ABSTRACT: Three-dimensional puzzles are disclosed for forming a hollow ornamental object having a surface of revolution. The surface is formed, for the most part, of a plurality of substantially identical puzzle pieces each of which has projections and complementary recesses about its periphery for cooperation with corresponding complementary recesses and projections on a contiguous piece. In one embodiment, the surface is a sphere, and the pieces are arranged in sets forming triangular and pentagonal portions of the spherical surface. In a second embodiment, the surface of revolution is cylindrical. A pair of such cylindrical surfaces intersect to form a cross.
THREE DIMENSIONAL PUZZLES

BACKGROUND OF THE INVENTION

This invention relates to puzzles and, more particularly, to three-dimensional puzzles for forming hollow decorative objects.

Two-dimensional jigsaw puzzles are well known and usually consist of a plurality of pieces having complementary projections and recesses whereby the pieces may be interfitted, one to the other, to form a complete two-dimensional picture or object. It has also been proposed to form three-dimensional objects employing interfitting puzzle pieces. In U.S. Pat. No. 1,964,007, for example, solid three-dimensional forms are created by stacking a plurality of two-dimensional puzzle layers, each of which is formed in the manner common to two-dimensional jigsaw puzzles.

It has also been proposed in U.S. Pat. No. 2,987,318 to provide a three-dimensional jigsaw puzzle in which a plurality of interfitting puzzle pieces form a hollow body. Each of the pieces in the puzzles shown in this patent, however, are of different shape, thus requiring that each of the individual pieces be separatedly formed, adding to the expense involved in manufacture of the puzzle. The hollow puzzles shown in this patent also require inwardly projecting pegs supported on a central core body.

SUMMARY OF THE INVENTION

It is therefore the principal object of the present invention to provide improved three-dimensional puzzles.

More specifically, it is an object of the invention to provide three-dimensional puzzles in which the individual pieces are identical puzzle pieces are employed.

It is also a further object of the invention to provide an embodiment in which the puzzle pieces form a spherical surface which is self-supporting.

Briefly, the invention contemplates the provision of three-dimensional puzzles for forming hollow ornamental objects having a surface of revolution and comprised of a plurality of similarly-shaped four-sided puzzle pieces. In one embodiment of the invention, the puzzle pieces interfit to form a sphere. Sets of three of the pieces share a common corner and form substantially triangular portions of the surface, and sets of five of the triangular portions share a common corner and form substantially pentagonal portions of the surface. In addition, sets of five of the pieces share a common corner and form smaller substantially pentagonal portions of the surface. At least some of the pieces are formed with an aperture to facilitate handling by inserting a finger therethrough.

In a second embodiment of the invention, the puzzle pieces form cylindrical surfaces which are arranged to intersect to form a cruciform object, such as a religious cross. In this embodiment of the invention, a reinforcing wire member may be provided to maintain the assembed pieces together. This embodiment also requires some auxiliary pieces which are shaped to interfit at the lines of intersection between the two cylindrical surfaces.

The foregoing and other objects, advantages, and features of the invention and the manner in which the same are accomplished will become more readily apparent upon consideration of the description of the invention taken in conjunction with the accompanying drawings, which illustrate preferred and exemplary embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 discloses a perspective view of a first embodiment of the invention with the puzzle pieces assembled;

FIG. 2 is a perspective view of one of the puzzle pieces employed to form the object shown in FIG. 1;

FIG. 3 is a schematic view showing a set of puzzle pieces of the object of FIG. 1 forming a pentagonal portion thereof;

FIG. 4 is a perspective view of a second embodiment of the invention with the puzzle pieces assembled;

FIG. 5 is a perspective view of one of the puzzle pieces employed to form the object of FIG. 4; and

FIG. 6 is a perspective view showing an auxiliary puzzle piece employed adjacent to a line of intersection on the body of FIG. 4.

DETAILED DESCRIPTION

Turning to FIG. 1, it will be seen that the three-dimensional puzzle of the invention may be employed to form a ball-like or spherical hollow ornamental object. The object of FIG. 1 is formed of a plurality of substantially identically shaped puzzle pieces 12, one of which is shown in greater detail in FIG. 2. It will be observed from FIG. 2 that puzzle piece 12 is four-sided and is shaped with a spherical curvature, the radius of curvature of all of the pieces 12 being identical. Each piece 12 has supplementary projections 14 extending from two of its sides and complementary recesses 16 extending inwardly from two of the remaining sides. The spherical surface of the hollow body 10 is formed by interfitting projections 14 of one piece with corresponding complementary recesses of a contiguous piece, the projections 14 and recesses 16 being shaped, as shown, to interlock with one another and thereby form a self-supporting structure. More particularly, the projections and recesses are shaped so that when they interfit with one another, a self-supporting structure is formed.

Referring again to FIG. 1, it will be seen that sets of three puzzle pieces, such as pieces 12a, 12b, 12c, share a common corner 18 and form a substantially triangular portion of the sphere. It will be noted that the sphere is formed from a number of such triangular portions which interfit along the side edges thereof.

In addition, it will be observed from FIG. 3, in particular, that five of the puzzle pieces 12d, 12e, 12f, 12g, and 12h share a common corner 20 and form a substantially pentagonal portion of the spherical surface. It will be noted from FIG. 1 that a plurality of such pentagonal portions interfit to form the entire spherical surface. In like manner, groups of five of the triangular portions mentioned previously, share a common corner 22 to form a larger pentagonal portion of the spherical surface.

It will be noted that some of the puzzle pieces 12 are provided with apertures 24 sized to receive a finger to facilitate handling of the pieces, particularly when the last piece is to be added or removed from the puzzle. The pieces snugly interfit so that when all of the pieces are assembled, the spherical surface is self-supporting.

While the pieces may be made from any suitable material, they are preferably made of a molded plastic material having glastike properties. For example, the pieces may be molded from methyl methacrylate. The pieces may be transparent or translucent and may be provided in different colors. The surfaces of the pieces are preferably slightly roughened to add to the ornamental interest of the pieces. The resulting sphere, after the pieces are assembled, is a highly decorative article and may be used as an amusement device, or even as a practical object, such as a lamp housing or globe.

Turning now to the embodiment shown in FIG. 4, it will be observed that in this embodiment a hollow cruciform object 30 is provided. This body is formed by two intersecting cylindrical surfaces 32 and 34. The cylindrical surfaces are made primarily of substantially identical four-sided puzzle pieces 36. As shown most clearly in FIG. 5, a puzzle piece 36 is provided with a cylindrical curvature and has identical projections 38 extending from two of its sides and complementary recesses 40 recessed inwardly of the remaining two sides. It will be observed from FIG. 4 that four of the puzzle pieces 36 interfit to form ring portions 42 of the cylindrical surface. Adjacent ring sections interfit by engaging corresponding projections and recesses to complete the cylindrical surfaces.

Special mention must be made of portions of the cylindrical surfaces adjacent to the lines of intersection therebetween. Here, it is necessary to employ auxiliary puzzle pieces of different shapes in order to facilitate the interconnection of the cylinders. Thus, cylindrical surface 32 may be made up of auxiliary pieces 44 which are shaped along one edge to conform with the line of intersection 46 between the two cylindrical sur-
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faces. Projections 48 extend from auxiliary pieces 44 and interfit with complementary recesses in auxiliary pieces 50 which form the adjacent part of cylindrical surface 34. It is seen in FIG. 6 that auxiliary pieces 50 have typical projections 52 and recesses 54 which are respectively similar to the projections 38 and recesses 40 shown in FIG. 5. In addition, however, auxiliary puzzle piece 50 includes a special recess 56 extending inwardly therefrom from the side edge 58, which corresponds with the line 46 of intersection between the cylindrical surfaces. Special recess 56 is shaped to receive the projection 48 from the auxiliary puzzle piece 44.

Since the cruciform structure thus described has a tendency to easily fall apart, it is advisable in some applications to provide a reinforcing wire member 60 to hold it together. The reinforcing wire member 60 has a hooklike end 62 engaging one end of cylindrical surface 32 and another hooklike portion 64 engaging the other end thereof. A branch wire 66 engages the midportion of wire 60 and extends upwardly through cylindrical portion 34, and a hook 68 is provided to engage the upper end of cylindrical portion 34. In like manner, an additional branch wire may extend downwardly and be engaged with the lower end of cylindrical portion 34.

The puzzle pieces and auxiliary puzzle pieces forming the puzzle shown in FIG. 4 may, as mentioned with respect to the puzzle pieces of FIG. 1, be molded, or formed of any suitable material. Preferably, the pieces are molded from a glasslike plastic, such as methyl methacrylate.

While preferred embodiments of the invention have been shown and described it will be apparent to those skilled in the art that changes can be made without departing from the principles and spirit of the invention, the scope of which is defined in the appended claims. Accordingly, the foregoing embodiments are to be considered to be illustrative rather than restrictive of the invention, and those modifications which come within the meaning and range of equivalency of the claims are to be included therein.

1 claim:

1. A three-dimensional puzzle for forming a hollow object having a surface of revolution, comprising: a plurality of identical four-sided puzzle pieces each forming an individual section of said surface of revolution, each of said pieces having complementary peripheral necked projections and recesses on the sides thereof, said projections and recesses being shaped to interfit with one another so that a projection from one piece will interfit with a corresponding complementary recess on an adjacent contiguous piece to interlock the contiguous pieces together to form a self-supporting surface, said pieces being shaped so that, when fitted together, sets of three of said pieces will share a common corner and form substantially triangular portions of said surface, and sets of five of said pieces will share another common corner and form substantially pentagonal portions of said surface.

2. A three-dimensional puzzle as recited in claim 1, wherein said surface of revolution is a sphere.

3. A three-dimensional puzzle as recited in claim 2 wherein at least some of said pieces are provided with an aperture of sufficient size to receive a finger to facilitate handling thereof.