United States Patent	12392587
Kind Code	B2
Date of Patent	August 19, 2025
Inventor(s)	Xia; Xubin

Deformable hollow dart head for toy dart and toy dart with the same

Abstract

A deformable hollow dart head for a toy dart includes a dart cap and a connector, the dart cap has a cap top and a cylindrical cap wall extending from a periphery of the cap top, the cap wall is provided with air vents, the connector has a circular base connecting with the cap wall, thereby sealing the dart cap to form a deformable cavity, the material of the dart cap is softer than that of the circular base. At the moment when the dart toy hits a target, the dart cap contacts and impacts the target. The target exerts a reactive force on the dart toy, and the deformable cavity provides deformation space for the dart cap, thereby causing the dart cap to deform and increasing the contact area with the target.

Inventors: **Xia; Xubin (Huizhou, CN)**

Applicant: **HuizhouShi Xute Plastic Electronic Technology Co., Ltd.** (Huizhou, CN)

Family ID: **1000008765381**

Assignee: **HuizhouShi Xute Plastic Electronic Technology Co., Ltd. (Huizhou, CN)**

Appl. No.: **18/483500**

Filed: **October 09, 2023**

Prior Publication Data

Document Identifier	Publication Date
US 20240328762 A1	Oct. 03, 2024

Foreign Application Priority Data

CN	202320679132.6	Mar. 29, 2023
CN	202321539807.3	Jun. 16, 2023

Publication Classification

Int. Cl.: **A63B65/02** (20060101); **F42B6/00** (20060101)

U.S. Cl.:

CPC **F42B6/003** (20130101);

Field of Classification Search

CPC: F42B (6/003)

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
6083127	12/1999	O'Shea	446/213	A63H 33/18
9459081	12/2015	Chia	N/A	N/A
9964383	12/2017	Chang	N/A	B29C 65/18
10018451	12/2017	Ma	N/A	N/A
11073367	12/2020	Chia et al.	N/A	N/A
11592271	12/2022	Chia	N/A	F42B 12/745
2006/0276277	12/2005	Montefusco	102/502	F42B 8/16
2024/0142205	12/2023	Chia	N/A	F42B 6/00
2024/0167798	12/2023	Johnson	N/A	F42B 6/003

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
203053330	12/2012	CN	N/A

Primary Examiner: Ricci; John A

Background/Summary

FIELD OF THE INVENTION

(1) The present invention relates to the technical field of toy darts, more particularly, to a deformable hollow dart head for a toy dart and a toy dart with the same.

BACKGROUND OF THE INVENTION

(2) Chinese Utility Model No.: CN201320034331.8 discloses a toy dart for a toy gun, which includes a dart head and a dart body, the dart head includes a cushion and a connector, and both ends of the connector are respectively connected with the cushion and the dart body, and the cushion is made of flexible material and configured to reduce the impact force of the toy dart on the shooting target when colliding with it. However, the cushion with the above configuration is difficult to deform or has limited deformation, and cannot effectively reduce the impact force of the toy dart on the shooting target.

SUMMARY OF THE INVENTION

(3) The present invention provides a deformable hollow dart head for a toy dart to overcome the deficiencies that the toy dart in the prior art “is difficult to deform or has limited deformation, and cannot effectively reduce the impact force of the toy dart on the shooting target”.

(4) The deformable hollow dart head for a toy dart includes a dart cap and a connector, the dart cap

has a cap top and a cylindrical cap wall extending from the periphery of the cap top, the cap wall is provided with two air vents, the connector has a circular base connecting with the cap wall, thereby sealing the dart cap to form a deformable cavity, the material of the dart cap is softer than that of the circular base.
(5) The circular base is provided with a connecting ring on a side facing the dart cap, the connecting ring is plugged into the dart cap to fit the cap wall, and a height of the connecting ring is smaller than that of the cap wall.
(6) The circular base, the connecting ring, and the cap wall are bonded by an adhesive.
(7) The present invention further provides a toy dart with the aforementioned deformable hollow dart head for a toy dart.
(8) The circular base is connected with a dart body on the other side opposing to the dart cap, the circular base separates the dart body and the dart cap.
(9) The other side of the circular base is provided with a plug-in column, the dart body is a long cylindrical shape with an inner cavity, and the plug-in column is inserted into the inner cavity of the dart body to connect it.
(10) The outer wall of the plug-in column is provided with multiple adhesive grooves, which are used to accommodate adhesive and connect the plug-in column and the dart body.
(11) A toy dart includes a dart cap, a dart body, and a connector. The connector has a circular base. The dart cap has a cap top and a cylindrical cap wall extending from the periphery of the cap top, the cap body has a cylindrical body with opposite end faces and a cavity passing through the opposite end faces. The dart cap and the dart body are respectively disposed on opposite two sides of the circular base and connected thereto. The circular base is connected with the cap wall and seals the dart cap to form a deformable cavity. The material of the dart cap is softer than that of the circular base. The cap wall of the dart cap is provided with two air vents to communicate the deformable cavity and the outside.
(12) The opposite two sides of the circular base are respectively provided with a connecting ring and a plug-in column, the outer diameter of the connecting ring and the outer diameter of the plug-in column are smaller than the outer diameter of the circular base. The connecting ring is inserted into the dart cap to adhere to the cap wall, and the height of the connecting ring is smaller than that of the cap wall. The plug-in column is inserted into the cavity of the dart body to connect the dart cap and the dart body. The plug-in column of the connector is provided with grooves.
(13) The benefit of the present invention: the deformable hollow dart head for the toy dart in the present invention, at the moment when the dart toy shoots a target, the dart cap contacts and impacts the target. The target exerts a reactive force on the dart toy, and the deformable cavity provides deformation space for the dart cap, thereby causing the dart cap to deform and increasing the contact area with the target. At the same time, due to the deformation of the deformable cavity, the gas therein is discharged through the air vents, and the circular base carries the dart body forward and is affected by the deformation of the dart cap, thereby reducing the impact force on the target. The circular base provides support for the deformation of the dart cap, ensuring the stability of the dart head.
(14) In the present invention, the opposite two sides of the circular base are respectively arranged with the dart body and the dart cap. The circular base separates the dart cap and the dart body. The dart body, the dart cap, and the connector are respectively made from different materials. If the three are bonded by the adhesive, it will increase the performance requirements for the adhesive, greatly increasing the production difficulty. However, in the present invention, the dart cap only contacts with the circular base, and the dart body only contacts with the circular base, thereby the adhesive only needs to bond the dart cap and the circular base, or the dart body with the circular base, it greatly reduces the performance requirements for the adhesive, thereby reducing the production cost and the production difficulty.
(15) In the present invention, the dart body adopts a hollow cylindrical structure with a large aspect

ratio and a front center of gravity, during flight, the aerodynamic center of the dart body is located behind the center of gravity, which has a balance and stability effect, avoiding the impact of wind force, air resistance, and other factors on the dart toy, and maintaining the flight stability and speed of the dart toy.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a perspective view of the deformable hollow dart head of a dart toy according to an embodiment in the present invention.

(2) FIG. **2** is a section view along the A-A line of FIG. **1**.

(3) FIG. **3** is a perspective view of the dart toy according to an embodiment in the present invention.

(4) FIG. **4** is a section view along the B-B line of FIG. **3**.

(5) FIG. **5** is the other perspective view of the dart toy according to an embodiment in the present invention.

(6) FIG. **6** is a section view along the C-C line of FIG. **5**.

(7) FIG. **7** is another perspective view of the dart toy according to an embodiment in the present invention.

(8) FIG. **8** is a section view along the D-D line of FIG. **7**.

EMBODIMENTS

(9) In order to make the purpose, the technical solution, and the technical effect of the present invention clearer, the following will further explain the present invention in conjunction with specific implementation methods. It should be understood that the specific embodiments described here are only intended to explain the present invention and are not intended to limit it.

(10) Referring to FIG. **1-4**, the deformable hollow dart head for a toy dart includes a dart cap **10** and a connector **20**. The dart cap **10** has a cap top **11** and a cylindrical cap wall **12** extending from a periphery of the cap top **11**, the cap wall **12** is provided with air vents **16**. The connector **20** has a circular base **21** connecting with the cap wall **12**, thereby sealing the dart cap **10** to form a deformable cavity **13**. The dart cap **10** and the connector **20** are both made of flexible materials such as rubber and thermo-plastic-pubber material. The material of the dart cap **10** is softer than that of the connector **20**. The deformable hollow dart head for a toy dart is mounted on the dart body **20** by a circular base **21**, thereby forming a dart toy. At the moment the dart toy hits the shooting target, the dart cap **10** contacts and impacts the target. The target exerts a reactive force on the dart toy, and the deformable cavity **13** provides deformation space for the dart cap **10**, thereby causing the dart cap **10** to deform and increasing the contact area with the target. At the same time, due to the deformation of the deformable cavity **13**, the gas therein is discharged through the air vents **16**, and the circular base **21** carries the dart body **30** forward and is affected by the deformation of the dart cap **10**, thereby reducing the impact force on the shooting target. The circular base **21** provides support for the deformation of the dart cap **10**, ensuring the stability of the dart head.

(11) The circular base **21** is provided with a connecting ring **22** on a side facing the dart cap **10**. The connecting ring **22** is plugged into the dart cap **10** to fit the cap wall **12**, and a height of the connecting ring **22** is smaller than that of the cap wall **12**. The connecting ring **22** is set to insert into the dart cap **10** so as to increase the connection strength between the dart cap **10** and the circular base **21**, thereby preventing them from falling off easily and improving product quality. The height of the connecting ring **22** is set to be smaller than the cap wall **12** to prevent it from affecting the deformation of the dart cap **10** and increasing the deformation difficulty of the dart cap **10**. The height of the connecting ring **22** is preferably ⅓ of the cap wall **12**. In addition, the

connecting ring **22** is inserted into the dart cap **10** and fits with the cap wall **12**, thereby relatively positioning the connecting ring **22** and the dart cap **10**, so that their center-lines are coincided, thereby reducing installation errors and improving the shooting accuracy of the dart head. The cap wall **12** is outside the connecting ring **22**, the joint of the cap wall **12** and the connecting ring **22** is difficult to deform, ensuring their centerlines to be coincided and improving the shooting accuracy of the dart head.

(12) The circular base **21**, the connecting ring **22**, and the cap wall **12** are bonded by adhesive, thereby increasing the adhesion strength and preventing the dart cap **10** and the connecting ring **20** from falling off easily and improving product quality.

(13) The circular base **21** is connected with a dart body **30** on the other side opposite to the dart cap **10**, the dart body **30** and the circular base **21** are bonded by an adhesive. The circular base **21** separates the dart body **30** and the dart cap **10**. The commonly used dart body **30** on the market is preferably made of EPE Foam (Polyethylene foam) material, while the dart cap **10** in the invention is made of softer flexible rubber, thermo-plastic-pubber material, and other materials, and the circular base **21** is made of harder rubber, thermo-plastic-pubber material, and other materials. The circular base **21** is set to separate the dart cap **10** and the dart body **30**, which can avoid high requirements for adhesive performance due to the mixed bonding of the three different materials. In the present invention, the dart cap **10** only contacts with the circular base **21**, and the dart body **30** only contacts with the circular base **21**, the requirement for adhesive between two materials is greatly reduced, thereby saving costs and reducing production difficulty.

(14) The other side of the circular base **21** is provided with a plug-in column **23**, the dart body **30** is a long cylindrical shape with an inner cavity, and the plug-in column **23** is inserted into the inner cavity of the dart body **30** to connect it.

(15) The outer wall of the plug-in column **23** is provided with multiple adhesive grooves **24**, which are used to accommodate adhesive and connect the plug-in column **23** and the dart body **30**. The adhesive groove **24** is preferably uniformly distributed on the plug-in column **23**.

(16) The periphery of the cap top **11** is set as a circle, and it slightly bulges from the periphery to the middle. The circular hat top **11** increases the contact area between the hat top **11** and the target when the dart toy hits the shooting target, reducing the impact force borne by the target. The slightly raised structure facilitates the dart toy to reduce air resistance and increase flight speed during flight.

(17) The joint **14** between the cap top **11** and the cap wall **12** forms an arc-shaped transition, thereby reducing the difficulty of deformation of the dart cap **10** and facilitating its deformation.

(18) The middle part of the hat top **11** protrudes inward with a circular platform **15**, which increases the deformation difficulty of the middle part of the hat top **11** relative to the other parts of the dart cap **10**. When the dart cap **10** deforms, the other parts deform with the center of the circular platform **15** and extend laterally, thereby increasing the contact area between the target and the dart cap **10**.

(19) Referring to FIG. **3** and FIG. **4**, a toy dart includes a dart cap **10**, a dart body **30** and a connector **20**. The connector **20** has a circular base **21**. The dart cap **10** has a cap top **11** and a cylindrical cap wall **12** extending from a periphery of the cap top **11**, the cap wall **12** is provided with air vents **16**. The cap body **30** has a cylindrical body **31** with opposite two end faces and a cavity **32** passing through the opposite two end faces. The dart cap **10** and the dart body **30** are respectively disposed on the opposite two sides of the circular base **21** and connected thereto. The circular base **21** is connected with the cap wall **12** and seals the dart cap **10** to form a deformable cavity **13**. The dart cap **10** and the connector **20** are both made of flexible rubber, thermo-plastic-pubber material, and other materials. The dart body **30** is made of EPE Foam (Polyethylene foam) cotton, and the material of the dart cap **10** is softer than that of the circular base **21**. The cap wall **12**, the body **31**, and the circular base **21** have the same radial outer diameter and are connected to form a long cylindrical toy dart.

(20) At the moment the dart toy shoots the target, the dart cap **10** contacts and impacts the target. The target exerts a reactive force on the dart toy, the dart cap **10** directly bears the reactive force from the target, and the deformable cavity **13** provides deformation space for the dart cap **10**, thereby causing the dart cap **10** to deform and increasing the contact area with the target. At the same time, the circular base **21** carries the dart body **30** forward and is affected by the deformation of the dart cap **10**, thereby reducing the impact force on the target. The circular base **21** provides support for the deformation of the dart cap **10**, ensuring the stability of the dart head. The dart body **30** has a balancing and stabilizing effect during flight, avoiding the impact of wind force, air resistance, etc. on the dart, and maintaining its flight stability and speed.
(21) The joint **14** between the cap top **11** and the cap wall **12** forms an arc-shaped transition, thereby reducing the deformation difficulty of the dart cap **10** and facilitating its deformation.
(22) The opposite two sides of the circular base **21** are respectively provided with a connecting ring **22** and a plug-in column **23**, the out diameter of the connecting ring **22** and the out diameter of the plug-in column **23** are smaller than the outer diameter of the circular base **21**. The connecting ring **22** is inserted into the dart cap **10** to adhere to the cap wall **12**, and the height of the connecting ring **12** is smaller than that of the cap wall **12**. The plug-in column **23** is inserted into the cavity **32** of the dart body **30** to connect the dart cap **10** and the dart body **30**. The connecting ring **12** is set to insert into the dart cap **10** so as to increase the connection strength between the dart cap **10** and the circular base **21**, thereby preventing them from falling off easily and improving product quality. The height of the connecting ring **22** is set to be smaller than the cap wall **12** to prevent it from affecting the deformation of the dart cap **10** and increasing the deformation difficulty of the dart cap **10**. The height of the connecting ring **22** is preferably ⅓ of the cap wall **12**. The dart body **30** is set with a cavity **32** to further move the overall center of gravity of the toy dart forward, ensuring flight stability.
(23) The outer side of the connecting ring **22** is bonded with the inner side of the cap wall **12** through adhesive, and the outer side of the plug-in column is bonded with the inner side of the body **31** through adhesive; thus increasing the bonding strength, preventing the detachment of the dart cap **10**, the dart body **30**, and the connector **20**, and improving product quality.
(24) Preferably, the opposite two sides of the circular base **21** are respectively attached with the end surface of the cap wall **12** and one end of the dart body **30** and bonded by adhesive to increase the bonding strength, preventing the detachment of the dart cap **10**, the dart body **30**, and the connector **20**, and improving product quality. The circular base **21** separates the dart cap **10** and the dart body **30**. The commonly used dart body **30** on the market is preferably made of EPE Foam (Polyethylene foam) material, while the dart cap **10** in the invention is made of softer flexible rubber, thermo-plastic-pubber material, and other materials, and the circular base **21** is made of harder rubber, thermo-plastic-pubber material, and other materials. The circular base **21** is set to separate the dart cap **10** and the dart body **30**, which can avoid high requirements for adhesive performance due to the mixed bonding of the three different materials. In the present invention, the dart cap **10** only contacts with the circular base **21**, and the dart body **30** only contacts with the circular base **21**, the requirement for adhesive between two materials is greatly reduced, thereby saving costs and reducing production difficulty.
(25) The outer wall of the plug-in column **23** is provided with multiple adhesive grooves **24**, which are used to accommodate adhesive and connect the plug-in column **23** and the dart body **30**.
(26) The periphery of the cap top **11** is set as a circle, and it slightly bulges from the periphery to the middle. The circular hat top **11** increases the contact area between the hat top **11** and the target when the dart toy hits the target, reducing the impact force borne by the target. The slightly raised structure facilitates the dart toy to reduce air resistance and increase flight speed during flight.
(27) The joint **14** between the cap top **11** and the cap wall **12** forms an arc-shaped transition, thereby reducing the difficulty of deformation of the dart cap **10** and facilitating its deformation.
(28) The middle part of the hat top **11** protrudes inward with a circular platform **15**, which increases

the deformation difficulty of the middle part of the hat top **11** relative to the other parts of the dart cap **10**. When the dart cap **10** deforms, the other parts deform with the center of the circular platform **15** and extend laterally, thereby increasing the contact area between the target and the dart cap **10**.
(29) Referring to FIG. **5** and FIG. **6**, the wall of the dart cap **10** is provided with air vents **16** communicated with the deformable cavity and the outside. When the dart head is deformed, the air vents **16** are used for exhaust.
(30) Referring to FIG. **5** and FIG. **6**, preferably, the connector **20** is provided with a groove **24**, the groove **24** is arranged on the plug-in column **23** to reduce the weight of the connector **20** and the weight of the toy dart.
(31) The dart body adopts a hollow cylindrical structure with a large aspect ratio and a front center of gravity, during flight, the acrodynamic center of the dart body is located behind the center of gravity, which has a balance and stability effect, avoiding the impact of wind force, air resistance, and other factors on the dart toy, and maintaining the flight stability and speed of the dart toy.
(32) Preferably, the dart body **30** is made of polyethylene foam cotton, the dart cap **10** is made of softer thermo-plastic-pubber material, the connector **20** is made of harder thermo-plastic-pubber material which is facilitate to bond the dart body **30** and the connector **20** by adhesive, the bonding effect is good.
(33) The above content is a further detailed explanation of the present invention based on the specific preferred implementation methods, and it cannot be considered that the specific implementation of the present invention is limited to these explanations. For ordinary technical personnel in the technical field to which this present invention belongs, without departing from the concept of this present invention, its architectural form can be flexible and varied, and a series of products can be derived. Just making a few simple deductions or substitutions should be considered as belonging to the scope of patent protection of this present invention determined by the submitted claims.

Claims

1. A deformable hollow dart head for a toy dart, comprising a dart cap and a connector, said dart cap has a cap top and a cylindrical cap wall extending from a periphery of said cap top, said cap wall is provided with air vents, said connector has a circular base connecting with said cap wall, thereby sealing said dart cap to form a deformable cavity, a material of said dart cap is softer than that of said circular base.
2. The deformable hollow dart head for said toy dart according to claim 1, wherein said circular base is provided with a connecting ring on a side facing said dart cap, said connecting ring is plugged into said dart cap to fit said cap wall, and a height of said connecting ring is smaller than that of said cap wall.
3. The deformable hollow dart head for said toy dart according to claim 2, wherein said circular base, said connecting ring, and said cap wall are bonded by an adhesive.
4. The deformable hollow dart head for a toy dart according to claim 1, wherein said periphery of said cap top is set as a circle, and slightly bulges from said periphery of said cap top to a middle of said cap top; said middle part of said cap top protrudes inward with a circular platform, a joint between said cap top and said cap wall forms an arc-shaped transition.
5. A toy dart, comprising a deformable hollow dart head for a toy dart, said deformable hollow dart head for said toy dart comprises a dart cap and a connector, said dart cap has a cap top and a cylindrical cap wall extending from a periphery of said cap top, said cap wall is provided with air vents, said connector has a circular base connecting with said cap wall, thereby sealing said dart cap to form a deformable cavity, a material of said dart cap is softer than that of said circular base.
6. The toy dart according to claim 5, wherein said circular base is connected with a dart body on a

side opposing to said dart cap, said circular base separates said dart body and said dart cap.
7. The toy dart according to claim 6, wherein said circular base is provided with a plug-in column on said side opposing to said dart cap, said dart body is a long cylindrical shape with an inner cavity, and said plug-in column is inserted into said inner cavity of said dart body to connect said dart body.
8. The toy dart according to claim 7, wherein an outer wall of said plug-in column is provided with multiple adhesive grooves, which are used to accommodate adhesive and connect said plug-in column and said dart body.
9. A toy dart, comprising a dart cap, a dart body, and a connector; said connector has a circular base; said dart cap has a cap top and a cylindrical cap wall extending from a periphery of said cap top, said cap body has a cylindrical body with opposite two end faces and a cavity passing through said opposite two end faces; said dart cap and said dart body are respectively disposed on opposite two sides of said circular base and connected thereto; said circular base is connected with said cap wall and seal said dart cap to form a deformable cavity; a material of said dart cap is softer than that of said circular base; said cap wall of said dart cap is provided with air vents to communicate said deformable cavity and an outside.
10. The toy dart according to claim 9, wherein said opposite two sides of said circular base is respectively provided with a connecting ring and a plug-in column, an out diameter of said connecting ring and an out diameter of said plug-in column are smaller than an outer diameter of said circular base; said connecting ring is inserted into said dart cap to adhere to said cap wall, and a height of said connecting ring is smaller than that of said cap wall; said plug-in column is inserted into said cavity of said dart body to connect said dart cap and said dart body; said plug-in column of said connector is provided with grooves.