9 is a view of a modified strut end segment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With continuing reference to the above drawing wherein application reference numerals indicate parts similarly identified in the following specification, the reference numeral 10 indicates connector ring components of the kit. Included within the kit are a quantity of elongate struts indicated at 11 each being of a uniform length for each kit. Typically the kit marketed comprise from 200 to 400 pieces with a uniform strut length of a kit ranging from 2 up to 6 inches. For the sake of convenience and low production costs the struts may be in the form of colored, double tapered wooden members widely marketed for various culinary purposes. Obviously other suitable materials may be used for the struts with the only requirement being a degree of rigidity. Further, if desired, the shapes and sizes of struts could be varied as the connector 10 is capable of receiving various cross-sectional shapes and sizes.

With particular attention to FIGS. 2 through 4, wherein details of the connector rings 10 are disclosed, each ring comprises a flexible, pierceable, annularly walled member surrounding and defining the axial bore of the ring, said member being formed from a flexible resinous plastic such as a soft vinyl with one suitable embodiment of a connector having an outside diameter of one-half inch and a wall thickness of approximately one sixteenth of an inch. The vinyl material used may be of the type commonly referred to as “soft” vinyl in the trade as of the type used in the manufacture of flexible tubing. The width (axial dimension) of the sleeve may also be varied with a suitable width being approximately three eighths of an inch with ring width somewhat dependent upon the cross sectional area of the inserted strut end. The extremely pliable nature of the connector is such that slight deformation of the con-
ector will occur upon piercing insertion of the strut end as best viewed in FIG. 4. With continuing reference to FIG. 4, it will be seen that the struts' position may be other than normal to the axis A of the connector ring and similarly may project outwardly and downwardly in other than a true radial relationship to said axis of the connector. As is readily apparent from FIGS. 1 and 2, in the connector 10 shown therein the circumference of the bore, that is, the internal circumference of the wall, exceeds six times the diameter of the strut ends, thereby enabling at least six struts to be inserted into the connector in about the same transverse plane.

A modified form of the kit may include struts of uniform length which may have blunted ends as seen on modified struts 12 in FIG. 6. For ease of strut-connector engagement an awl 13 (FIG. 5) is provided for conveniently piercing the annular wall to form pilot openings in the connector. In cases where the strut components are blunted ended, obviously a pilot hole is required. The connectors may also be varied, with a modified form indicated at 14 in FIG. 6. The modified form of the connector ring is of greater diameter than the connector first described and formed from a somewhat less flexible resinous plastic. With attention again to the struts 12 the same may be flexible wood members permitting, if desired, some curvature in the integrated strut members.

In FIG. 7, I disclose one form of engagement between connector ring and strut wherein the strut projects outwardly through the flexible connector ring wall. The greater the flexibility of the ring material the greater the angularity possible between the strut and the wall of the ring.

In FIG. 8, a pair of connectors are joined one within the other, as permitted by the flexible nature of the rings. The inner ring is collapsed by fingertip pressure for insertion into the outer ring with the inner ring held in place by biased frictional engagement with the outer ring by reason of the inner rings inherent tendency to return to its annular configuration. Struts may thereafter be inserted in the outer ring or the exposed portion of the inner, collapsed ring.

In use, a structure or design is progressively assembled with a single connector initially supporting inserted strut ends. The number of struts inserted and the angular relationship of same to one another and the connector will be determined, of course, by the geometric design or three dimensional structure being built. Each strut, subsequent to initial engagement with a connector, may be swung in an arcuate manner about its connector attachment point thereby allowing for corrections to be made during assembly without requiring removal and re-insertion of a strut. If necessary, the latter may be readily accomplished as the strut is readily separable from its connector ring.

If desired the blunted ended struts may be provided with an annular recess or groove as at 12A in FIG. 9 which groove serves to receive the surrounding perforated wall of the connector ring. The groove provides a more secure connection between the ring 14 and the end segment of the modified strut 12.

While I have shown but a few embodiments of the invention it will be apparent to those skilled in the art that the invention may be embodied still otherwise without departing from the spirit and scope of the invention.

Having thus described the invention what is desired to be secured under a Letters Patent is:

1. A construction kit from which three dimensional model structures may be assembled, said kit comprising:
   a. elongate strut members each having end segments for passage in a radial manner through an annular wall of a connector ring, and
   b. connector rings for interconnecting said multiple strut members in desired angular relationship, each of said connector rings being of a flexible synthetic resinous material and having a flexible, imperforate, annular wall surrounding and defining an axial bore whose circumference exceeds six times the diameter of said strut end segments, said wall being pierceable to provide openings therethrough for grippingly receiving strut end segments, the flexible nature of the annular wall permitting distortion of circumferentially spaced apart wall areas so that when said wall is so pierced and said strut ends are received in such pierced openings, each strut member may be swung in an arcuate manner about its ring attachment point to alter angular relationship of said strut member to the ring and to other strut members,
   c. at least some of said strut member end segments having means for facilitating connector-strut member engagement when a pilot opening in the connector is used, and for making an opening in said wall when a pilot opening is not used.

2. The construction kit as claimed in claim 1 wherein said strut members have pointed end segments facilitating wall penetration.

3. The construction kit as claimed in claim 1 additionally including a pointed tool for forming pilot openings in the connector rings.

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