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(54) FLYING TOY

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(57) ABSTRACT

A launcher (20) for a flying object, such as a boomerang (21), having a body that includes a plurality of wings (31). The launcher includes a stop (23), against which the object rests at a point (27) on its body. A moving member (25) engages one of the wings of the object so as to impart forward motion thereto, such that the object is propelled forward from the launcher with a rotational moment about the stop. The boomerang is preferably made from a sheet (50) of material which is cut to form the plurality of wings, joined at a vertex (28), wherein one or more of the wings are folded to produce lift flaps (34, 35).

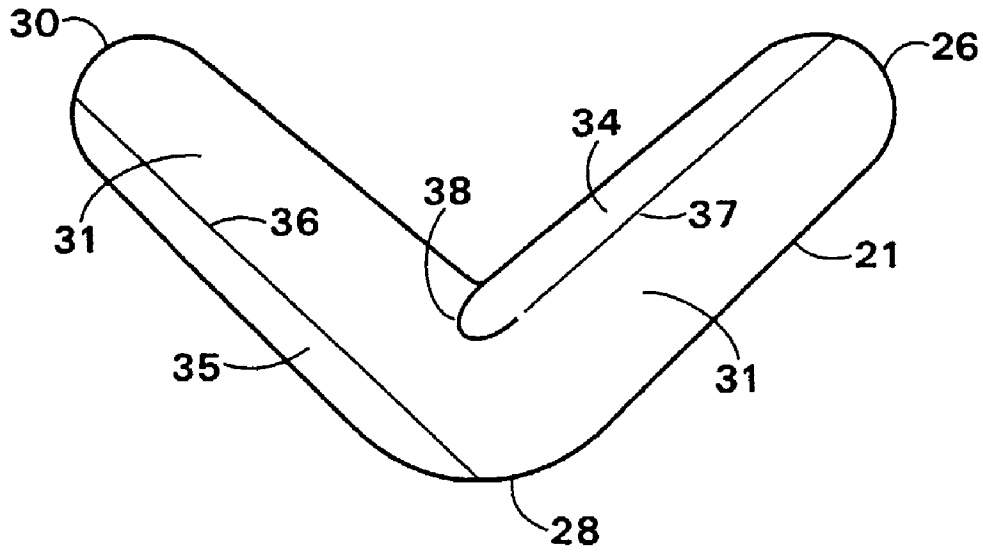


FIG. 1

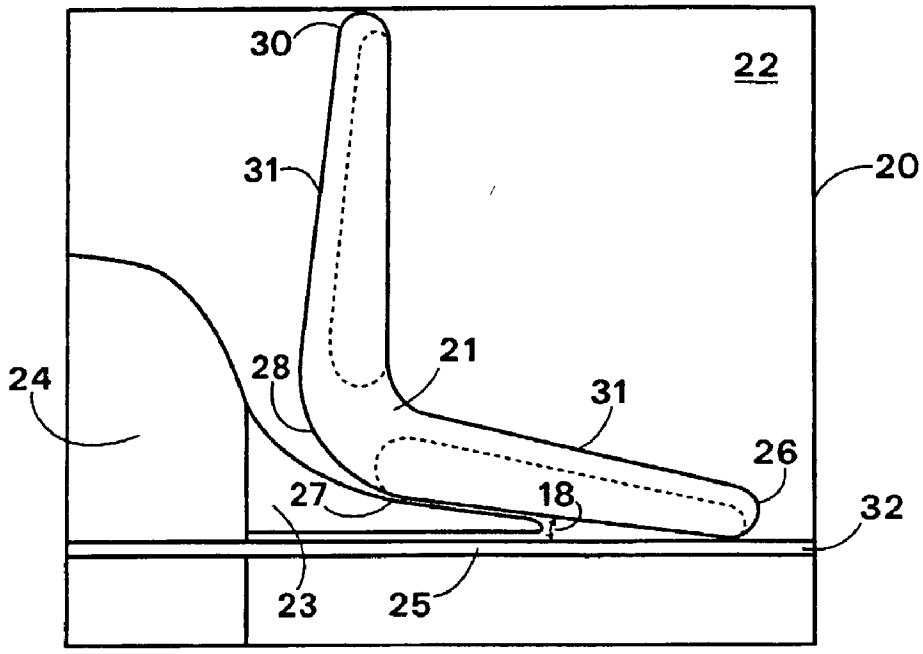

30
22
31
20
24
28
21
31
26
27
18
32
23
25

FIG. 2

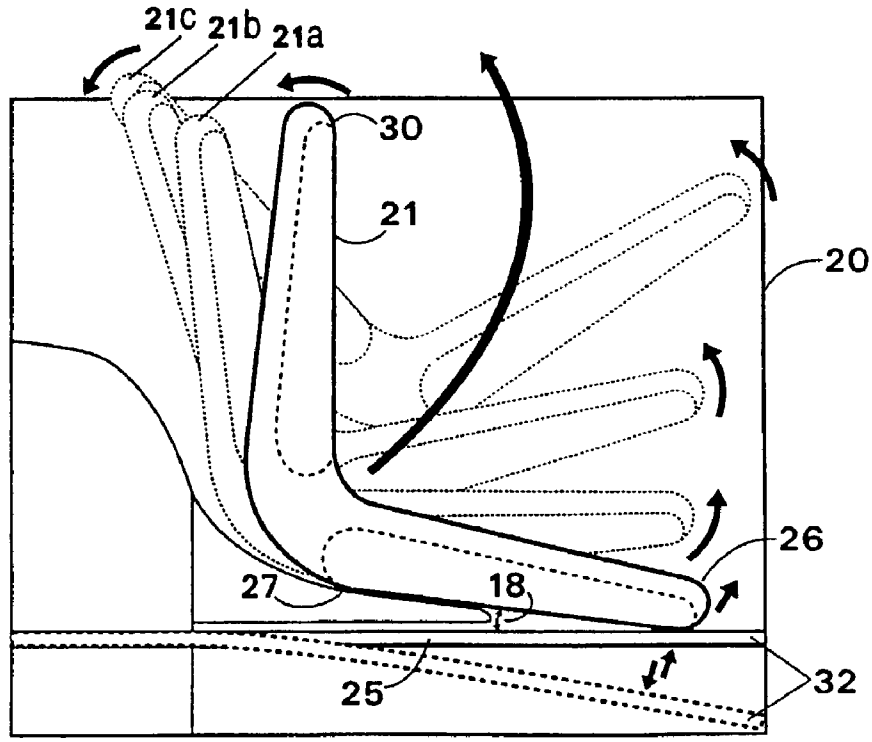

21c
21b
21a
30
21
20
26
27
18
25
32

FIG. 3

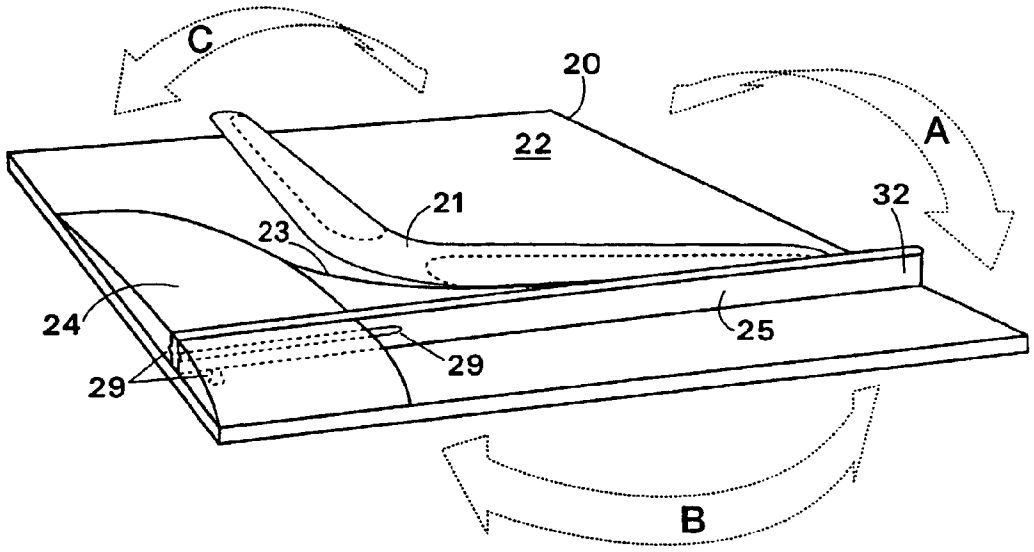


FIG. 4

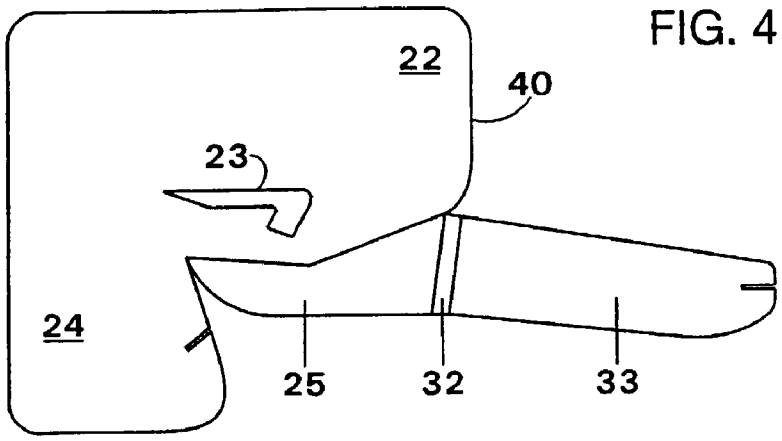


FIG. 5

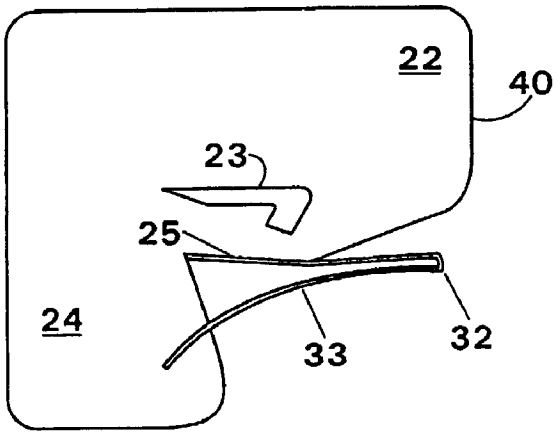


FIG. 6

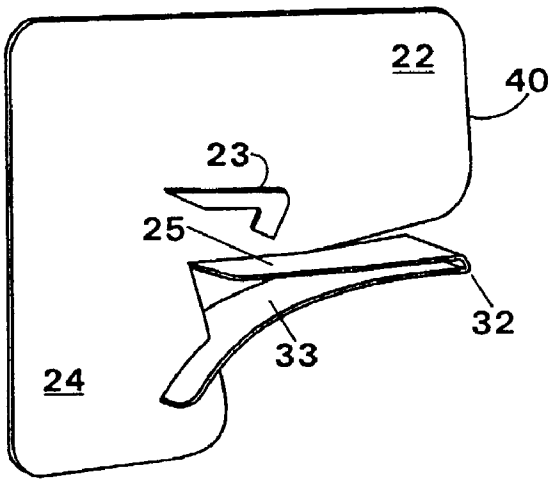


FIG. 7

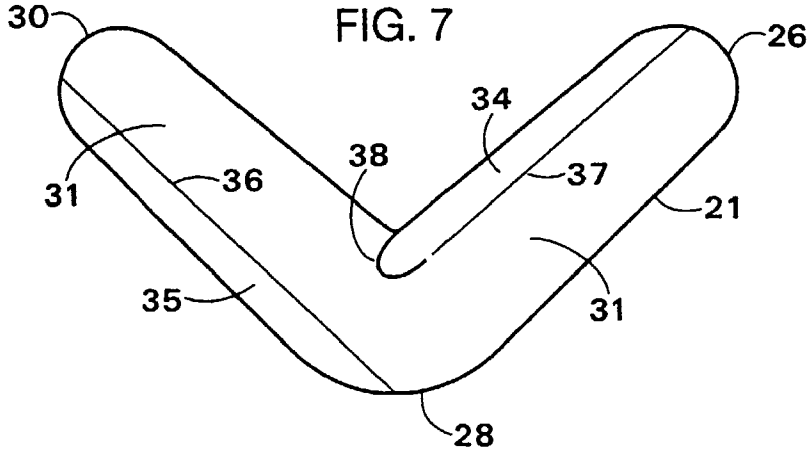


FIG. 8

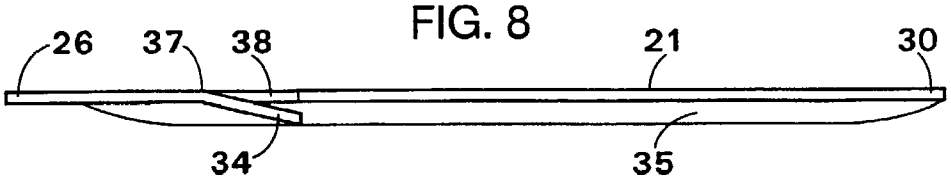
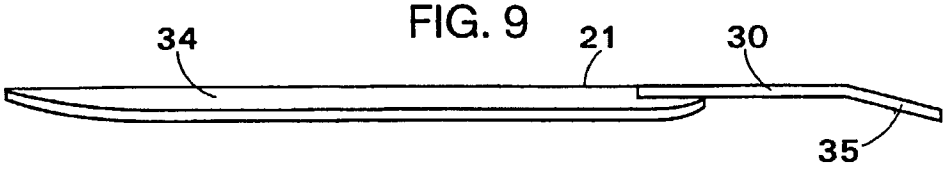


FIG. 9



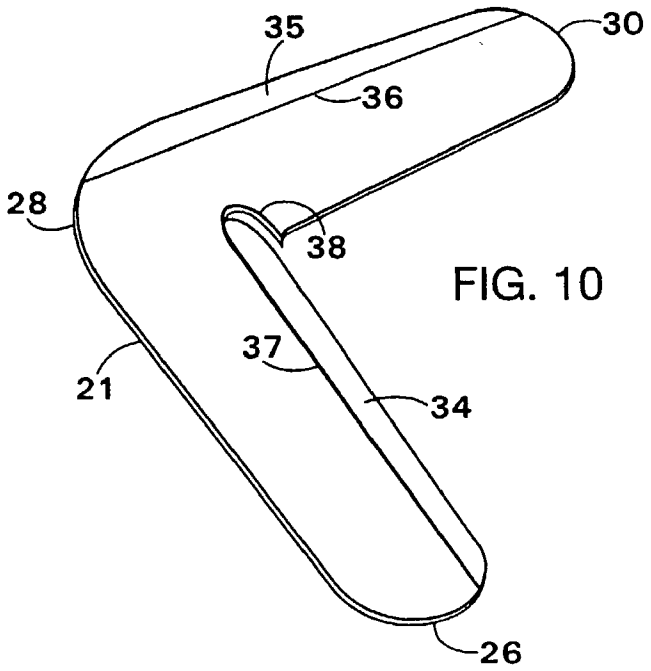


FIG. 10

FIG. 11

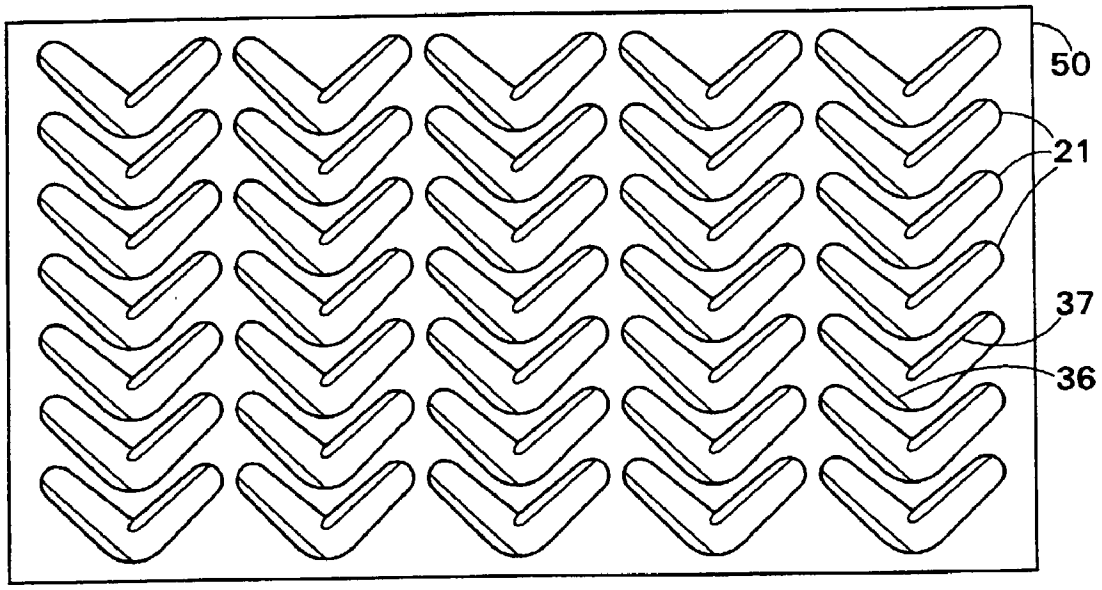
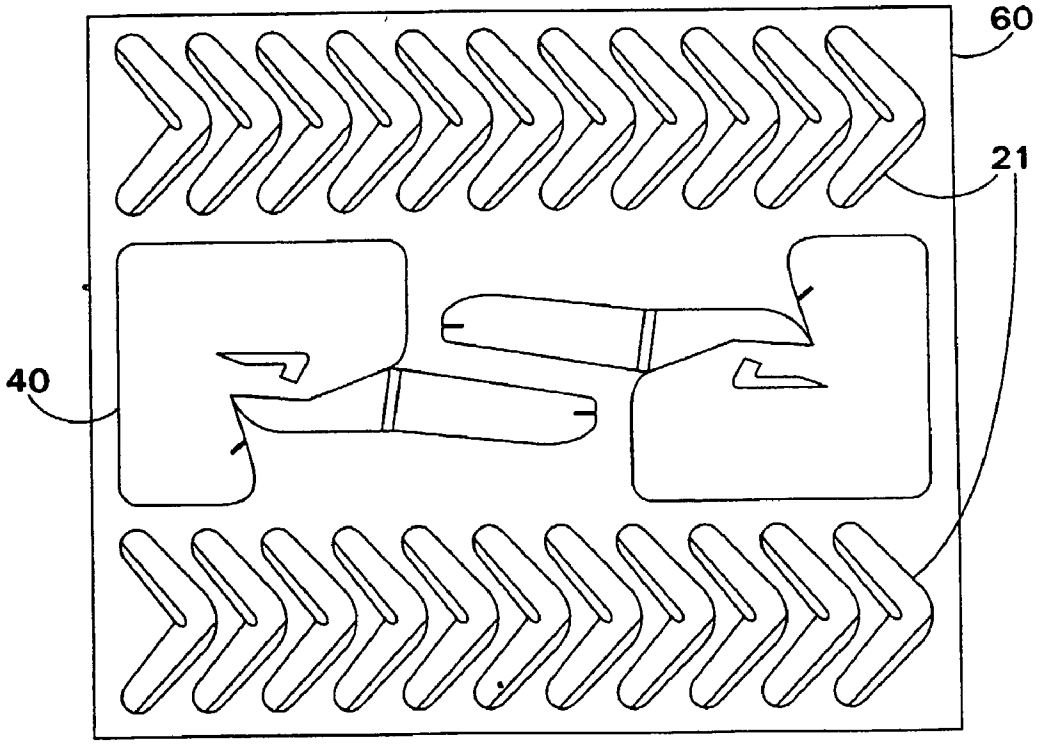


FIG. 12



FLYING TOY

FIELD OF THE INVENTION

[0001] The present invention relates generally to toys and games, and specifically to flying toys and methods and apparatus for launching such toys.

BACKGROUND OF THE INVENTION

[0002] The boomerang was originally invented by the aborigines of Australia as a hunting weapon. It typically comprises two mutually-angled wings connected at a vertex. The wings are shaped so that when the boomerang is thrown in the proper manner, it will describe a circuit and return to the point from which it was thrown. Throwing the boomerang properly, however, requires considerable strength, coordination and skill. The thrower must launch the boomerang with the proper combination of forward and rotational momentum, using the muscles of his arm, hand, leg and torso, in order to obtain the desired aerodynamic effect. Boomerangs have thus achieved limited popularity as toys, due to the difficulties in throwing them and the danger that a misguided boomerang will strike a participant or bystander. Light-weight and very small boomerangs cannot generally be thrown with sufficient momentum to make them fly in a circuit.

[0003] Other flying toys known in the art, such as the Frisbee and other toys based on propellers, parachutes and flying rings, also rely on a combination of forward and rotational momentum to develop lift. Such toys do not generally have the characteristic of the boomerang of being able to return accurately to the point from which they were thrown.

[0004] European Patent Application EP071319 describes apparatus for launching a boomerang or other, similar article. A holder has a continuous slot for receiving the boomerang, with a narrow end into which the vertex is inserted and a wide end for the wings. A striker strikes the vertex through an opening in the narrow end of the holder, thus propelling the boomerang forward. A stop at one of the sides of the wide end of the holder engages and restrains the tip of one of the wings, causing the boomerang to rotate around that tip as it moves forward out of the holder.

[0005] The boomerang launcher described in this European application suffers from a number of drawbacks: (1) Because of its fixed, partly closed mechanical structure, it is capable of accepting and launching boomerangs only of a very limited range of sizes and wing angles. (2) It includes a large number of different parts, including several moving parts, which increase its cost and decrease its reliability. (3) The slot into which the boomerang must be inserted restrains the boomerang at multiple points along its length, so that a part of the energy imparted by the striker is wasted in freeing the boomerang from the launcher. (4) Further energy is wasted when the wing tip engages the stop, since force is exerted at this point on the boomerang in a direction more or less opposite to the desired flight direction. Only the other, unrestrained wing has forward momentum and can develop the lift necessary for the boomerang to fly. (5) Because the striker exerts a sudden, percussive force on the boomerang, the launcher cannot be used with boomerangs that are particularly small and flexible.

SUMMARY OF THE INVENTION

[0006] It is an object of some aspects of the present invention to provide improved apparatus and methods for launching of boomerangs and other flying toys.

[0007] It is a further object of some aspects of the present invention to provide boomerangs and launchers that can be produced simply and inexpensively, with a minimal number of separate parts.

[0008] There is therefore provided, in accordance with a preferred embodiment of the present invention, a launcher for a flying object, such as a boomerang, having a body that includes a plurality of wings, the launcher including:

[0009] a stop, against which the object rests at a point on its body; and

[0010] a moving member, which engages one of the wings of the object so as to impart forward motion thereto, such that the object is propelled forward from the launcher with a rotational motion about the stop.

[0011] Preferably, the moving member includes a resilient element, which is pulled back and then released in order to impart the forward motion to the wing.

[0012] Further preferably, the launcher includes a generally planar base on which the object is placed before launching, wherein the stop and the moving element protrude from the base, wherein the base, stop and moving member are most preferably made from a single sheet of material, which is folded to form the stop and moving member.

[0013] There is further provided, in accordance with a preferred embodiment of the present invention, a launcher for a flying object, such as a boomerang, the launcher including:

[0014] a sheet of resilient material, defining a plane on which the object rests before launching; and

[0015] a moving member, formed by folding a portion of the sheet, which engages the object and which is pulled back and then released so as to impart forward motion to the object.

[0016] Preferably, along with the forward motion, the moving member imparts to the object rotational motion in the plane of the sheet.

[0017] Preferably, the sheet is partially cut and is folded to form the moving member so that when the member is pulled back and released, it bends about an axis generally perpendicular to the plane of the sheet. Further preferably, the moving member includes an extension of the sheet, which is folded over itself and is then folded out of the plane and fixed to the sheet so as to form an angle of approximately 90° thereto. Most preferably, the launcher includes substantially no functional elements that are not a part of the sheet of resilient material.

[0018] There is also provided, in accordance with a preferred embodiment of the present invention, a flying toy, preferably a boomerang, including a substantially flat sheet of material, which is cut to form a plurality of wings joined at a vertex, wherein one or more of the wings are folded to produce lift flaps.

[0019] There is additionally provided, in accordance with a preferred embodiment of the present invention, a method for producing a flying toy, such as a boomerang, from a substantially flat sheet of material, including:

[0020] cutting the material to form a plurality of wings joined at a vertex; and

[0021] folding one or more of the wings to form lift flaps.

[0022] There is moreover provided, in accordance with a preferred embodiment of the present invention, a method for producing a launcher for a flying object, including:

[0023] cutting a sheet of resilient material so as to define a planar portion on which the object rests before launching and a movable portion; and

[0024] preparing one or more folds in the sheet, along which the movable portion of the sheet is folded to produce a moving member, which engages the object and which is pulled back and then released so as to impart forward motion to the object.

[0025] Preferably, the sheet is cut so that when the portion is folded, the moving member bends about an axis generally perpendicular to the plane of the sheet when the member is pulled back and released.

[0026] There is furthermore provided, in accordance with a preferred embodiment of the present invention, a method for launching a flying object, such as a boomerang, having a body that includes a plurality of wings, the method including:

[0027] resting the object against a stop at a point on the body of the object; and

[0028] bringing a moving member into engagement with one of the wings of the object so as to impart forward motion thereto, such that the object is launched with a rotational motion about the stop.

[0029] Preferably, bringing the moving member into engagement with the one of the wings includes pulling back and releasing a resilient element.

[0030] The present invention will be more fully understood from the following detailed description of the preferred embodiments thereof, taken together with the drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] **FIG. 1** is a schematic top view of a boomerang and a launcher, in accordance with a preferred embodiment of the present invention;

[0032] **FIG. 2** is a schematic top view showing stages in the launching of the boomerang of **FIG. 1**;

[0033] **FIG. 3** is a schematic, pictorial view of the boomerang and launcher of **FIG. 1**;

[0034] **FIG. 4** is a schematic top view of a sheet of material that is cut for assembly of a boomerang launcher therefrom, in accordance with a preferred embodiment of the present invention;

[0035] **FIG. 5** is a schematic top view of the launcher assembled from the material of **FIG. 4**;

[0036] **FIG. 6** is a schematic, pictorial view of the launcher shown in **FIG. 5**;

[0037] **FIG. 7** is a schematic top view showing details of a boomerang, in accordance with a preferred embodiment of the present invention;

[0038] **FIGS. 8 and 9** are schematic side views of the boomerang of **FIG. 7**;

[0039] **FIG. 10** is a schematic, pictorial view of the boomerang of **FIG. 7**;

[0040] **FIG. 11** is a schematic top view of a sheet of material that is cut for production of boomerangs therefrom, in accordance with a preferred embodiment of the present invention; and

[0041] **FIG. 12** is a schematic top view of a sheet of material that is cut for production of boomerangs and launchers therefrom, in accordance with a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0042] Reference is now made to **FIGS. 1, 2** and **3**, which schematically illustrate a boomerang **21** and a boomerang launcher **20**, in accordance with a preferred embodiment of the present invention. **FIGS. 1 and 2** are top views, while **FIG. 3** is an isometric, pictorial view. In **FIG. 2**, boomerang **21** is shown in successive positions during launch thereof, represented by outlines **21***a*, **21***b* and **21***c*.

[0043] Boomerang **21** comprises a single body made up of wings **31**, which are joined at a vertex **28**. The preferred structure and method of producing the boomerang are described further hereinbelow. Launcher **20** comprises a generally flat sheet **22**, on whose surface boomerang **21** rests before launching. A stop **23** (or optionally, two or more stops) and a moving member **25** protrude upward from sheet **22**. Prior to launching, a tip **26** of one of wings **31** rests against moving member **25**, and the boomerang body rests against stop **23** at a point **27**. It is noted that the position of the boomerang relative to the launcher is not fixed, and tip **26** can be moved along to various positions along member **25**, thereby varying an angle **18** defined between the wing and the member and altering the flight characteristics of the boomerang. It is further noted that the illustrated structure of launcher **20** is capable of accommodating boomerangs of different sizes, shapes and vertex angles, unlike the launcher described in the above-mentioned European Patent Application EP071319. Boomerang **21** can even be launched in a reverse orientation, i.e., with vertex **28** pointing outward, rather than toward stop **23**.

[0044] The parts of launcher **20** are preferably constructed by suitably cutting and folding a single sheet of resilient material. A preferred implementation of this type of construction is shown below in **FIGS. 4, 5** and **6**. Alternatively, the launcher may be assembled from multiple pieces and/or types of material, or may be molded, preferably from a suitable plastic, as is known in the art. Optionally, the launcher includes a handle **24**. In the embodiment illustrated in **FIG. 3**, moving member **25** comprises protrusions **29** and is anchored to sheet **22** and preferably to handle **24** so as to provide mechanical strength when the member is bent in order to launch the boomerang.

[0045] To launch boomerang **21**, a user places it on the surface of sheet **22**, and rests it against stop **23** at the desired point **27**. The position of the boomerang may be varied to create a longer or shorter lever arm between tip **26** and point **27**. The desired elevation, azimuth and tilt for launch are selected, as illustrated by arrows A, B and C, respectively, in **FIG. 3**. Grasping handle **24**, preferably between the thumb and forefinger, the user pulls back a tip **32** of member **25**, as shown in **FIG. 2**, and then releases it suddenly. Member **25** springs back and imparts a forward momentum to tip **26**. As tip **26** begins to move forward, the boomerang simultaneously acquires a rotational motion about point **27** on stop **23**. The rotational and forward motion of the boomerang are imparted, as well, to an opposite wing tip **30**.

[0046] Thus, unlike the launcher shown in the above-mentioned EP071319 patent application, tip **30** is not restrained in any way, and substantially all forces exerted by launcher **20** on boomerang **21** are in the direction of desired motion. Member **25** contacts boomerang **21** at a point along wing **31**, rather than at the vertex of the boomerang as in EP071319. Therefore, the boomerang moves off the launcher efficiently, at high speed, with both of wings **31** contributing to generate a strong aerodynamic lift.

[0047] **FIGS. 4, 5** and **6** illustrate a boomerang launcher **40**, in accordance with another preferred embodiment of the present invention. Launcher **40** is functionally equivalent to launcher **20**, described hereinabove, and parts of launcher **40** are labeled in the figures with the same reference numerals as are used for the parts of launcher **20** that perform similar functions. Launcher **40** has the additional advantage, however, that it is entirely made out of a single sheet of resilient material, preferably a plastic, such as polypropylene, which is suitably cut and folded.

[0048] **FIG. 4** shows sheet **22** as it is cut to shape and prepared for folding. Movable member **25** is made from a long, protruding extension **33**, which is partly cut away from the remainder of sheet **22**. As shown in **FIGS. 5 and 6**, extension **33** is folded over along a line corresponding to tip **32** of member **25**, and is then folded up by 90° (out of the plane of the page). A slot at the end of extension **33** engages a corresponding slot on sheet **22**, so the member **25** is anchored firmly in place. In this configuration, the curved extension **33** provides mechanical strength and resilience. When member **25** is pulled back (downward in the perspective of **FIGS. 5 and 6**), it bends about an axis perpendicular to the plane of sheet **22**, and then snaps back when released to propel the boomerang forward.

[0049] In the configuration shown in **FIGS. 5 and 6**, launcher **40** is most suitable for use by right-handed people, who can grasp handle **24** in their left hand and use their right hand to launch the boomerang. A launcher that is convenient for left-handed people can be produced simply by reversing the directions of the folds of extension **33** and stop **23**. When boomerang **21** is launched from this "left-handed" launcher, the orientation of wing tips **26** and **30** will be reversed relative to the orientation shown in **FIG. 1**. This reversal may alter the flight characteristics of the boomerang.

[0050] Reference is now made to **FIGS. 7, 8, 9** and **10**, which are schematic illustrations showing details of boomerang **21**, in accordance with a preferred embodiment of the present invention. **FIG. 7** is a top view. **FIGS. 8 and 9** are side views, wherein **FIG. 8** shows the boomerang as seen from a point adjacent to wing tip **26**, and **FIG. 9**, from a point adjacent to wing tip **30**. **FIG. 10** is an isometric, pictorial representation.

[0051] Boomerang **21** is preferably made from a flat piece of flexible, resilient material, such as polypropylene or Teslin (produced by PPG, of Pittsburgh, Pa.), which is preferably coated with a laminate on one or both sides. The sheet is bent at folds **36** and **37**, preferably longitudinally and downwards by a small angle as shown in the figures, in order to produce lift flaps **34** and **35**, which give the boomerang a desired degree of aerodynamic lift as it flies. A cut **38** is preferably made in the adjoining wing, so as to enable flap **34** to be folded cleanly and evenly. Flaps **34** and **35** may be adjusted to substantially any desired angle, up or down relative to the plane of wings **31**, to vary the aerodynamic properties of the boomerang. The flaps obviate the need encountered in boomerangs known in the art for the wings to have a curved or variable cross section or volume for aerodynamic purposes.

[0052] **FIG. 11** is a schematic top view of a sheet **50** of the material from which a plurality of boomerangs **21** are made, in accordance with a preferred embodiment of the present invention. The boomerangs are preferably stamped out of sheet **50** by a suitable die, as is known in the art, enabling simple, low-cost mass-production. Most preferably, folds **36** and **37** are prepared by applying pressure and/or heat along the corresponding lines on sheet **50** while stamping out the boomerangs or beforehand. Typically, one or both surfaces of the boomerangs are printed with a desired image before stamping. Thus, substantially all of the processes involved in producing boomerang **21** (and likewise, launchers **20** and **40**) can be carried out using standard equipment and techniques, well known in the printing industry.

[0053] **FIG. 12** is a schematic top view of a sheet **60** of material from which a plurality of boomerangs **21** and launchers **40** are made, in accordance with another preferred embodiment of the present invention. Both the boomerang and the launcher are thus produced from the same sheet of material, in a single process. This embodiment is particularly convenient in terms of packaging and distribution, since it enables a complete kit of one or more boomerangs and one or more launchers to be contained together on the single sheet **60**.

[0054] To summarize, boomerangs and launchers in accordance with preferred embodiments of the present invention can be produced simply and inexpensively and are easy and safe to use, requiring no special skill. They require very little storage space or packaging volume, and can even be distributed as an insert in a publication. The boomerangs can be made in substantially any desired size and from any suitable material, including light, relatively flimsy materials, of a type that cannot readily be thrown by hand or propelled using launchers known in the art, such as that described in the above-mentioned European Patent Application EP071319. Compare to launchers known in the art, launchers **20** and **40** propel boomerangs with high speed and efficiency, with minimal mechanical shock to the boomerang.

[0055] Although preferred embodiments are described hereinabove with reference to a boomerang of a given shape and dimensions, it will be understood that launchers **20** and **40** are suitable substantially without change for launching

boomerangs having different sizes, shapes and wing angles, unlike launchers known in the art. Launchers **20** and **40** may be used, as well, for launching flying toys of different designs, such as "boomerangs" having three or more wings. With straightforward modifications, launchers suitable for propelling a variety of other sorts of flying objects may likewise be produced in accordance with the principles of the present invention. It will thus be appreciated that the preferred embodiments described above are cited by way of example, and the full scope of the invention is limited only by the claims.

1. A launcher for a flying object having a body that includes a plurality of wings, the launcher comprising:

a stop, against which the object rests at a point on its body; and

a moving member, which engages one of the wings of the object so as to impart forward motion thereto, such that the object is propelled forward from the launcher with a rotational motion about the stop.

2. A launcher according to claim 1, wherein the moving member comprises a resilient element, which is pulled back and then released in order to impart the forward motion to the wing.

3. A launcher according to claim 1, and comprising a generally planar base on which the object is placed before launching, wherein the stop and the moving element protrude from the base.

4. A launcher according to claim 3, wherein the base, stop and moving member are made from a single sheet of material, which is folded to form the stop and moving member.

5. A launcher according to any of the preceding claims, wherein the flying object comprises a boomerang.

6. A launcher for a flying object, comprising:

a sheet of resilient material, defining a plane on which the object rests before launching; and

a moving member, formed by folding a portion of the sheet, which engages the object and which is pulled back and then released so as to impart forward motion to the object.

7. A launcher according to claim 6, wherein the sheet is partially cut and is folded to form the moving member so that when the member is pulled back and released, it bends about an axis generally perpendicular to the plane of the sheet.

8. A launcher according to claim 7, wherein the moving member comprises an extension of the sheet, which is folded over itself and is then folded out of the plane and fixed to the sheet so as to form an angle of approximately 90° thereto.

9. A launcher according to any of claims **6-8**, wherein along with the forward motion, the moving member imparts to the object rotational motion in the plane of the sheet.

10. A launcher according to claim 9, wherein the flying object comprises a boomerang.

11. A launcher according to claim 9, wherein the launcher comprises substantially no functional elements that are not a part of the sheet of resilient material.

12. A flying toy, comprising a substantially flat sheet of material which is cut to form a plurality of wings joined at a vertex, wherein one or more of the wings are folded to produce lift flaps.

13. A flying toy according to claim 12, wherein the flying toy comprises a boomerang, and wherein the plurality of wings comprises two wings joined at an angle.

14. A method for producing a flying toy from a substantially flat sheet of material, comprising:

cutting the material to form a plurality of wings joined at a vertex; and

folding one or more of the wings to form lift flaps.

15. A method according to claim 14, wherein the flying toy comprises a boomerang, and wherein cutting the material comprises forming two wings joined at an angle.

16. A method for producing a launcher for a flying object, comprising:

cutting a sheet of resilient material so as to define a planar portion on which the object rests before launching and a movable portion; and

preparing one or more folds in the sheet, along which the movable portion of the sheet is folded to produce a moving member, which engages the object and which is pulled back and then released so as to impart forward motion to the object.

17. A method according to claim 16, wherein the sheet is cut so that when the portion is folded, the moving member bends about an axis generally perpendicular to the plane of the sheet when the member is pulled back and released.

18. A method according to claim 16 or **17**, and comprising cutting the sheet of material to produce the flying object that is launched by the launcher.

19. A method for launching a flying object having a body that includes a plurality of wings, the method comprising:

resting the object against a stop at a point on the body of the object; and

bringing a moving member into engagement with one of the wings of the object so as to impart forward motion thereto, such that the object is launched with a rotational motion about the stop.

20. A method according to claim 19, wherein bringing the moving member into engagement with the one of the wings comprises pulling back and releasing a resilient element.

21. A method according to claim 19 or **20**, wherein the object comprises a boomerang.

* * * * *