

- [54] **FLYING SAUCER**
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 [73] **Assignee: Wham-O Mfg. Co., San Gabriel, Calif.**
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 [52] **U.S. Cl.....46/74 D, 273/106 B**
 [51] **Int. Cl.....A63b 27/00**
 [58] **Field of Search.46/74 D, 174; 273/106 R, 106 B**

3,359,678 12/1967 Headrick.....46/74 D
 3,566,532 3/1971 Wilson.....46/74 D

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Assistant Examiner—A. Heinz
Attorney—Christie, Parker & Hale

[56] **References Cited**

UNITED STATES PATENTS

1,677,122 7/1928 Johnson273/106
 629,312 7/1899 Beidler46/175

[57] **ABSTRACT**

An improved saucer shaped throwing implement. A portion of the upper surface of the saucer located intermediate a circular rim portion and crown portion is also below the points of maximum elevation of the rim and crown portions to create a trough or depression extending around the saucer which is located immediately adjacent to the rim portion. A low profile contributes to the ability to "fly" the saucer at a relatively high speed.

11 Claims, 6 Drawing Figures

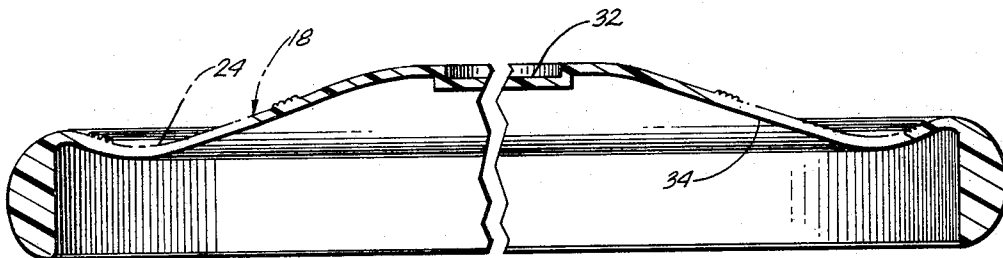


FIG. 2

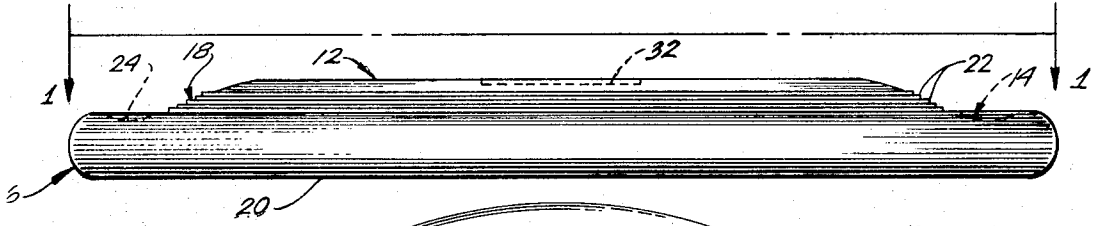


FIG. 1

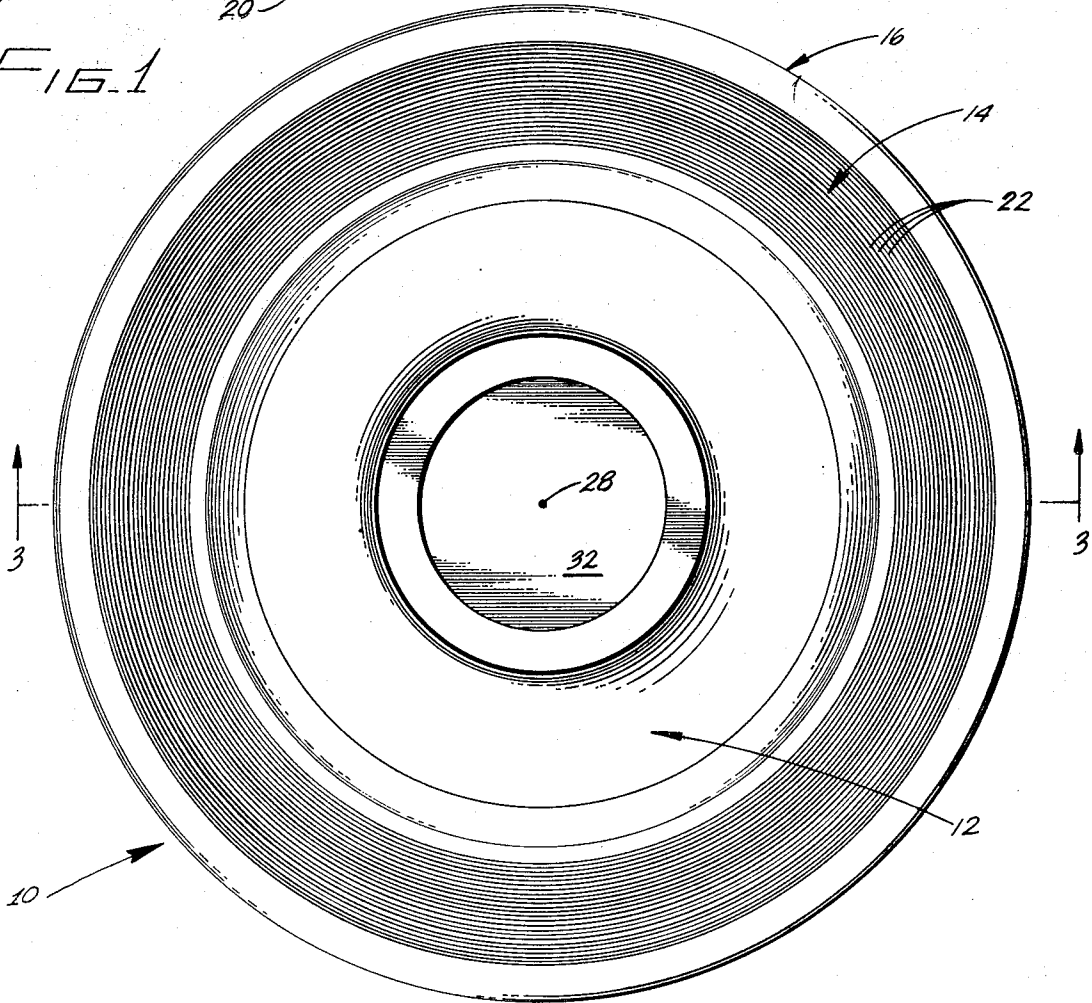
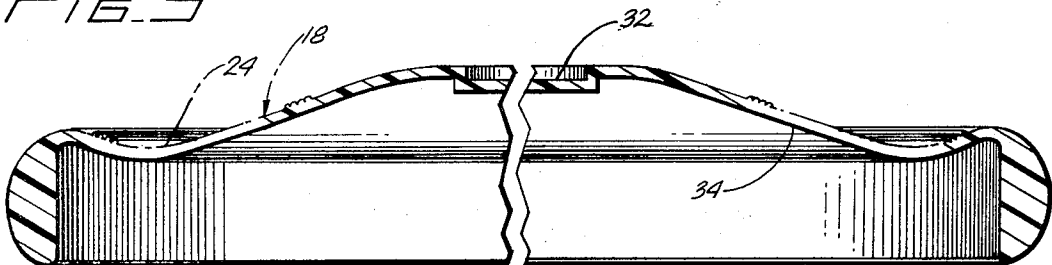


FIG. 3



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FIG. 4

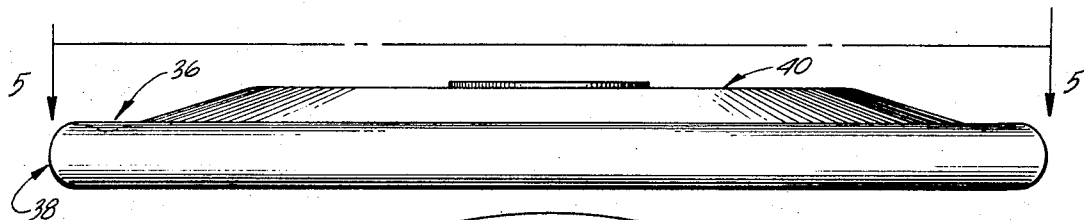


FIG. 5

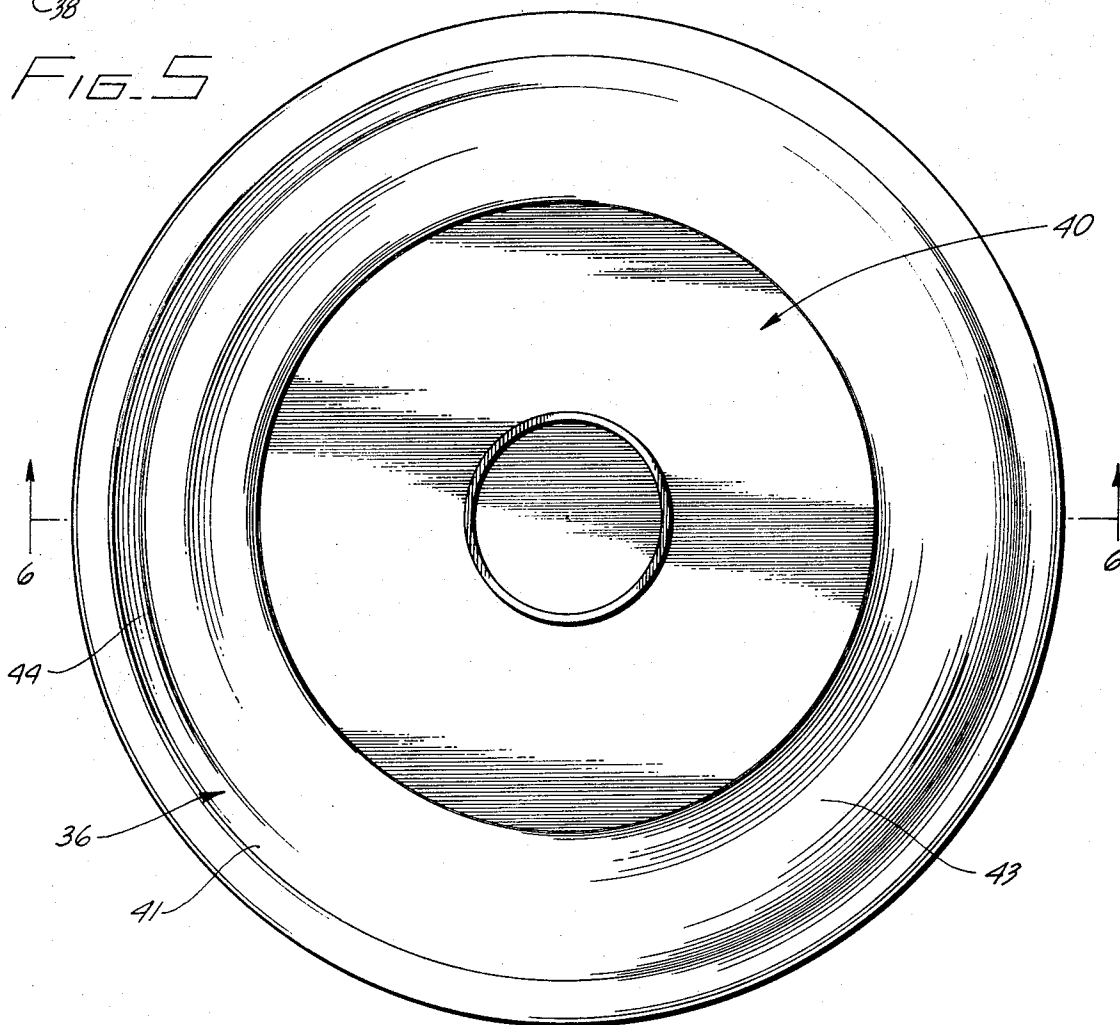
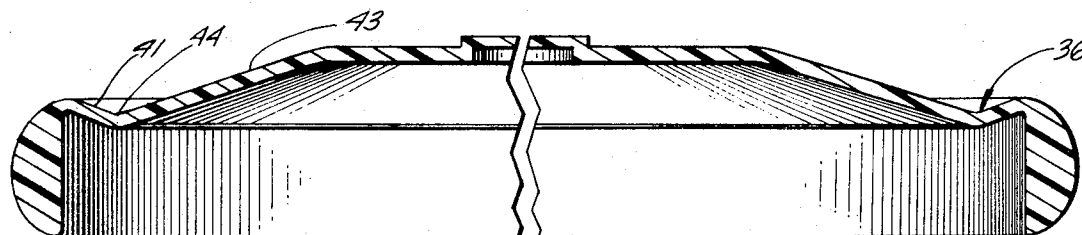


FIG. 6



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FLYING SAUCER

BACKGROUND OF THE INVENTION

This invention relates to aerodynamic toys to be thrown through the air and in particular to flying saucers to be used in throwing games.

Over the past decade, toys resembling inverted platters or saucers have enjoyed great popularity as recreational items for use in throwing games and contests. In the usual embodiment the toy is made of a plastic material in a circular configuration with a rim portion located at its periphery, the rim portion being relatively thick in comparison to the remaining portions of the implement. In its normal inverted platter orientation, the rim curves downwardly from the toy body giving the implement a shape which approximates that of an airfoil when viewed in elevation. Such a toy has been marketed for the period indicated above by the assignee of the present application under the trademark Frisbee.

In use in throwing games, the toy is normally grasped with the thumb on the convex side of the saucer and one or more of the fingers on the concave side. Throwing is accomplished with a wrist snapping motion wherein the thrower assumes a stance approximately at right angles to the intended target and retracts his arm across his body. By uncoiling his arm and snapping his wrist, momentum and spin is imparted to the saucer to cause it to fly or glide toward another participant in a game or in some cases toward an inanimate target. The intricacies of the flight path from the thrower depends upon the thrower's skill in selecting the proper release point and the angle of the saucer relative to the ground when it is released. Its appeal resides in the fact that it exhibits definite aerodynamic characteristics, can be made to do in-flight maneuvers of various kinds, can be caused to glide over substantial distances, and is relatively easy to master.

In an improved version of this well known flying saucer, a series of concentric discontinuities were provided on the upper surface of the saucer adjacent the rim, all as described in greater detail in U.S. Pat. No. 3,359,678. These discontinuities, which, in the preferred embodiment, were a series of concentric ribs, exerted an interfering effect on the air flow over the top surface of the implement creating a turbulent, un-separated boundary layer of air of a significantly greater area in comparison to the boundary layer created over the relatively smooth upper surface of the unimproved version as shown in U.S. Pat. No. D183,626. In effect, the discontinuities acted as air spoilers and resulted in substantially enhanced gliding characteristics.

SUMMARY OF THE INVENTION

The present invention provides additional improvements in the configuration and profile of a flying saucer of the above types. In this invention a surface of limited elevation is located intermediate a circular rim portion and a crown portion situated interiorly of the rim. In addition, the overall height dimension of the platter is measured from the top of the crown to the bottom edge of the rim is significantly limited. The result of imposing the foregoing physical features on the structure of the flying saucer is that the overall profile is substantially reduced when compared to prior art versions.

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The invention provides an aerodynamic toy comprising a circular crown portion having a center, a substantially flat circular surface area surrounding the center and a downwardly curved circumferential portion surrounding the flat circular surface area, the boundary of the circular crown portion being defined by a first predetermined radius. A rim is located circumscribing the circular crown portion having its point of maximum elevation located a predetermined distance below the point of maximum elevation of the circular crown portion with the inner boundary of the rim being defined by a second predetermined radius greater than said first predetermined radius. An intermediate circular surface extends between the rim and the circular crown portion and is integrally formed with said circular crown portion and said rim along its inner and outer circumferential extremities respectively. The point of maximum elevation of the intermediate circular surface is limited to an elevation below the point of maximum elevation of the rim whereby a circular depression extending around the circumference of the toy interiorly of the rim is provided.

What results is a saucer having a substantially reduced elevational profile presented to the airstream flowing around it thereby achieving a reduction in drag and a consequent increased ability to "bore" into the wind at a higher speed. Manipulation of the saucer is also enhanced due to the presence of the depressed intermediate surface which provides a point of purchase adjacent the rim for the thumb of the user. In a preferred embodiment the intermediate surface has a reverse curvature relative to the rim and crown portions, thereby locating a concave surface between two convex surfaces on the upper face of the saucer or platter. The presence of a surface of this configuration enables the user to in effect "push" the saucer before complete release thereby resulting in greater speed at launching and an increase in the length of flight of the projectile.

In one embodiment of this new and improved version of the flying saucer, spoilers such as concentric, closely spaced ribs are provided extending across the intermediate surface and up the downwardly curving outer periphery of the crown portion of the flying saucer to achieve an increased area of turbulent air flow over the saucer before separation or "breakaway" of the airstream. Other embodiments of the spoilers are also contemplated including discontinuous ribs and shallow depressions disposed over portions of the upper surface of the inverted saucer. In the preferred embodiment, the saucer is balanced and symmetrically constructed so that a straight line flight is achieved when properly launched in level orientation along a straight line trajectory extending away from the thrower. Any departure from balance and symmetry produces predictable anomalies in flight patterns, with the saucer typically demonstrating a tendency to curve away toward the weighted side of the saucer.

DESCRIPTION OF THE DRAWING

The invention will be better understood by reference to the following figures in which:

FIG. 1 is a top view of the presently preferred embodiment of the flying saucer of the present invention; FIG. 2 is a side view of the saucer shown in FIG. 1;

FIG. 3 is a sectional view taken along lines 3—3 of FIG. 2;

FIG. 4 is a side view of an alternate embodiment;

FIG. 5 is a top view taken along lines 5—5 of FIG. 4 of the alternate embodiment of the saucer according to the present invention; and

FIG. 6 is a sectional view taken along lines 6—6 of FIG. 4.

DESCRIPTION OF THE SPECIFIC EMBODIMENT

Referring now to FIG. 1, the top view of a flying saucer 10 according to the present invention, it can be seen that the toy is a circular saucer-like or platter implement having a central crown portion 12, an intermediate surface portion 14 and a rim portion 16. The central portion 12, intermediate circular portion 14, and rim 16 together define a top and bottom side of the flying saucer. For purposes of reference herein, the top side of the saucer will be referred to as the convex side and the bottom or underside as the concave side.

As can be observed from FIG. 2, the bottom edge 20 of the saucer 10, together with its convex side, presents a profile which roughly approximates a disc of a given thickness having a domed or crown portion raised above and located in the center of the upper surface of the disc. In the region corresponding to the transition between the central portion 12 and the inner circumference of intermediate portion 14, a curved surface 18 is provided as a part of portion 12 which extends downwardly from the point of maximum elevation of the central portion to an elevation below the point of maximum elevation of the rim portion. Rim portion 16 which extends from bottom edge 20 rises upwardly in a curving outline to the region corresponding to the transition between the rim 16 and the outer circumference of intermediate surface portion 14. As is also indicated in greater detail in conjunction with the description of FIGS. 3 and 5, the point of maximum elevation of intermediate surface 14 is limited to a height which is below the point of maximum elevation of the rim creating a trough or depression extending around the saucer. This likewise imposes the limitation that the point of maximum elevation of the intermediate surface 14 is located a predetermined distance below the point of maximum elevation of the crown or dome portion 12 of the saucer. In comparison to preceding versions of this flying saucer, the distance between the bottom edge 20 of the saucer and the point of maximum elevation of the crown or dome portion 12 is substantially less than the corresponding dimension in the prior art versions. This lower height dimension combined with the intermediate trough or depression on the convex side of the saucer provides the saucer of the present invention with a substantially lower profile and results in the higher flight speed and longer flight distances.

In FIGS. 2 and 3, the side and sectional views of a presently preferred embodiment of the saucer, the outline of the convex and concave sides of the saucer 10 are more completely illustrated. As can be seen from these figures, the implement resembles an inverted saucer. Further, the rim which extends downwardly in an essentially perpendicular relation to the general plane of the saucer is substantially thicker than the remaining portions of the saucer and in cross-section

resembles a circular segment. A plurality of concentric, closely spaced ribs or ridges 22 are superimposed or raised from intermediate surface 14 and extend a predetermined distance up surface 18 of crown portion 12. As previously indicated, the ridges produce an air spoiling effect and a turbulent, closely adhering boundary layer flow of air over a greater portion of the top surface of the saucer before separation in comparison to the flow over a smooth surface, resulting in an increased stability in the flight of the saucer. The exterior most spoiler rib is located at or slightly interiorly of the point of juncture of the rim 16 and intermediate surface 14 with the remaining spoilers extending interiorly thereof.

In the embodiment shown in FIGS. 2 and 3, surface 14 is dished or curved such that a reverse or "S" curve is produced in the transition from the rim to the intermediate surface and thence to the surface of the central or crown portion 12. This surface of reverse curvature results in an annular depressed trough 24 extending around the saucer located immediately interiorly of the rim portion. In addition to its contribution to the lowered profile of the saucer, the trough or depression provides a means whereby the saucer may be more readily gripped particularly when being launched by a user. When grasped in the conventional launching manner with the convex side as the top surface and the concave side the bottom surface of the saucer when in flight, the fingers of the user grip the under or convex side of the saucer and rim portion while the thumb rests in and grips the trough 24 on the concave side thereof. In this way the user is enabled to maintain firmer physical contact with the saucer during launching resulting in the greater "push" and thereby achieving the longer and faster flights of the saucer of the present invention.

A discontinuity in the convex surface of the toy in the form of a circular shallow recess 32 is located interiorly of spoilers 22 in the center of crown portion 12 and forms a closed circle thereon concentric with the center 28 of the saucer. The central region of crown portion 12 in such an embodiment is thereby essentially flat. As shown in FIG. 3, the concave side of the saucer has an essentially smooth surface 34 extending from the rim interiorly to recess 32. The recess 32 appears as a circular disc raised from the surface of the concave side of the saucer.

FIGS. 4 and 5 illustrate an alternate embodiment of the saucer of the present invention. In this embodiment the saucer resembles that of FIGS. 1 and 3 with the exception that an intermediate circular surface 36 is located between a rim 38 and a central or dome portion 40. In this embodiment an essentially angular "V"-shaped trough is defined by a first surface 41 extending from its point of juncture along the interior of rim portion 38 to the apex 44 of the "V" and a second surface 43 which extends from apex 44 to the point of juncture with the downwardly curving periphery of a crown portion 40. In this embodiment, as in the previous embodiment, a saucer of a substantially lower profile is again achieved having the same advantages as outlined above with respect to its flying characteristics. The curved and V-shaped troughs of the two embodiments described herein are illustrative of the several possible configurations which can be molded into the saucer within the general requirement that an annular trough

be provided in the surface of the saucer located in the region immediately interiorly of the rim portion.

In its presently preferred embodiment the saucer of the present invention is fabricated by injection molding of polyethylene. Fabrication in this manner from such a material results in a saucer having the degree of rigidity necessary for shape retention while retaining a limited degree of softness and flexibility to enhance its handling and to reduce the shock of impact when used in a toss game between two or more players. In its presently preferred embodiment the saucer has a weight of between 100 and 120 grams and a diameter of approximately 9¼ inches. Larger and smaller versions of the presently preferred embodiment are also contemplated having proportional weight and dimensional characteristics.

What is claimed is:

1. A saucer adapted to be thrown through the air and having an aerodynamic lifting surface facing substantially vertically upward; said aerodynamic lifting surface comprising:

a circular crown portion having a center, an intermediate circular surface area surrounding the center, and a circumferential portion surrounding the circular surface area and having a gradual slope extending downwardly from the circular surface area, the crown portion having a circumferential boundary defined by a first radius extending from said center;

a rounded peripheral portion circumscribing the crown portion and located at an elevation lower relative to the circular surface area of the crown portion, the peripheral portion having an inner boundary defined by a second radius greater than said first radius such that the peripheral portion is radially spaced from the circular crown portion, said peripheral portion further defined by an annular top surface area having a generally upwardly facing convex curvature and an edge portion extending downwardly relative to the top surface area thereof to define a circumferential rim for the saucer; and

an intermediate depressed annular portion extending between the peripheral portion and the circular crown portion and having inner and outer boundaries integrally formed with said crown and

peripheral portions, respectively, wherein a depressed surface extends around the saucer immediately, interiorly of the peripheral portion such that the general cross sectional outline of the lifting surface of the saucer is characterized by a first convex surface along the outer periphery of the saucer extending radially inwardly to an intermediate concave surface which in turn extends radially inwardly to a second more centrally located generally convex surface, each of the three main portions of the saucer having respective elevations which are interrelated such that the saucer presents a low profile.

2. A saucer according to claim 1 wherein the intermediate portion is an annular trough extending circumferentially around the saucer.

3. A saucer according to claim 2 wherein the trough has the form of a circular arc whereby the lifting surface of the saucer is convex on both sides of the trough and concave in the region of the trough.

4. A saucer according to claim 1 wherein the intermediate circular portion comprises a pair of inclined surfaces joined together along a common annular line to provide a V-shaped annular trough extending circumferentially around the saucer.

5. A saucer according to claim 2 wherein the edge portion of the rim is substantially thicker than the remaining portions of the saucer and in cross-section is a shape approximating a circular segment.

6. A saucer according to claim 5 wherein a plurality of air spoilers are located on the lifting surface of the saucer.

7. A saucer according to claim 6 wherein the air spoilers are located on the circular crown portion.

8. A saucer according to claim 7 wherein the air spoilers are a plurality of concentric, closely spaced raised ribs.

9. A saucer according to claim 8 wherein the plurality of concentric raised ribs are located on the surface of the trough.

10. A saucer according to claim 9 wherein the circular of the crown portion is essentially flat.

11. A saucer according to claim 1 in which the intermediate surface area of the crown portion is substantially planar.

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