No. 692,608. Patented Feb. 4, 1902.

S. BRISTOW.

TOY BOOMERANG.

(Application filed June 21, 1901.)

(No Model.)

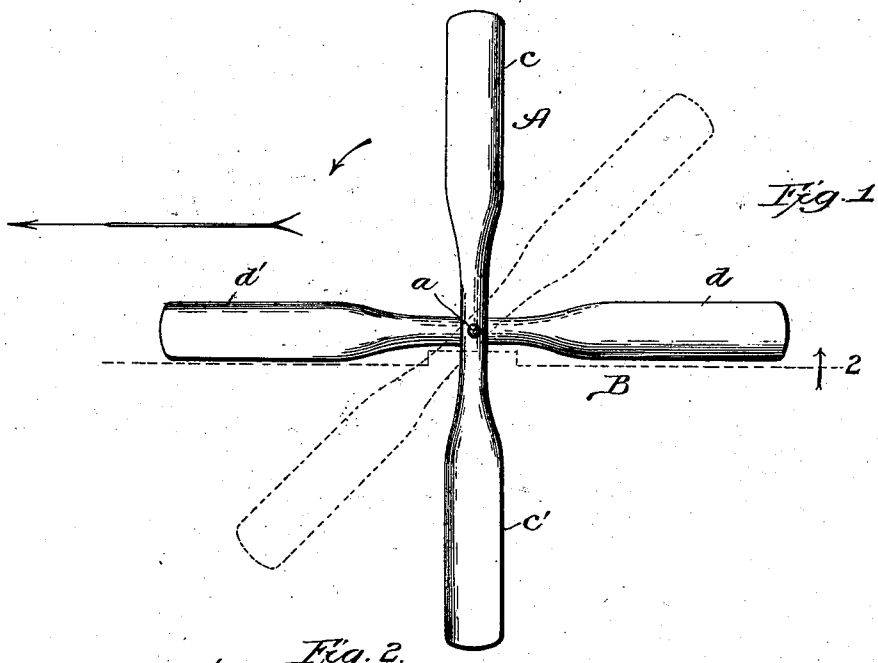


Fig. 1.

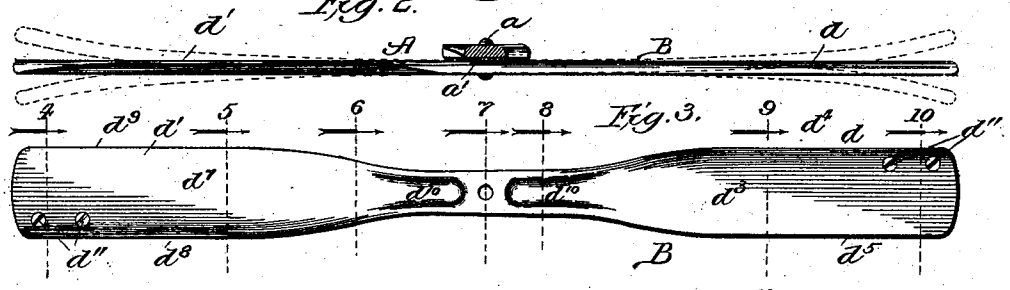
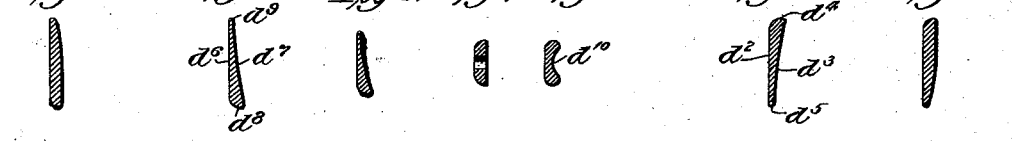


Fig. 2.

Fig. 3.

Fig. 4. Fig. 5. Fig. 6. Fig. 7. Fig. 8. Fig. 9. Fig. 10.



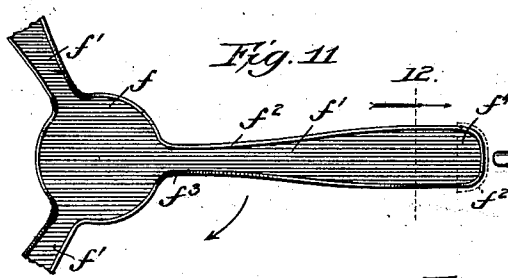


Fig. 11.

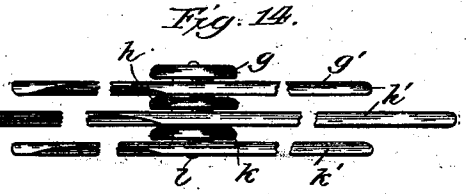


Fig. 14.



Fig. 12.



Fig. 13.

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UNITED STATES PATENT OFFICE.

SAMUEL BRISTOW, OF WETMORE, KANSAS.

TOY BOOMERANG.

SPECIFICATION forming part of Letters Patent No. 692,608, dated February 4, 1902.

Application filed June 21, 1901. Serial No. 65,393. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL BRISTOW, a citizen of the United States, residing at Wetmore, in the county of Nemaha and State of Kansas, have invented a new and useful Improvement in Toy Boomerangs, of which the following is a specification.

My invention relates particularly to aerial toys; and my primary object is to provide an instrument of this character capable of being hurled by a skilful hand in such a manner as to cause it to move through the air in a variety of graceful curves—as, for instance, in a horizontal circle of a diameter of fifty feet, more or less, returning to the thrower. Experiment has demonstrated that an instrument constructed as hereinafter described can be thrown so as to move in various curves without the assistance of the wind and without regard to the action of gravity, the instrument being capable of rising against the force of gravity.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 represents a view of the instrument in its preferred form, showing the side of the instrument which is toward the center of curvature of the path of the instrument when the instrument is hurled; Fig. 2, a section taken as indicated at line 2 of Fig. 1; Fig. 3, a view of that side of one of the blades employed which is away from the center of curvature of the path of flight; Figs. 4 to 10, inclusive, sectional views taken as illustrated at corresponding lines of Fig. 3; Fig. 11, a broken view illustrating a modified form of the instrument, showing the manner of construction when the instrument is stamped from sheet material; Fig. 12, a section taken as indicated at line 12 of Fig. 11; Fig. 13, a detached view of a tip employed for the ends of the wings, particularly when the instrument is made of sheet material; and Fig. 14, a broken view illustrating a modification of the construction shown in Fig. 1, wherein a plurality of vanes located in different planes are employed.

In the preferred construction there are employed two cross arms or members A B, pivotally connected at a and having interposed between them at their pivotal point friction material a', such as resin or wax. In the preferred construction the arms or members mentioned are made from a suitable wood, compressed fiber, or other suitable material having the characteristics of lightness and strength. In this construction each arm or member comprises two vanes or wings, those of the member A being designated $c\,c'$, respectively, and those of the member B being designated $d\,d'$. The contour of each arm or member is preferably of the form shown in Fig. 1, producing vanes having the proportions of about one and one-eighth inches width to seven inches length, the width of the vanes narrowing gradually from points about four inches from their outer ends to the center, from which they radiate. The vanes are, in an instrument of these dimensions, about one-eighth of an inch thick at their thickest points. The surfaces of the arms or members which are toward the center of curvature of the path of flight are preferably flat and perpendicular to the axis of the instrument. The opposite surfaces are suitably beveled or concaved or beveled and concaved to cleave the air during rotation of the instrument about its own axis in such a manner as to cause the path of flight to be a curve. Thus the member B has on one side for the vane d a plane surface d^2, which is perpendicular to the axis of the instrument, and on the opposite side a hollowed or concaved surface d^3, thereby producing a strong ribbed or thick edge d^4 and a thin edge d^5 for the vane, and said member has for the vane d' a plane surface d^6 on the same side of the member as the surface d^2 and a concaved surface d^7 on the opposite side, producing a strong thick edge d^8 and a thin edge d^9. It will be observed that the thin edge d^9 is at one edge of the member B, considered as a whole, and that the thin edge d^5 is at the opposite edge of said member. During rotation of the instrument about its axis, however, the thin edge of each blade is always the advance edge of the blade, thereby insuring the proper cleavage of the air. Near the center of the member B the concaved oppositely-slanting surfaces d^3 d^7 end in concavities d^{10}, as illustrated in Figs. 3 and 8. At the extremities of the blades d d' the surfaces d^3 d^7 assume less slant and become slightly convex rather than concave, whereby blunt outer ends are afforded for the vanes. The purpose of this is to

prevent injury to the vanes when their ends strike any object and also to prevent injury to the thrower, who may, if he desires, catch the instrument upon its return to him. Also this feature is of advantage when the instrument rolls upon the ground, as in one manner of use. For the purpose of giving to the instrument a variable range I provide removable weights d^{11} at the outer ends of the vanes, these weights being usually of a material having greater specific gravity than the material of the vanes. The construction of the member A is similar in detail to the construction of the member B. The pivotal connection between the members permits the members to assume any angle with relation to each other, one angle being illustrated by means of dotted lines in Fig. 1. Moreover, such a connection is a protection to the instrument, inasmuch as it will permit the members to fold upon each other, thereby reducing shock when a hard object is struck by the instrument. The corners of the vanes are rounded, as shown. The rounded corners at the thick edge of the vanes on the plane sides thereof serve the purpose of expediting the rotary movement of the instrument, inasmuch as they afford bevel surfaces against which the air closes or presses after being cut by the vanes.

The manner of use is to employ one of the vanes as a handle for hurling the instrument. For example, the instrument may be grasped by the vane c' and while disposed in a vertical plane hurled directly horizontally from the shoulder, the axis of the instrument being perpendicular to the path followed by the instrument. The path of the instrument is indicated by the large arrow in Fig. 1. In the act of throwing the instrument the latter is naturally given a rotary movement about its own axis, the momentum acquired from the throw being sufficient to carry the instrument, guided, as it is, by the vanes during rotary movement, about a curve and back to the thrower. The effect of the weights at the extremity of the vanes is to give a longer range, inasmuch as it is possible to impart greater momentum to the object as a whole and also to produce a stronger rotary movement. The instrument may be hurled in such ways as to produce a large variety of curves. For instance, it may be thrown so as to circle about in practically a horizontal plane and return directly to the thrower, or it may be thrown so as to circle about in a horizontal plane and pass completely around the thrower. If desired, it may be disposed in a horizontal plane during the act of throwing and caused to rise to a great height in the air and return over the head of the thrower to a great distance in the rear of the thrower. Assuming the instrument to be disposed in a vertical plane when thrown horizontally, or, if desired, with a given downward inclination, the result of the effective forces acting upon the blades is to cause the instrument, while maintaining its rotary movement, to circle about in a horizontal plane. During this orbital movement the instrument has a tendency to gradually assume a horizontal plane, the end of the axis which is toward the center of curvature of the path of flight turning upwardly, the result being to keep the instrument in the air for a greater length of time than would occur otherwise. The instrument may, upon its return to the thrower, be caught by the hand, or the player may have a small whip provided with a flexible weighted lash with which he may strike the instrument, the latter winding up the lash. Owing to the fact that the instrument is always provided with three or more vanes, it can always be caught readily in this manner. Moreover, the provision of three or more wings results in perfectly balancing the instrument, bringing the center of rotation at the center, from which the vanes radiate, which is of great importance in securing the best results. The device may be thrown so as to come into contact with and roll upon the ground in a circular course, the vanes acting much like the spokes of a fellyless wheel. Various games may be devised for the use of the toy, the count depending upon the skill of the player in causing the instrument to follow a prescribed course. In addition the device possesses considerable scientific value, inasmuch as it may be used for studying the effect of air-pressures upon bodies.

Figs. 11 to 13, inclusive, show the instrument embodied in the form of a disk f, from which radiate three equidistant vanes f'. In Fig. 11 the side of the instrument which is during flight away from the center of curvature of the path of flight is shown. This side of the instrument is provided with a peripheral flange f^2, which is reduced in size between points f^3 f^4 on the cutting or advance side of each blade. In this construction the instrument may be stamped from any suitable sheet material or molded from any suitable material. Preferably the ends of the vanes are equipped with rubber tips f^2, as shown in Fig. 13, and which occupy the position illustrated in dotted lines in Fig. 11. It will be observed that the flanges at the rear sides of the blades not only afford strengthening-ribs for the blade, but are of sufficient size to catch the air, thereby affording a cushion of practically dead air. These cushions of air act to produce inclined surfaces, as illustrated by dotted lines in Fig. 12, whereby much the same result is obtained as in the construction shown in Figs. 1 to 10, inclusive.

In Fig. 14 I have illustrated an instrument comprising a series of vanes g g' h h' k k', respectively, all having a common pivot l. Each set of vanes enumerated may be of the common construction of the instrument shown in Fig. 1. Any vane of the central set may be employed as a handle for throwing

the instrument. Any desired number of sets of vanes may be put together to produce an instrument of the general form shown in Fig. 14 or of any other desired shape, suitable provision being made for permitting the instrument to be grasped by one vane or a number of corresponding vanes. In this construction it will of course be understood that the several vanes rotate in a common direction.

In all the constructions shown the vanes of an instrument radiate from a common axis. This is of very great importance in producing an instrument of large range and of certainty or precision of movement. It will be understood readily that the effect of this construction is to arrange the material of the vanes in such manner as to give to them the greatest possible moment in producing rotary movement about the axis of the instrument. In all the constructions the shape of the vanes themselves is such as to produce a preponderance of weight toward the extremities of the vanes, thereby adding to the effect noted. The effect of concaving the vanes in the manner described and providing thickened or ribbed rear edges is evidently to produce a light strong blade without sacrificing those air-displacing qualities of the blades which are necessary to the best results. The pivotal connection between the members A and B permits the device to be folded into small space for convenience in carrying.

In some instances it is desirable to bend or curve the blades transversely, as indicated in dotted lines in Fig. 2. For this purpose the material of the blades may be of a nature to receive a set when curved, so as to retain the shape given. Thus by curving the blades upwardly, as shown in Fig. 2, the result is to cause the instrument to turn more quickly into a horizontal plane, giving a greater floating effect, and by curving the ends downwardly the result is to make the instrument fall to the ground more quickly.

Changes in details of construction within the spirit of my invention may be made. Hence no limitation is to be understood from the foregoing detailed description except as shall appear from the appended claims.

What I claim as new, and desire to secure by Letters Patent, is—

1. An instrument of the character described, comprising three or more vanes radiating from a common center, said vanes being elongated in form to be readily grasped by the hand and having correspondingly-beveled surfaces on one side thereof to cleave the air during rotation, substantially as described.

2. An instrument of the character described, comprising three or more vanes radiating from a common center, said vanes having corresponding beveled or slanting surfaces on one side thereof to cleave the air in a common manner during rotation, the rear edges of said vanes being thicker than the advance edges, thereby to strengthen the vanes and engage the air, substantially as and for the purpose set forth.

3. An instrument of the character described, having three or more vanes radiating from a common center, said vanes having correspondingly-beveled surfaces on one side thereof and corresponding thick rear edges, the extremities of the vanes being thickened at the sharp edges, substantially as described.

4. An instrument of the character described, comprising three or more vanes radiating from a common center, said vanes being provided with weights near their extremities of greater specific gravity than the material of the vanes.

5. An instrument of the character described, comprising three or more vanes radiating from a common center, said vanes having on one side concave surfaces, the advance edge of each vane being thinner than the rear edge thereof, substantially as described.

6. An instrument of the character described, comprising three or more vanes radiating from a common center and having on one side correspondingly-beveled surfaces, said vanes being yieldingly connected at the center of radiation.

7. An instrument of the character described, comprising two or more cross-arms, connected to afford vanes radiating from a common center, each cross-arm having oppositely-beveled surfaces and oppositely-located thickened rear edges.

8. An instrument of the character described, comprising two or more cross-arms pivotally connected together at their centers to afford vanes radiating from a common center, said vanes having one side correspondingly beveled.

9. An instrument of the character described, comprising vanes radiating from a common center, a pivot connecting said vanes at their centers, and friction material interposed between said vanes at their centers.

10. In an instrument of the character described, the combination of two cross-arms having corresponding plane surfaces on one side, each cross-arm having on the other side oppositely-beveled surfaces on opposite sides of its center, thereby affording vanes having correspondingly-beveled surfaces on one side.

11. An instrument of the character described, comprising suitably-beveled connected vanes and removable weights attached to said vanes near their extremities.

12. An instrument of the character described, comprising suitably-connected vanes, said vanes having on one side plane surfaces perpendicular to the axis of the instrument ending at the rear edges of the vanes in rounded corners, the opposite sides of said vanes being beveled, producing relatively thin advance edges.

SAMUEL BRISTOW.

In presence of—
D. W. LEE,
ALBERT D. BACCI.