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SPINNING MUSICAL TOY

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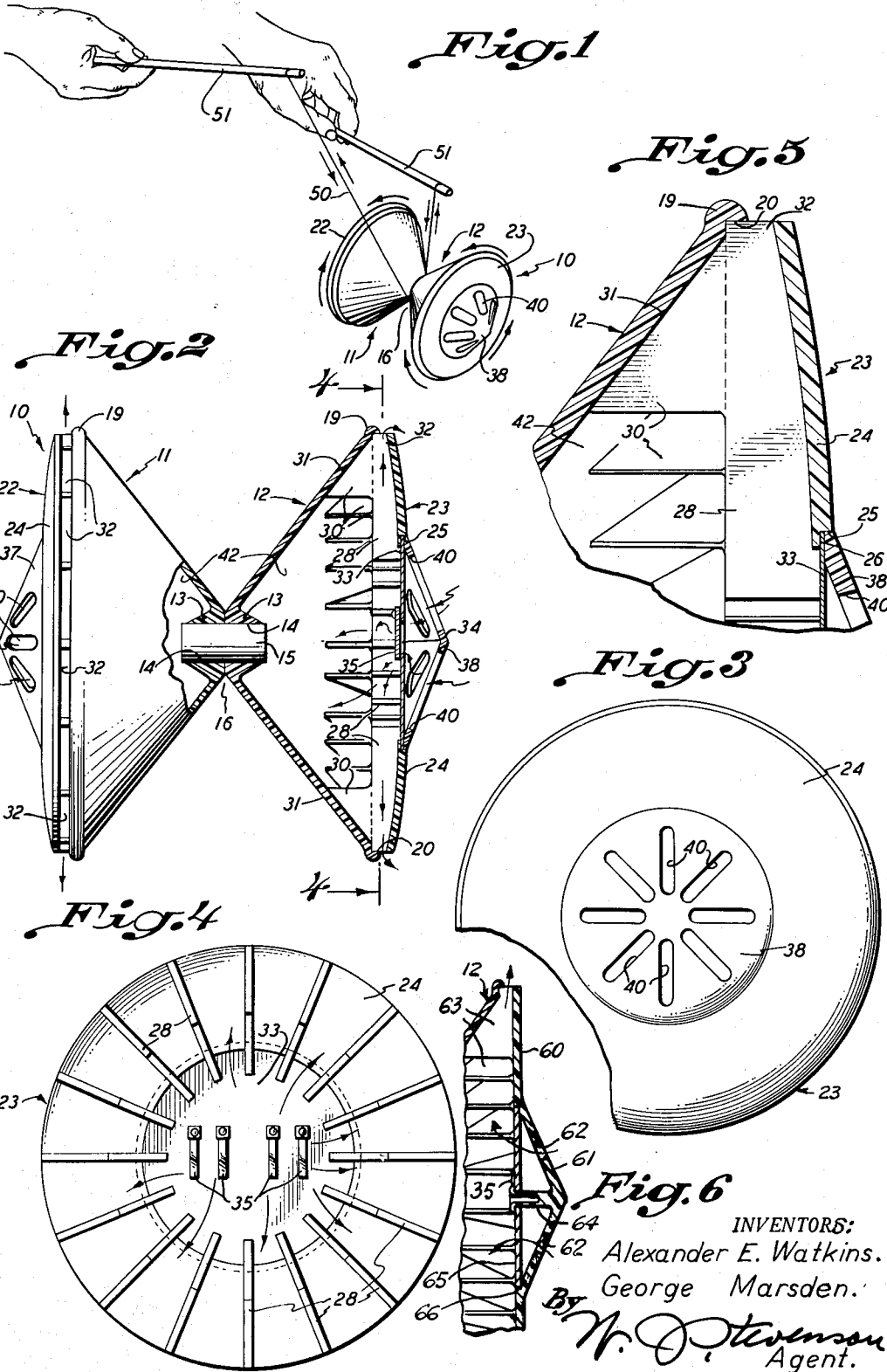


Fig. 1

Fig. 5

Fig. 2

Fig. 3

Fig. 4

Fig. 6

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1

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SPINNING MUSICAL TOY

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9 Claims. (Cl. 46-60)

Our invention relates to the toy or game art and more particularly to an amusement or game device known as a diabolo. Specifically, the invention is concerned with a diabolo of the musical type capable of producing a humming sound during its rotation.

Diabolos currently in use take the form of a symmetrical double cone, the conical portions being coaxial and having their apices meeting to provide a small annular, central, V-shaped groove for receiving an operating cord. The ends of the cord are tied to handles which are held in the hands and alternately raised and lowered to cause the cord to spin the diabolo in a selected direction. This operation tests the operator's skill but the true dexterity of the player is tested when he or she tosses the spinning diabolo into the air, by means of the cord, and then catches the descending spinning diabolo on the cord which is then operated to impart further spinning motion to the diabolo. The alternate spinning, tossing and catching of the top-like device thus is not only interesting and amusing to the player but requires skillful manipulation of the device to effect the desired result.

It is an object of our invention to improve such conventional diabolos by providing means incorporated in the structure thereof for producing a humming or like sound when the diabolo is rotated. A related object is to provide such a means which produces a combination of tones or a chord, the intensity of the sound being dependent upon and proportional to the rotative speed of the diabolo.

Another object of the invention is to provide a diabolo in which the sound producing means embodies a plurality of musical reeds through which air passes, when the device is rotated, to produce a chord-like tone.

Another object is to provide a device, of the character referred to, in which the sound producing means is incorporated in the outer ends of the conical portions of the diabolo and each includes passages so arranged as to produce, in effect, a centrifugal pump or turbine which functions upon rotation of the diabolo to draw air across the reeds to vibrate the same.

Another object is to provide a device of the type indicated in which each turbine means is embodied in a separate end member secured to and forming the outer end of one of said conical elements, each turbine member carrying one or more of the musical reeds. A related object is to provide a turbine member which is hollow and has substantially axial apertures through which air may enter the member, and inner radial ribs or partitions defining radial passages or jets through which the air, having passed across the reeds, is forcibly expelled to draw air into the member through its inlet apertures.

A further object is to provide a device of the type specified which is highly practical and efficient in operation, the musical means not interfering with its performance. Another object is to provide such a device which is relatively light in weight, and one which lends itself to economical manufacture, the majority of the parts

2

preferably being mass produced as molded plastic elements and cemented or otherwise bonded together.

Further objects will appear from the following description and from the drawings, which is intended for the purpose of illustration only, and in which:

Fig. 1 is a perspective view of our improved diabolo and the cord for rotating the same, the device being illustrated as applied to use;

Fig. 2 is an enlarged side elevational view of the diabolo, shown partly in section to illustrate the internal structure;

Fig. 3 is an end view of the diabolo;

Fig. 4 is a cross-sectional view, taken on line 4-4 of Fig. 2;

Fig. 5 is a further enlarged fragmentary sectional view of an end portion of the diabolo; and

Fig. 6 is a fragmentary sectional view of a diabolo of alternative construction.

Referring to the drawing in detail, our improved diabolo 10 includes a body comprising a pair of conical elements 11 and 12, each being molded from plastic material and having a boss 13 at its small or apex end. The bosses 13 have axial bores 14 for receiving a central pin or axle 15 which preferably is cemented in place to retain the elements 11 and 12 with their inner ends in abutting relation. The conical peripheries of the elements 11 and 12 thus provide an annular groove 16. The outer annular ends of the elements 11 and 12 are provided with beads 19, the inner portions of which have shouldered recesses 20.

Adapted to close the outer open ends of the conical elements 11 and 12 are molded plastic end members 22 and 23 each having a circular plate portion 24 provided with a central opening 25. As shown in Fig. 5, the opening 25 has an enlarged recess providing an annular shoulder 26. The plate portion 24 may be straight, conical or curved as desired and, as shown in the drawing, is provided with a plurality of integral, radially extending ribs 28 on its inner face. The inner ends of the ribs 28 extend inwardly to a point within the confines of the opening 25. The outer ends of the ribs 28 of each member 22 and 23 are adapted to fit within the recess 20 of one of the conical elements 11 and 12 and to be cemented in place therein so as to permanently join the members 22 and 23 to the respective elements 11 and 12. In order to provide adequate cementing surface and to effect greater strength, the outer ends of the ribs 28 are formed with tapered projections 30 having sloping edges 31 which follow the contour of the inner conical surfaces of the elements 11 and 12 and which are cemented thereto. As shown in Fig. 2, the ribs 28 define, with the elements 11 and 12 and the plate portions 24, a plurality of air discharge openings or jets 32.

Insertable into the opening 25 of each member 22 and 23 and against the shoulders 26 are thin circular plates 33, each having a series of apertures 34. Riveted, or otherwise secured against a side of each plate 33 are metal reeds 35, the free ends of the reeds overlying the apertures 34.

End caps 37 and 38, preferably of conical form, have their peripheral edges cemented or otherwise secured in place in the openings 25 of the members 22 and 23, these edges abutting the peripheral edges of the reed plates 33 to retain the latter in place. The conical surfaces of the end caps 37 and 38 are provided with air inlet openings 40 which may be of any desired configuration. With the parts assembled as explained above, the diabolo 10 is provided with two chambers 42 into which air is drawn and from which it is expelled during rotation of the diabolo.

The diabolo 10 is applied to use by first placing it upon a string or cord 50, the ends of which are connected to

operating handles 51, the cord being disposed in the groove 16. By lifting the handles 51 and cord 50, the diabolito 10 is raised and suspended on the cord. Now, by alternately raising and lowering each handle 51, the diabolito is rotated, the direction of rotation being determined by the initial movement of the cord. As the rate of movement of the handles is increased, the speed of rotation of the diabolito is likewise increased.

During this rotative movement of the diabolito, the rotating ribs 28 serve as pump vanes or turbine blades to expel air from the chambers 42 radially outwardly through the discharge openings or jets 32. Thus, air is drawn inwardly into the chamber through the inlet openings 40 and apertures 34 to replace the air expelled through the jets 32. In passing through the apertures 34, the incoming air flexes the metal reeds 35 to vibrate the same, thus effecting a musical tone in the nature of a humming sound. Preferably, the reeds are so made and tuned that the humming sound produced is a combination of blended tones or a chord, the intensity of which varies with the speed of rotation of the diabolito and the centrifugal pumping action of the vanes 28.

When the diabolito attains a relatively high rate of speed, the player may quickly move the handles 51 apart to tighten the cord 50 so as to impart an upward thrust to the spinning diabolito which then is propelled upwardly through the air. The operator then catches the descending diabolito on the cord 50 and continues oscillation of the handles to impart further rotative force to the diabolito, after which the diabolito may again be tossed into the air in the usual way. It is thus seen that as the diabolito is revolved, on the cord and in the air, it produces a pleasant humming sound, the intensity of which is proportional to the speed of rotation.

Referring now to Fig. 6, our invention further contemplates a diabolito in which the end portions are molded as one-piece elements. That is to say, each end of the diabolito consists of an end member 60 of circular, plate-like form, the member having an integral, conical, end cap portion 61 provided with air inlet openings 62. As in the structure illustrated in Figs. 1 through 5, the end member 60, which is preferably molded from plastic material, has tapered projections or vanes 63 which are cemented to the inner tapered surface of a conical element 11 or 12. Each end member 60 has an axial, inwardly-directed lug 64, the inner end of which is cored to provide a tubular portion.

The toy shown in Fig. 6 also includes a thin circular plate 65 which carries the reeds 35, the reeds being vibrated in response to inward flow of air through holes provided for this purpose. Each plate 65 is disposed in a shallow recess 66 formed in the inner face of the end member 60 and is retained in place by the central lug 64 which projects through a central hole in the plate. As shown, the inner extremity of the plastic lug 64 is expanded or headed over against the inner surface of the plate 65 by means of a heated conical-ended tool inserted into the tubular end of the lug.

By the structure illustrated in Fig. 6, the toy is greatly simplified, both from the molding and assembling standpoints, so as to further reduce the cost of the item. As will be apparent, the device of Fig. 6 operates in a manner similar to the toy disclosed in Figs. 1 through 5, the air being drawn into the end chambers through the openings 62 by way of the reed holes, and past the reeds to vibrate the same, the air then being expelled centrifugally outwardly under the action of the radial vanes 63 as the diabolito is rotated, so as to produce the musical sound.

As will be apparent, any suitable air-operated, sound-producing means, such as whistles, may be substituted for the vibratory reeds herein disclosed, within the purview of our invention, the reeds being illustrated merely to exemplify one such means.

It will be observed from the foregoing that our invention provides a diabolito which is simple in construction,

practical and efficient in performing its intended function. The diabolito is composed of simple components which are adapted for economical manufacture, preferably as molded plastic parts, and which may be quickly assembled without the use of screws, rivets or other fastening means.

As a particular feature of improvement, the diabolito includes sound producing means which functions to produce a pleasing humming sound during rotation. The sound producing means embodies a turbine or pump which functions to draw air across vibratory reeds and to expel the air with a centrifugal pumping action. The flow of air is axially inward and radially outward and thus the diabolito requires no scoops on its periphery for drawing in the air and which would obviously impair free rotation of the diabolito.

We claim as our invention:

1. A diabolito, comprising: a hollow, double conical body providing a V-shaped peripheral groove adapted to receive an operating cord; end members for said body and defining therewith air chambers at the ends of the diabolito, each end member having air inlet openings and a recess in its inner face, each end member having integral, substantially radial vanes permanently secured to said body member and spacing the end member from a base portion of the body and defining a plurality of substantially radial air exhaust openings; a plate disposed in said recess and having holes therein; retainer means on each end member engaging a said plate to retain the same in a said recess; and sound-producing means carried by said plate to be operated by air passing through said holes.

2. A diabolito, comprising: a hollow, double conical body providing a V-shaped peripheral groove adapted to receive an operating cord; end members for said body and defining therewith air chambers at the ends of the diabolito, each end member having air inlet openings and a recess in its inner face, each end member having substantially radial vanes secured to said body member and spacing the end member from a base portion of the body and defining a plurality of substantially radial air exhaust openings, each end member also having an inwardly directed tubular lug; a plate disposed in said recess and having air passage holes therein; and sound-producing means carried by said plate to be operated by air passing through said holes, said tubular lug extending through a central hole in said plate and having a head engaging the inner surface of the plate to retain the latter seated in said recess.

3. A diabolito, comprising a hollow, double conical body providing a V-shaped groove adapted to receive an operating cord; end members for said body and having an integral, axial, outwardly projecting conical cap portion, said end members defining with the body air chambers at the ends of the diabolito, each end cap portion having air inlet openings and each end member having a recess in its inner face, each end member having substantially radial vanes secured to said body member and spacing the end member from a base portion of the body and defining a plurality of substantially radial air discharge openings, each cap portion having an inwardly directed tubular lug; a plate disposed in said recess and having air passage holes therein; and sound-producing means carried by said plate to be operated by air passing through said holes, said tubular lug extending through a central aperture in said plate and having a radially expanded end engaging the inner surface of the plate to retain the latter seated in said recess.

4. A diabolito, comprising: a body having a pair of hollow conical elements disposed with their apices abutting and providing a V-shaped peripheral groove adapted to receive an operating cord, said apices having axially aligned tubular bosses; a connecting axle secured within said bosses; end members secured to and substantially closing the base ends of the conical elements and defin-

5

ing therewith air chambers, each member having a substantially axial air flow passage and a radial air flow passage communicating with a said chamber, each member having vane means disposed within a said chamber and adapted to centrifugally force air therefrom through said radial passage so as to draw air into said chamber through said axial passage; and at least one vibratory musical reed carried by each of said end members and across which air entering a said chamber through a said axial air flow passage is directed, each end member having a plate portion, said vane means consisting of a plurality of substantially radially extending ribs formed integrally with said plate portion at the inner side thereof, said ribs of each member being bonded to a said conical element and spacing said plate portion axially from the base end of a said element, said base end, said plate portion and said ribs together defining a plurality of substantially radial air discharge jets.

5. A diablo, comprising: a body having a pair of hollow conical elements disposed with their apices abutting and providing a V-shaped peripheral groove adapted to receive an operating cord, said apices having axially aligned tubular bosses; a connecting axle secured within said bosses; end members secured to and substantially closing the base ends of the conical elements and defining therewith air chambers, each member having a substantially axial air flow passage and a radial air flow passage communicating with a said chamber, each member having vane means disposed within a said chamber and adapted to centrifugally force air therefrom through said radial passage so as to draw air into said chamber through said axial passage; and at least one vibratory musical reed carried by each of said end members and across which air entering a said chamber through a said axial air flow passage is directed, each base portion having a shouldered recess, each end member having a plate portion, said vane means consisting of a plurality of substantially radially extending ribs formed integrally with said plate portion at the inner side thereof, said ribs of each member being bonded within a said recess and spacing said plate portion axially from the base end of a said element, said base end, said plate portion and said ribs together defining a plurality of substantially radial air discharge jets.

6. A diablo, comprising: a body having a pair of hollow conical elements disposed with their apices abutting and providing a V-shaped peripheral groove adapted to receive an operating cord, said apices having axially aligned tubular bosses; a connecting axle secured within said bosses; end members secured to and substantially closing the base ends of the conical elements and defining therewith air chambers, each member having a substantially axial air flow passage and a radial air flow passage communicating with a said chamber, each member having vane means disposed within a said chamber and adapted to centrifugally force air therefrom through said radial passage so as to draw air into said chamber through said axial passage; and at least one vibratory musical reed carried by each of said end members and across which air entering a said chamber through a said axial air flow passage is directed, each base portion having a shouldered recess, each end member having a plate portion, said vane means consisting of a plurality of substantially radially extending ribs formed integrally with said plate portion at the inner side thereof, said ribs of each member being bonded within a said recess and spacing said plate portion axially from the base end of a said element, said base end, said plate portion and said ribs together defining a plurality of substantially radial air discharge jets, each end member having an axial opening having an annular shoulder therein, said reed being carried by a plate disposed in said axial opening against said shoulder, said plate having an aperture across which said vibratory reed extends and through which air enters said chamber.

7. A diablo, comprising: a body having a pair of hol-

6

low conical elements disposed with their apices abutting and providing a V-shaped peripheral groove adapted to receive an operating cord, said apices having axially aligned tubular bosses; a connecting axle secured within said bosses; end members secured to and substantially closing the base ends of the conical elements and defining therewith air chambers, each member having a substantially axial air flow passage and a radial air flow passage communicating with a said chamber, each member having vane means disposed within a said chamber and adapted to centrifugally force air therefrom through said radial passage so as to draw air into said chamber through said axial passage; and at least one vibratory musical reed carried by each of said end members and across which air entering a said chamber through a said axial air flow passage is directed, each base portion having a shouldered recess, each end member having a plate portion, said vane means consisting of a plurality of substantially radially extending ribs formed integrally with said plate portion at the inner side thereof, said ribs of each member being bonded within a said recess and spacing said plate portion axially from the base end of a said element, said base end, said plate portion and said ribs together defining a plurality of substantially radial air discharge jets, each end member having an axial opening having an annular shoulder therein, said reed being carried by a plate disposed in said axial opening against said shoulder, said plate having an aperture across which said vibratory reed extends and through which air enters said chamber; and a pair of end caps each having its peripheral edge portion secured within a said axial opening and retaining a said reed plate against said shoulder, each end cap having at least one air inlet opening therein.

8. A diablo, comprising: a body having a pair of hollow conical elements disposed with their apices abutting and providing a V-shaped peripheral groove adapted to receive an operating cord, said apices having axially aligned tubular bosses; a connecting axle secured within said bosses; end members secured to and substantially closing the base ends of the conical elements and defining therewith air chambers, each member having a substantially axial air flow passage and a radial air flow passage communicating with a said chamber, each member having vane means disposed within a said chamber and adapted to centrifugally force air therefrom through said radial passage so as to draw air into said chamber through said axial passage; and at least one vibratory musical reed carried by each of said end members and across which air entering a said chamber through a said axial air flow passage is directed, each base portion having a shouldered recess, each end member having a plate portion, said vane means consisting of a plurality of substantially radially extending ribs formed integrally with said plate portion at the inner side thereof, said ribs of each member being bonded within a said recess and spacing said plate portion axially from the base end of a said element, said base end, said plate portion and said ribs together defining a plurality of substantially radial air discharge jets, each end member having an axial opening having an annular shoulder therein, said reed being carried by a plate disposed in said axial opening against shoulder, said plate having an aperture across which said vibratory reed extends and through which air enters said chamber; and a pair of end caps each having its peripheral edge portion secured within a said axial opening and retaining a said reed plate against said shoulder, each end cap having at least one air inlet opening therein, said conical elements, said end members and said end caps being molded plastic components and cemented together.

9. A spinning, musical toy, including: a pair of coaxial members, one of said members having an outwardly-directed cone at its axis, air inlet openings in said cone and an axial recess at the base of said cone, said one member also having a plurality of integral, radially-ex-

7

tending vanes on its inner face permanently bonded against the other member and spacing said members axially to provide a central air chamber therebetween, said vanes defining with said members a plurality of radially-extending air exhaust openings communicating with said air chamber; a plate secured in said recess and having holes therein; and sound-producing reed means carried by said plate to be vibrated by air entering said cone and air chamber through said inlet openings, passing through said holes and exhausting from the toy through said exhaust openings as the toy is rotated on its axis.

5

10

8

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