A dart having a substantially hollow shaft and one or a plurality of removable weights to be placed in the lumen of the shaft so that the weight of the dart is adjustable and there is a secondary momentum when the dart hits a dartboard, wherein the weight is magnetic or non-magnetic.
DART WITH ADJUSTABLE WEIGHT

RELATED APPLICATION


TECHNICAL FIELD

[0002] The present invention relates to dart games and more specifically to a dart which includes a hollow shaft and one or more active weights located within the lumen of the shaft.

BACKGROUND ART

[0003] Dart games have been used for a long time. Conventional dart games employ a dartboard that is usually made of cork, paper, or hair, and a plurality of sharp pointed darts. Conventional darts include a shaft having a sharp point at the forward end and aerodynamic fins or “fins” on the rear end which facilitate traveling of the dart through the air when thrown. Typically, the shaft of a dart is made of a solid metal or alloy and provides the necessary impact force to cause the sharp point of the dart to penetrate into a board. In addition to providing a desired mass for purposes of ensuring that a dart will “stick” when it impacts a dartboard, the shaft of a dart also has to be weight-balanced in order to allow a user to control the throwing of the dart.

[0004] Recently, flat headed darts have been used in conjunction with magnetic dart games. The flat heads and the shafts of such darts are typically made of a solid metal or plastic material and the flat head is magnetic. After such a flat headed, magnetic dart is thrown through the air towards a dartboard, the magnetic flat head of the dart hits the dartboard and sticks onto the surface of the metallic dartboard.

[0005] There are several aspects of conventional darts that can be improved. For example, the weight of a conventional dart is fixed. Even if one has a choice of selecting different darts made of different materials of darts having different, fixed weights, the selection of such darts is limited and costly. Also, if one prefers to use lighter darts or prefers to throw darts will a lighter throwing force, the resulting impact of a dart on the dartboard may not be sufficient to cause the dart to penetrate into the dartboard fall enough so that the dart may bounce off the dartboard thereby creating a dangerous situation.

DISCLOSURE OF THE INVENTION

[0006] According to various features, characteristics and embodiments of the present invention which will become apparent as the description thereof proceeds, the present invention provides a dart that comprises an internal movable magnetic weight, which magnetic weight is slidably within the dart along a longitudinal axis of the dart.

[0007] The present invention further provides a dart that includes:

- a shaft having opposite ends and a central hollow lumen;
- a tail piece configured to receive and support aerodynamic fins;
- a head that is configured to become attached to a dartboard; and
- at least one weight that is movable within the lumen of the shaft,
- wherein at least one of the shaft and at least one weight are configured to equalize pressure on at least one side of the weight within the shaft.

BRIEF DESCRIPTION OF DRAWINGS

[0013] The present invention will be described with reference to the attached drawings which are given as non-limiting examples only, in which:

[0014] FIGS. 1A and 1B are sectional views of a pair of darts that illustrate how the weight of the darts can be adjusted according to one embodiment of the present invention.

[0015] FIG. 2 is an exploded view of a dart according to one embodiment of the present invention that has a sharp-pointed end and a one-piece hollow shaft.

[0016] FIG. 3 is an exploded view of a dart according to one embodiment of the present invention that has a flat head and a two-piece hollow shaft.

[0017] FIGS. 4A and 4B depict weights that may be placed in the lumen of hollow shaft darts according to one embodiment of the present invention.

[0018] FIGS. 5A and 5B depict weights that may be placed in the lumen of hollow shaft darts according to another embodiment of the present invention.

[0019] FIGS. 6A and 6B depict weights that may be placed in the lumen of hollow shaft darts according to another embodiment of the present invention.

[0020] FIGS. 7A and 7B depict weights that may be placed in the lumen of hollow shaft darts according to another embodiment of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

[0021] The present invention is directed to darts that are used in conjunction with conventional or magnetic dart boards. When used with conventional dart boards such as bristle boards, the darts of the present invention can be provided with sharp metallic points that are designed to penetrate the dart boards. When used in conjunction with magnetic dart boards that include magnetic field sensors within scoring areas of the dart boards, the darts of the present invention can be provided with sharp points, weights and shafts, and at least one of which can be magnetized or made from magnetic materials. It is also within the scope of the present invention to provide darts that have blunt ends that are non-metallic, or metallic and darts which can have flat ends, weights and shafts, any or all of which can be magnetized or made from magnetic materials.

[0022] The present invention provides darts that comprise a substantially hollow shaft and one or more weights that can be removably placed in the lumen of the dart shafts.
The hollow shafts can either comprise a one piece structure or, according to alternative embodiments, can comprise two or more shaft portions that can be easily coupled together by any suitable mechanism coupling arrangement, including cooperating threaded connections, bayonet connections, luer locking connections, press, snap-fit and compression connections and connections that involve screwing, turning, sliding, snapping, clicking, pressing, and other conventional interlocking mechanisms/arrangements.

One or more of the removable weights can be placed in the lumen of the shaft of a dart so that the total weight of the dart becomes adjustable by the selection and/or combination of the weights and the weight of the dart shaft, tip and fins. A player may select one or a plurality of different weights to suit individual taste and arrange the weights as desired. In this regard, the individual weights can have different mass densities so that the order of the weights along the axis of a dart shaft can affect the overall center of mass or "balance" of the shaft when it is thrown. It is also within the scope of the present invention to include spacer elements between individual weights, which spacer elements have a negligible mass.

FIGS. 1A and 1B are sectional views of a pair of darts that illustrate how the weight of the darts can be adjusted according to one embodiment of the present invention. As depicted in FIGS. 1A and 1B each dart 1 includes a hollow shaft 2 having a lumen 3 in which one or more weights 4 can be placed to affect a desired weight and/or balance of the dart 1. The weights 4 can be individually made from a variety of metals, alloys and other materials, including composite materials and have similar or different shapes and/or masses as desired. Examples of the materials from which the weights 4 can be made include copper, iron, stainless steel, brass, and other metals and/or alloys. In an alternative embodiment, a weight comprising a low to medium viscosity liquid such as water that is contained in a fluid-tight lumen. In such an embodiment, the liquid can flow within the shaft of the dart between the opposite ends of the shaft 2.

One or more of the weights 4 can be magnetized or made from a magnetic material so that when a dart 1 containing such a magnetized or magnetic weight(s) approaches or strikes an electronic dartboard having a plurality of induction coils prearranged in a predetermined pattern on or in the dartboard, the motion of the magnetic weight 4 relative to the dartboard creates an induced current in the coil or in the dartboard nearest to the point of impact of the dart 1, whereby the induced current can be used to automatically generate an electronic "score" signal that can be sent to an electronic scoring circuit processing in a known manner. The motion of the magnetic (or non-magnetic) weight 4 relative to the dartboard can have a component (referred to herein for descriptive purposes only as the primary component) that is dependent on the motion of the dart 1 and a component (referred to herein for descriptive purposes only as the secondary component) that is independent with respect to the motion of the dart 1 in which case the magnetic weight 4 moves in the lumen 3 of the dart 1 relative to the shaft 2 of the dart 1. In secondary component of motion is effected by the inertia created in the magnetic weight(s) 4 when the dart 1 is thrown which causes the magnetic weight(s) 4 to continue to move (within the lumen) after the dart 1 strikes the dartboard. In the case of darts 1 that are designed to penetrate a dartboard, this type of secondary component of motion which is enabled by having the weight(s) 4 move within the lumen 3 of the shaft 2 of the darts 1 creates additional impact force that can ensure that the darts 1 penetrate sufficiently deep into the dartboard.

According to a further embodiment of the present invention, magnetic repulsion can be used to provide additional impact force. For example, fixed magnets (not shown) can be provided in the front and rear ends of the lumen 3 and a movable magnetic weight 4 can be provided so that magnetic poles or faces of the movable magnetic weight 4 are opposite to like magnetic poles at the opposite ends of the lumen 3. As such a dart 1 strikes a dartboard, the rear-most magnet will repel the movable magnetic weight 4, and increase the force of impact. At the same time the forward-most magnet will repel the movable magnetic weight 4 and prevent it from becoming attached to the forward-most magnet.

The head of the dart may be sharp-pointed or blunt or substantially flat as in the case of magnetic heads that are designed to attach to the face of dartboards by magnetic forces.

According to one embodiment of the present invention, the weights are slidable within the lumens of the dart shafts so that when the darts hit a dartboard, the weights slide forward striking the end of the lumens to create a secondary impact of motion which can increase the penetrating momentum of the darts and reduce the chance of the darts bouncing off the dartboards.

According to one embodiment one or more grooves are provided in either the inner surfaces of the lumen walls or the outer surfaces of the weight(s) wherein the alignment of the groove(s) is substantially parallel to the longitudinal axis of the shaft of the dart. Such grooves prevent the sliding of the weight(s) within the lumens from being hindered by potential air locks within the lumens of the shafts of the darts.

According to another embodiment one or more through-bores can be provided in the weights which extend between and penetrate through the longitudinal ends of the weights so as to prevent the sliding of the weight(s) within the lumens from being hindered by potential air locks within the lumens of the shafts of the darts.

The weights may have any desirable cross sectional shape and are preferably shaped so as to be slidable within the lumens of the dart shafts. According to one embodiment, the cross sectional shapes of the weights are cylindrical and the cross sectional shapes of the lumens of the shafts of the darts are cylindrical.

The weights may be configured to fit snugly in the lumens of the dart shafts.

According to one embodiment, one or more openings can be provided in the body of the shafts of the darts at or near opposite ends thereof which vent the lumens and equalize the air pressure between inside and outside of the lumen so that the lumen is not completely air tight and the weight is thus free to slide therein without any air lock to prevent the movement of the weights within the lumens of the dart shafts.
[0035] One or more protruding continuous or non-continuous annular ridges can be formed or provided on the outer surfaces of the weights which annular ridges are configured to fit better in the lumen of the shaft to prevent the weights from wobbling inside the lumens. The annular ridges can be integral parts of the weights or separate elements such as O-rings that are made of plastic, rubber, metal, alloy, or other suitable materials that are placed on the outer surfaces of the weights. It is also possible to provide or form longitudinally extending ridges on the outer surface of the weights or the inner surface of the lumen walls. These and other alignment structures that align the central axes of the weights and lumen prevent the weights from wobbling inside the lumens.

[0036] Alternatively, one or more protruding annular ridges can be formed or provided on the inner wall of the lumens of the shafts of the darts to help hold the weights from wobbling inside the lumens. The annular ridges can be integral parts of the lumen walls or separate elements such as O-rings that are made of plastic, rubber, metal, alloy, or other suitable materials that are coupled on the inner surfaces of the lumens. It is also possible to form or provide longitudinally extending ridges on the inner wall of the lumen walls. These and other alignment structures that align the central axes of the weights and lumen prevent the weights from wobbling inside the lumens.

[0037] FIG. 2 is an exploded view of a dart according to one embodiment of the present invention that has a sharp-pointed end and a one-piece hollow shaft. The dart 1 depicted in FIG. 2 has a one-piece shaft 2 having a lumen 3 defined therein. One end of the dart 1 has a sharp pointed end 5 that can be coupled to the shaft 2 by cooperating threaded portions 6 and 7 that are provided on the shaft 2 and base of the sharp pointed end 5 as depicted. The opposite end of the shaft 2 is provided with a tail piece 8 that is configured to receive and support a set of fins 9. The tail piece 8 can be coupled to the shaft 2 by cooperating threaded portions 10 and 11 that are provided on the shaft 2 and the base of the tail piece 8 as depicted. The fins 9 and manner in which they are coupled to the tail piece 8 can be of any conventional design.

[0038] The dart 1 in FIG. 2 is depicted as having a magnetic weight 4 in the lumen 3 thereof. The magnetic weight 4 and shaft 2 can have corresponding circular cross sectional shapes whereby the magnetic weight 4 can slide freely within the lumen 3 of shaft 2.

[0039] An discussed above, the overall weight and balance of the dart 1 can be adjusted by adding addition weights 4 to the lumen 3 of the shaft 2 or the magnetic weight 4 can be removed and replaced with one or more weights having different or similar masses. Moreover, spacer elements (not shown) having negligible masses can be provided between or behind any of the weights 4 to adjust the balance of the dart 1 and travel distance of the weights 4 when the dart 1 impacts a dartboard. At least the leading weight 4 nearest the front or sharp pointed end 5 of the dart 1 should be a magnetic weight 4 that is either a magnetized or magnetic material.

[0040] When using the dart depicted in FIG. 2, a player may select a different weight 4 or weights 4 to suit individual taste. The weight(s) 4 is slideable in the lumen 3 of the shaft 2 of the dart 1 so that when the dart 1 hits a dartboard, there is a secondary momentum created by the weight 4 to help the dart 1 penetrate the dartboard or reduce the chance of the dart 1 bouncing off the dartboard. The weights 4 can be removed and replaced by removing either the sharp pointed end 5 or the tail piece 8 from shaft 2. Since only one of the sharp pointed end 5 or the tail piece 8 needs to be removable from the shaft 2, the other can be non-removable or integral with the shaft 2 is desired.

[0041] When the dart 1 depicted in FIG. 2 hits a dartboard which has a plurality of induction coils prearranged in a predetermined pattern on or in the dartboard, the motion of the magnetic weight 4 inside the lumen 3 of the shaft 2 creates an induced current in a coil on or in the dartboard nearest to the dart 1, whereby the induced current can be used to automatically generate an electronic “score” signal that can be sent to an electronic scoring circuit processing in a known manner.

[0042] FIG. 3 is an exploded view of a dart according to one embodiment of the present invention that has a flat head and a two-piece hollow shaft. The dart depicted in FIG. 3 has a two-piece shaft 2 that comprises two sections 2' and 2" that can be coupled together by cooperating threaded portions 12 and 13 on the adjacent ends as depicted. The two-piece shaft 2 has a common lumen 3 therein. One end of the dart 1 depicted in FIG. 3 has a flat magnetic head 14 that can be coupled to the shaft 2 by cooperating threaded portions 15 and 16 that are provided on the shaft 2 and base of the flat magnetic head 14 as depicted. The opposite end of the shaft 2 is provided with a tail piece 8 that is configured to receive and support a set of fins 9. The tail piece 8 can be coupled to the shaft 2 by cooperating threaded portions 10 and 11 that are provided on the shaft 2 and the base of the tail piece 8 as depicted. The fins 9 and manner in which they are coupled to the tail piece 8 can be of any conventional design.

[0043] The dart in FIG. 3 is depicted as having a weight 4 in the lumen 3 of the two-piece shaft 2. The weight 4 has at least one through-bore 17 therein that extends between and penetrates through the longitudinal ends of the weight 4. The weight 4 and shaft 2 can have corresponding circular cross sectional shapes whereby the weight 4 can slide freely within the lumen 3 of shaft 2 so that when the dart 1 hits a dartboard, there is a secondary momentum created by the weight 4 to increase the impact of the dart 1 against the dartboard.

[0044] FIGS. 4a and 4b depict weights that may be placed in the lumen of hollow shaft darts according to one embodiment of the present invention. FIG. 4a is a perspective view of a cylindrical weight 4 that can be non-magnetic or magnetic (or magnetized) as desired. FIG. 4b is a side view of the weight 4 of FIG. 4a.

[0045] FIGS. 5a and 5b depict weights that may be placed in the lumen of hollow shaft darts according to another embodiment of the present invention. FIG. 5a is a perspective view of a cylindrical weight 4 that can be non-magnetic or magnetic (or magnetized) as desired. The weight 4 depicted in FIG. 5a includes a through-bore 17 that extends between and penetrates through the longitudinal ends of the weight 4 to prevent the sliding of the weight 4 within a lumen from being hindered by potential air locks within the lumen of the shaft of a dart as discussed above. As further discussed above, even though one through-bore 17 is shown,
more than one through-bore can be provided in the weight 4. FIG. 5b is a side view of the weight 4 of FIG. 5a.

[0046] FIGS. 6a and 6b depict weights that may be placed in the lumen of hollow shaft darts according to another embodiment of the present invention. FIG. 6a is a perspective view of a cylindrical weight 4 that can be non-magnetic or magnetic (or magnetized) as desired. The weight 4 depicted in FIG. 6a includes a pair of annular ridges 18 that extend outward from the cylindrical surface 19 of the weight 4. These annular ridges 18 configured to fit better in the lumen of a shaft and to prevent the weight 4 from wobbling inside the lumen. As discussed above, the annular ridges 18 can be integral parts of the weight 4 or separate elements such as O-rings that are made of plastic, rubber, metal, alloy, or other suitable materials that are placed on the outer surface 19 of the weight 4. Although two annular ridges 18 are depicted in FIG. 6a, more that two annular ridges 18 can be provided, if desired. FIG. 6b is a side view of the weight 4 of FIG. 6a.

[0047] FIGS. 7a and 7b depict weights that may be placed in the lumen of hollow shaft darts according to another embodiment of the present invention. FIG. 7a is a perspective view of a cylindrical weight 4 that can be non-magnetic or magnetic (or magnetized) as desired. The weight 4 depicted in FIG. 7a includes a groove 20 in the outer surface 21 of the weight 4 wherein the alignment of the groove 20 is substantially parallel to the longitudinal axis of the weight 4. The groove 20 prevents the sliding of the weight 4 within a lumen of a dart shaft from being hindered by potential air locks within the lumen of the dart shaft. Although only one groove 20 is depicted in FIG. 7a, more that one groove 20 can be provided, if desired. FIG. 7b is a side view of the weight of FIG. 7a.

[0048] It is noted that the features of the weights 4 shown in FIGS. 4a-7b can be combined in a variety of manners. For example, the annular ridges 18 of FIGS. 6a and 6b and be used in conjunction with the through-bore 17 of FIGS. 5a and 5b. Likewise, the annular ridges 18 of FIGS. 6a and 6b and be used in conjunction with the groove 20 of FIGS. 7a and 7b with the groove 20 extending through or beneath the annular ridges 18.

[0049] Although the present invention has been described with reference to particular means, materials and embodiments, from the foregoing description, one skilled in the art can easily ascertain the essential characteristics of the present invention and various changes and modifications can be made to the various uses and characteristics without departing from the spirit and scope of the present invention as described above and set forth in the attached claims.

What is claimed is:

1. A dart that comprises an internal movable magnetic weight, which magnetic weight is slidable within the dart along a longitudinal axis of the dart.

2. A dart according to claim 1, wherein the dart comprises a shaft having a front end and the magnetic weight is slidable movable into a position adjacent to the front end of the shaft.

3. A dart according to claim 2, wherein the dart further comprises a point that extends outward from the front end of the shaft.

4. A dart according to claim 2, wherein at least one of the shaft and the magnetic weight includes at least one through-bore that equalizes pressure on at least one side of the magnetic weight within the shaft.

5. A dart according to claim 2, wherein at least one of the shaft and the magnetic weight includes at least one surface groove that equalizes pressure on at least one side of the magnetic weight within the shaft.

6. A dart according to claim 2, wherein fixed magnets are provided at opposite ends of the shaft and the slidable magnetic weight is oriented so that magnetic poles of the slidable magnetic weight face like magnetic poles of the fixed magnets at the opposite ends of the shaft.

7. A dart according to claim 2, wherein at least one of an inner surface of the shaft and an outer surface of the magnetic weight is provided with alignment structures that align central axes of the shaft and magnetic weight with one another.

8. A dart according to claim 2, wherein the magnetic weight is removably and replaceably provided in the shaft.

9. A dart that comprises:

a shaft having opposite ends and a central hollow lumen;

a tail piece configured to receive and support aerodynamic fins;

a head that is configured to become attached to a dartboard; and

at least one weight that is movable within the lumen of the shaft,

wherein at least one of the shaft and the at least one weight are configured to equalize pressure on at least one side of the weight within the shaft.

10. A dart according to claim 9, wherein the at least one of the shaft and the weight includes at least one through-bore that equalizes pressure on at least one side of the weight within the shaft.

11. A dart according to claim 9, wherein at least one of the shaft and the at least one weight includes at least one surface groove that equalizes pressure on at least one side of the weight within the shaft.

12. A dart according to claim 9, wherein at least one of an inner surface of the shaft and an outer surface of the weight is provided with alignment structures that align central axes of the shaft and weight with one another.

13. A dart according to claim 9, wherein the magnetic weight is removably and replaceably provided in the shaft.

14. A dart according to claim 9, wherein the head of the dart is pointed.

15. A dart according to claim 9, wherein the head of the dart is magnetic.

16. A dart according to claim 9, wherein the at least one weight is magnetic.

17. A dart according to claim 16, wherein fixed magnets are provided at opposite ends of the shaft and at least one magnetic weight is oriented so that magnetic poles of the at least one magnetic weight face like magnetic poles of the fixed magnets at the opposite ends of the shaft.

18. A dart according to claim 9, wherein the magnetic weight comprises a liquid.

19. A dart according to claim 9, wherein the shaft comprises at least two portions that can be coupled together.