United States Patent [19]

Linenfelser

[11] **3,710,505**

[45] **Jan. 16, 1973**

[54] **AERODYNAMIC TOY**

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[73] Assignee: **Brooklyn Products, Inc.**, Jackson, Mich.

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[52] **U.S. Cl.** ..... **46/74 D**, 273/106 B

[51] **Int. Cl.** **A63h 27/00**

[58] **Field of Search** ..... 46/74 D; 273/106 B

[56] **References Cited**

UNITED STATES PATENTS

3,359,678	12/1967	Headrick	46/74 D
3,545,760	12/1970	Wilson	46/74 D
3,026,110	3/1962	Hess et al.	273/106 B

OTHER PUBLICATIONS

American Calmac Corp., Mar. 10, 1966

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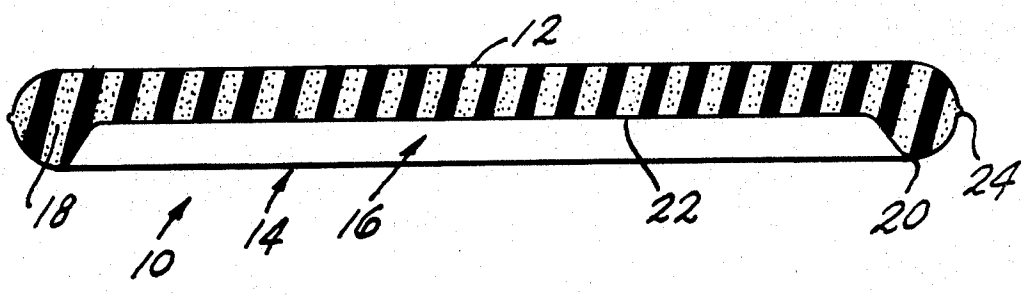
[57] **ABSTRACT**

An aerodynamic toy of a generally flat circular configuration adapted to glide through the air when thrown with a rotational movement imparted thereto, the configuration producing an aerodynamic lift, and the material of the toy consisting of a flexible, resilient polyurethane foam wherein the foam density in the central regions is slightly greater than at the peripheral region, and a recess is formed on the underside. The configuration of the body in conjunction with the recess producing aerodynamic lift, and the body material permitting the toy to be used indoors.

2 Claims, 7 Drawing Figures



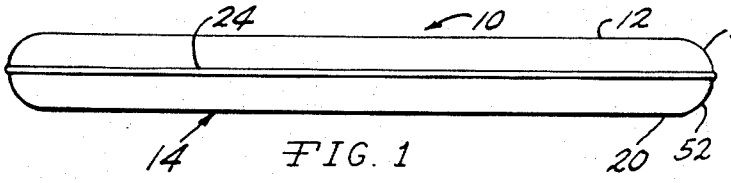


FIG. 1

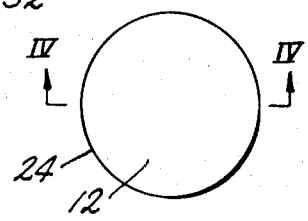


FIG. 2

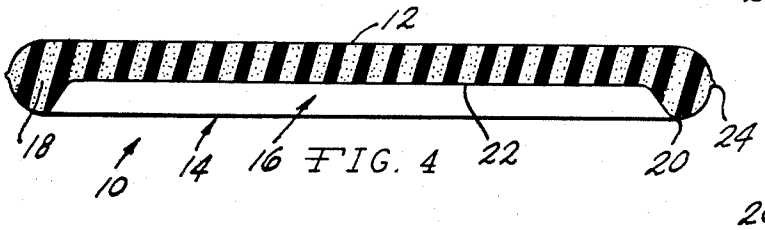


FIG. 4

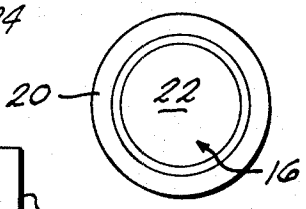


FIG. 3

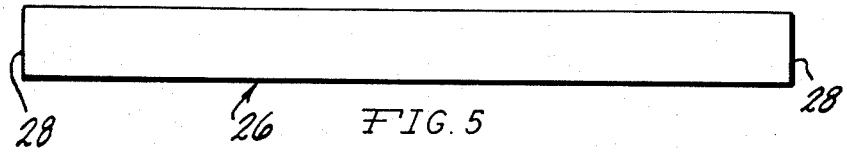


FIG. 5

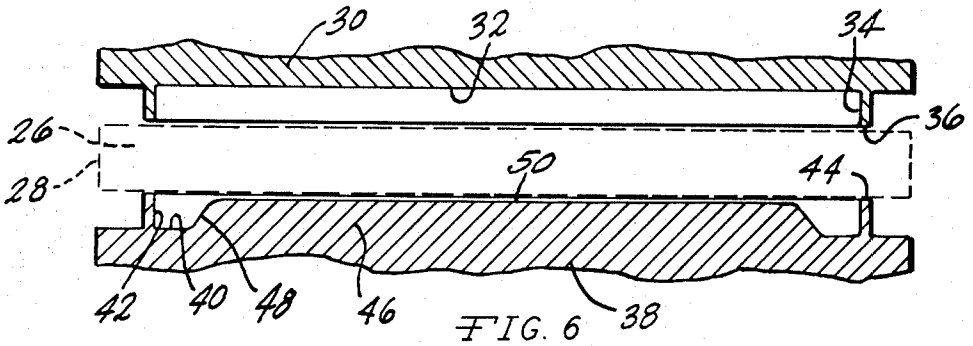


FIG. 6

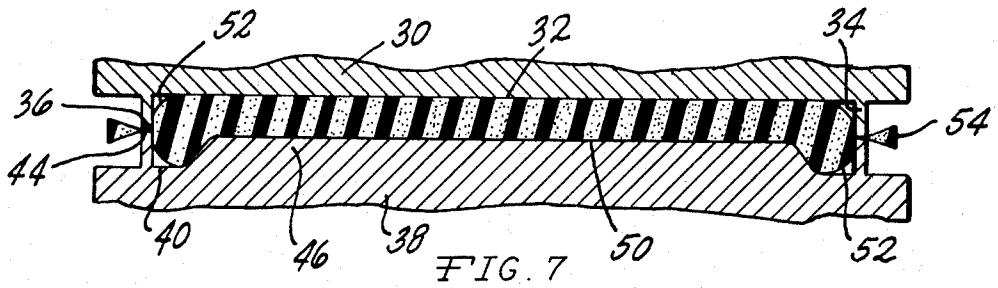


FIG. 7

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AERODYNAMIC TOY

BACKGROUND OF THE INVENTION

The invention pertains to an aerodynamic toy of the "flying saucer" type adapted to be thrown with a rotational movement imparted thereto. The toy is of a configuration inducing aerodynamic lift, and the direction and characteristics of flight may be predetermined by the manner thrown.

Aerodynamic toys of the "flying saucer" type have enjoyed wide popularity, and in particular, the toy constructed in accord with U.S. Pat. No. 3,359,678 has been widely distributed and used. Such an aerodynamic toy, when thrown, is capable of achieving aerodynamic lift, and the flight characteristics may be predetermined, within limits, by the manner thrown and the angle imparted to the toy as it leaves the thrower's hand.

Previously constructed aerodynamic toys of the aforementioned type have been formed of semirigid material, such as high density plastics, and are usually molded to the desired configuration. While aerodynamic toys constructed of such material have sufficient weight to produce extended flight, the "stiff" and firm material of which the saucer is formed requires that the toy be used outdoors where it will not engage windows, or other members which could be damaged by the rapidly moving toy. Also, in view of the weight of aerodynamic toys of the above type as formed of high density plastic material, a relatively high speed movement of the toy through the air is required to achieve significant aerodynamic lift, and thus the distance that the toy is thrown during normal use, and the force required to project the toy, is such that outdoor use only is practical.

SUMMARY OF THE INVENTION

It is an object of the invention to provide an aerodynamic toy of the "flying sucer" type which may be readily used indoors without damage to objects accidentally engaged thereby, and which may be used by small children in complete safety.

Furthermore, it is an object of the invention to provide an aerodynamic toy of the aforedescribed type which is of a light weight such that aerodynamic lift can be achieved at relatively slow velocities of movement, and yet the weight and configuration is sufficient to permit easy handling and throwing, and the toy will maintain its shape and physical characteristics even though abused and roughly handled.

In the practice of the invention the aerodynamic toy consists of a circular body formed of a soft, resilient, flexible polyurethane foam material. The toy includes an upper surface which is substantially flat and the peripheral edge is of a convex configuration whereby movement of air over the upper surface of the toy is encouraged. The undersurface is recessed in the central region of the body and the portion of the body between the recessed surface and the upper surface is formed of polyurethane foam of a slightly higher density than that present adjacent the convex edges. The convex configuration of the toy periphery is maintained by placing the edges under compression and drawing the edges of the toy toward a centrally located heat seam bead which assures maintaining the convex configuration and also strengthens the edge against ripping or other damage to the toy.

The fact that the entire body of the aerodynamic toy in accord with the invention is formed of a soft flexible polyurethane foam prevents the toy from damaging furniture, windows, lamps and other articles which may be inadvertently struck during use, and the toy is completely safe as a child struck thereby will not be harmed.

The light weight of the toy permits even a small aerodynamic lift effect to aid the gliding movement, and the relative roughness of the surface due to the construction of the flexible polyurethane foam aids the aerodynamic effect, as well as provides a pleasing handgrip surface.

BRIEF DESCRIPTION OF THE DRAWINGS

The aforementioned objects and advantages of the invention will be appreciated from the following description and accompanying drawings wherein:

FIG. 1 is an elevational side view of an aerodynamic toy constructed in accord with the invention,

FIG. 2 is a top plan view of reduced scale,

FIG. 3 is a reduced scale bottom view of the toy,

FIG. 4 is an elevational, diametrical, sectional view as taken along Section IV—IV of FIG. 2,

FIG. 5 is an elevational, side view of a blank of polyurethane foam prior to being formed in accord with the invention,

FIG. 6 is an elevational, diametric view of a forming press used in the construction of the aerodynamic toy prior to closing of the form halves, and,

FIG. 7 is a side, elevational, diametrical view of the press of FIG. 6 illustrating the press in the closed position at the forming stage of the toy.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENT

It will be appreciated in FIGS. 1 through 4 that the aeronautical toy constructed in accord with the invention comprises a body 10 which is of a circular configuration as viewed from the top and bottom, and is of a planar configuration as viewed from the side. The body upper surface 12 is substantially flat, and the under surface 14 is provided with a central recessed portion 16, of a circular configuration defining a rim portion 18, FIG. 4, having a lowermost edge 20, and the recess 16 includes the planar dished surface 22.

The periphery of the toy is circular and convex, as noted in FIGS. 1 and 4. Substantially centrally located between the surface 12 and the lowermost rim edge 20 is an annular bead 24 which results from the heating of portions of the polyurethane blank edges to maintain the edges under compression and impart the convex configuration thereto.

The aeronautical toy in accord with the invention is preferably formed from a flat stock material blank 26 which may be either circular or square in configuration, and is of a planar form having a thickness substantially equal to the desired distance between upper surface 12 and the rim edge 20 and includes squared edges 28. The side view of such a blank is shown in FIG. 5, and the blank is formed of a soft, flexible, resilient polyurethane foam of such a pliable characteristic as to permit folding back on itself and wadding up and compression within the user's fist without damage. Upon release of deforming pressures on the foam, it returns to its initial configuration. Such a foam is of a ther-

moplastic nature capable of being heat sealed, and capable of maintaining a predetermined configuration once heated and formed.

The toy is formed by a die press structure of the type shown in FIGS. 6 and 7. This press structure includes an upper portion 30 having a flat lower surface 32 surrounded by an annular, thin ring 34 terminating in a lower edge 36. The lower portion 38 of the press includes a surface 40 upon which the annual ring 42 is mounted in opposed relationship to the ring 34, and terminates in an upper edge 44 in opposed alignment with the ring edge 36. The lower die press portion also includes a raised portion 46 forming an annular conical surface 48, and a flat surface 50 centrally located within the annular ring 42. The lower portion 38 is heated to a temperature sufficient to heat seal and impart a permanent set and deformation to the polyurethane foam material employed.

The blank 26 is placed between the die press halves 30 and 38 as shown in dotted lines in FIG. 6 whereby the outer edges 28 of the blank extend radially beyond the aligned rings 34 and 42. The press halves are then closed to the position shown in FIG. 7 substantially engaging the ring edges 36 and 44. Such closing of the press portions simultaneously produces two operations on the foam blank 26.

One of the effects of the closing of the press portions 30 and 38 is to compress the blank 26 in its central region due to the reduced distance between the surfaces 32 and 50 compared with the distance between the surfaces 32 and 40. The heated condition of the portion 38 will heat the polyurethane foam adjacent the surfaces 48 and 50 forming a "skin" of high density foam material at these surfaces resulting in a smoother surface than exists at the other locations on the body 10. Thus, the foam material between the surfaces 32 and 50 is compressed to a higher density than that in the rim portion 18, and will remain of a slightly higher density due to the permanent deformation of the foam producing the recess 16 and the fact that the higher density, smooth surface 22 will prevent the return of the material to its original form.

Secondly, the closing of the press portions causes the ring edges 36 and 44 to substantially engage, separated only by compressed foam, and as the temperature of the ring 42 is sufficient to produce heat sealing, the substantial engagement of the edges 36 and 44 results in the heat sealed seam or bead 24. As will be appreciated from FIG. 7, the closing of the press portions tends to compress the material of the blank 26 adjacent the rings 34 and 42 to form the convex surfaces 52 which define the body periphery, FIG. 7. Once the ring edges 36 and 44 substantially engage to form the heat sealed bead 24, this compression of the foam material is permanently maintained such that when the press portions are opened the periphery of the toy will maintain the convex configuration desired. Upon opening of the press portions the excess material 54 falls to the lower portion surface 40 as the formation of the heat sealed seam will automatically produce a trimming of the excess material. If desired, the ring edges 36 and 44 may be slightly beveled to facilitate the heat sealing and the combined trimming operation.

As the axial length of the rings 34 and 52 are approximately the same the bead 24 occurs substantially equidistant between surfaces 12 and 20 and the bead will be located at the maximum diameter of the body and is therefore most effectively located.

The aforedescribed construction of the aerodynamic toy results in several unique advantages. For instance, the forming of the body of the toy of a soft, resilient, flexible polyurethane foam material permits the toy to be used indoors, and even if thrown hard, the toy will not damage furniture, windows, lamps, etc., or harm children struck thereby. Also, the higher density of the central region of the toy as defined between the recess 16 and the surface 12 lends a stability and rigidity which maintains the toy in its normal flat configuration, yet the slightly softer rim portion 18, due to the lower density in this area, contributes to the nondamaging characteristics.

The convex configuration of the toy periphery as defined by the surface 52 produces an aerodynamic flow over the top of the toy, which in conjunction with drag and "spoil" of the recess 16, imparts a lift to the toy as it moves through the air, and the light weight makes the toy sensitive to even small aerodynamic forces.

The presence of the bead 24 about the periphery of the toy, and at the outermost regions of the periphery, lends a strengthening and toughness to the periphery which effectively resists tearing and damage at this particularly high wear area, and thus the heat sealed seam forms a protective function, as well as maintaining the compression within the foam material necessary to achieve the convex configuration at the periphery.

It is appreciated that modifications to the invention may be apparent to those skilled in the art without departing from the spirit and scope thereof.

I claims

1. An aerodynamic toy comprising, in combination, a body formed of a soft, flexible, homogeneous, thermoplastic, resilient, foam material having a circular peripheral edge, a central region having a higher density than the density at said edge, a substantially flat upper surface and a lower surface, said peripheral edge comprising a convex surface formed of said foam material defining an aerodynamic lift surface, said lower surface being recessed throughout said central region defining a rim of foam material adjacent said peripheral edge having a body thickness between said upper and lower surfaces greater than at said central region and a foam material density less than at said central region, the density of said foam material within said central region between the recess defined in said lower surface and said upper surface being greater than the density of said foam material within said rim, and an annular heat formed high density bead defined on said peripheral edge of said foam material, said bead maintaining the foam material adjacent said peripheral edge under compression to define said convex surface.

2. In an aerodynamic toy as in claim 1 wherein said bead is defined on said peripheral edge substantially equidistant from said body upper and lower surfaces and at the location on said body defining the greatest diametrical dimension.

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