ABSTRACT

A plurality of structural elements, having dished bodies presenting convex outer and concave inner surfaces and corresponding in shape to that of a geometrical subsection of an even fractional portion of a spherical shell, are closely associated and preferably interfitted by means of broad and flat tongues and corresponding recesses, that are spaced below such convex outer surfaces and preferably lie substantially wholly between the convex and concave surfaces, to form a hollow sphere. Both the tongues and recesses have mating nubs for interlocking the individual elements together when interfitted to form a sphere. The structural elements can either be positively secured to each other or left free for easy disassembly. The convex outer surfaces of various of these structural elements may be colored or otherwise treated differently to provide a patterned exterior surface for the sphere, and the mated contiguous edges of such structural elements may be joined, adhesively or otherwise.

4 Claims, 9 Drawing Figures
HOLLOW SPHERE AND STRUCTURAL ELEMENTS FOR CONSTRUCTING SAME

BACKGROUND OF THE INVENTION

1. Field
The invention is in the field of hollow spherical structures and of structural elements for constructing same, regardless of the end use for such structures. Thus, such a structure can be a toy, a container, a gas-filled balloon, or a building, for example.

2. State of the Art
Hollow spherical structures are normally fabricated from hemispherical elements fitted and secured together.

Objectives: In the making of the present invention it was a major objective to provide for easily constructing a sturdy, hollow sphere from a number of relatively small, identical structural elements, at least some of which, preferably, have their outer surfaces differently colored or otherwise treated so as to provide for a pattern on the external surface of the sphere can be produced in constructing such sphere.

SUMMARY OF THE INVENTION

In accordance with the invention, a plurality of rigid or semi-rigid, structural elements are provided in any suitable manner, for example by injection molding of a plastic material or by molding a foamed plastic material such as “Styrofoam.” Each of these structural elements has a dished body corresponding in shape to that of a geometrical sub-section of an even fractional portion of a spherical shell. For example and as a preferred form of the invention, the dished body may be one-third geometrical sub-section of a one-eighth section of a spherical shell of some appropriate diameter for the purpose to which the completed hollow sphere is to be put. The dished body has a convex outer surface and a series of tongues and corresponding recesses extending along its peripheral edges and lying below such outer surface and having mating nubs whereby a number of the individual structural elements can be closely inter-fitted and interlocked to produce a hollow sphere. The convex outer surfaces of the respective individual structural elements can be differently colored or otherwise contrasting colors, so various patterns may be provided in constructing the sphere.

THE DRAWINGS

Several forms of structural elements and hollow spheres constructed therefrom, representing the best mode presently contemplated of carrying out the invention, are illustrated in the accompanying drawings, in which:

FIG. 1 is a view in elevation of a preferred form of the sphere of the invention, showing in dotted lines hidden interfitting parts of three individual structural elements of identical form making up a one-eighth section of the sphere;

FIG. 2 a top plan view drawn to a larger scale showing one of the structural elements per se, hidden recesses being shown by dotted lines;

FIG. 3, a view in perspective of the structural element of FIG. 2, looking toward one corner thereof;

FIG. 4, a view in perspective looking toward the tops of two of the structural elements of FIG. 2 fitted together;

FIG. 5, a fragmentary vertical section taken along the line 5—5 of FIG. 4 and drawn to a larger scale;

FIG. 6, a top plan view showing two structural elements of complimentary but not identical form about to be inter-fitted, each being a one-sixth geometrical sub-section of a one-eighth section of a sphere;

FIG. 7, a view corresponding to that of FIG. 1 but showing a sphere built up from the structural elements of FIG. 6;

FIGS. 8 and 9, similar views, but showing spheres built up from different forms, respectively, of identical structural elements conforming to the invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

In the form shown in FIGS. 1-5, the structural element 10, FIGS. 2 and 3, of the invention comprises a dished body 11 having shape corresponding to that of a one-third geometrical sub-section of a spherical shell 12 (see A, B, C, D), FIG. 1, of a one-eighth fractional portion 13 (see A, E, F), also FIG. 1, of a spherical shell 14. Interfitted means in the form of projecting tongues 15 and corresponding receiving recesses 16 alternate in series arrangement extending around the peripheral edges 17 of such structural element. Both the tongues and the recesses lie below the convex outer surface 11a of the body 11. In this form of structural element there are four of the edges 17 and a pair of tongues 15 projecting from opposite ends, respectively, of each of two opposite edges of the body, with a recess 16 therebetween, and a single tongue 15 projecting intermediate the length of each of the other two opposite edges of the body between two recesses 16.

The tongues 15 and recesses 16 may be formed as shown, with mating nub end members 15a and 16a, respectively, see particularly FIG. 5, or may be formed in some other way. Other forms may also be adopted. Thus, the dished body 11 in FIG. 5 could be thinner and the recesses formed, by displacing material below the convex surface, as by stamping a metal or plastic plate. A possible disadvantage here, however, would be the intrusion of the tongues into the surface pattern of the sphere.

In FIG. 6, a triangular structural element 18 is shown about to be closely interfitted with a conforming but not identical triangular structural element designated 18a. Here, tongues 19 similar to the tongues 15 project from the peripheral edges of each of the structural elements 18 and 18a and corresponding receiving recesses 20 are formed therebetween. As shown in FIG. 7, each of these structural elements is only a one-sixth geometrical sub-section of a one-sixteenth fractional portion of a spherical shell 21, or, stated somewhat differently, is a one-third geometrical sub-section of a one-sixteenth fractional portion of the spherical shell 21. Actually, each structural element 18 constitutes one-half of the structural element 10 cut diagonally from the side of a recess at one corner of such structural element to the side of a recess at the diagonally opposite corner of such structural element, the diagonal edge of one of such structural elements being provided with a tongue and the diagonal edge of the other being provided with a receiving recess for the tongue.

In FIG. 8, triangular structural elements 22, each a one-third geometrical sub-section of a one-eighth frac-
tional portion of a spherical shell 23, as in the embodiment of FIGS. 1-5, are formed with different numbers of tongues 24 and corresponding receiving recesses 25 in association with the respective edges of the triangle.

In FIG. 9, the structural elements 26 each have four edges, there being one tongue 27 and one corresponding receiving recess 28 associated with each edge. As in the embodiments of FIGS. 1-5, and 8, the structural elements 26 of this embodiment are each a one-third geometrical subsection of a one-eighth fractional portion of a spherical shell 29.

It should be noted that the tongues and recesses may alternate in a continuous series around the peripheral edges of the structural element, as in the respective embodiments of FIGS. 1, 8, and 9, or may have interposed edge length portions without either tongue or recess as at 30 in the embodiment of FIG. 6.

In all forms of the invention the fitting or interfitting means may be secured together in various ways depending upon the material used for the structural elements and the use to which the spherical structure is to be put, but it should be realized that the individual structural elements will hold together satisfactorily for many uses by reason of the interlocking fit provided by the mating nubs.

Whereas this invention is here illustrated and described with respect to certain preferred forms thereof, it is to be understood that many variations are possible without departing from the inventive concepts particularly pointed out in the claims.

I claim:

1. A structural element adapted to fit with like structural elements to form a hollow sphere, comprising a body having broad outer and inner surfaces and shape corresponding to that of a geometrical subsection of an even fractional portion of a spherical shell, so that an assembly of a sufficient number of similar structural elements will form a spherical shell; a series of individual broad tongues and alternating corresponding recesses disposed about the peripheral edge margins of said body as substantially planar parts thereof, said tongues and said recesses being spaced from the outer surface of said body and having mating nubs on outer broad surfaces of said tongues and on inner body surfaces defining said recesses, respectively, said nubs being arranged to interlock as structural means for holding interfitted structural elements together in the construction of a sphere which has no visible tongue and recess joiners.

2. A structural element in accordance with claim 1, molded to shape from a plastic material.

3. A plurality of the elements of claim 1 closely fitted together in the form of a hollow sphere.

4. The hollow sphere of claim 3, wherein various of the individual elements have their respective outer convex surfaces differently finished to provide a patterned exterior surface for the sphere.

* * * * *