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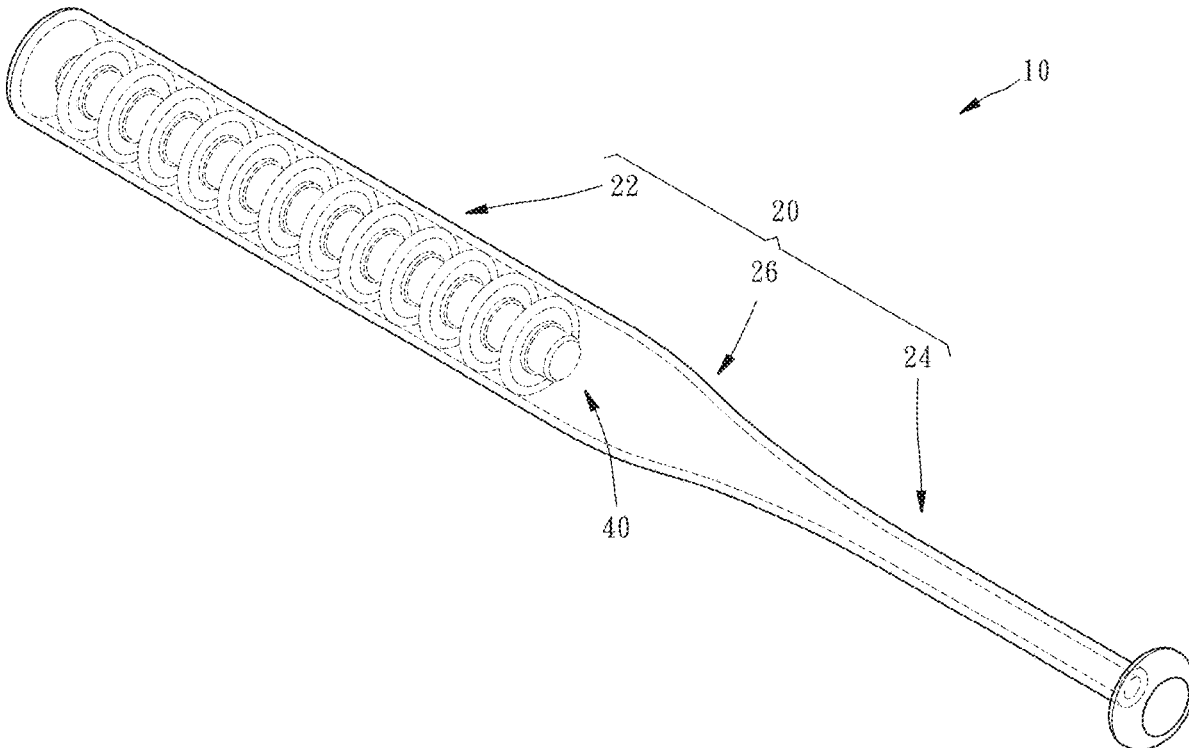
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ABSTRACT

A composite ball bat includes a bat body made of a multi-layer fiber composite material and including a hollow barrel, a handle and a tapered section joining the barrel to the handle, and a core material mounted in the hollow barrel of the bat body. The core material includes a rod member longitudinally set in parallel to the axial direction of the bat body, a plurality of rings attached onto the rod member and arranged along the axial direction of the rod member at equal intervals, and a plurality of elastic bands wrapped around the outer periphery of the rings within the inner peripheral surface of the hollow barrel in a one-to-one manner. In this way, the composite bat of the invention can use the core material to increase the structural strength, improve the hitting effect.



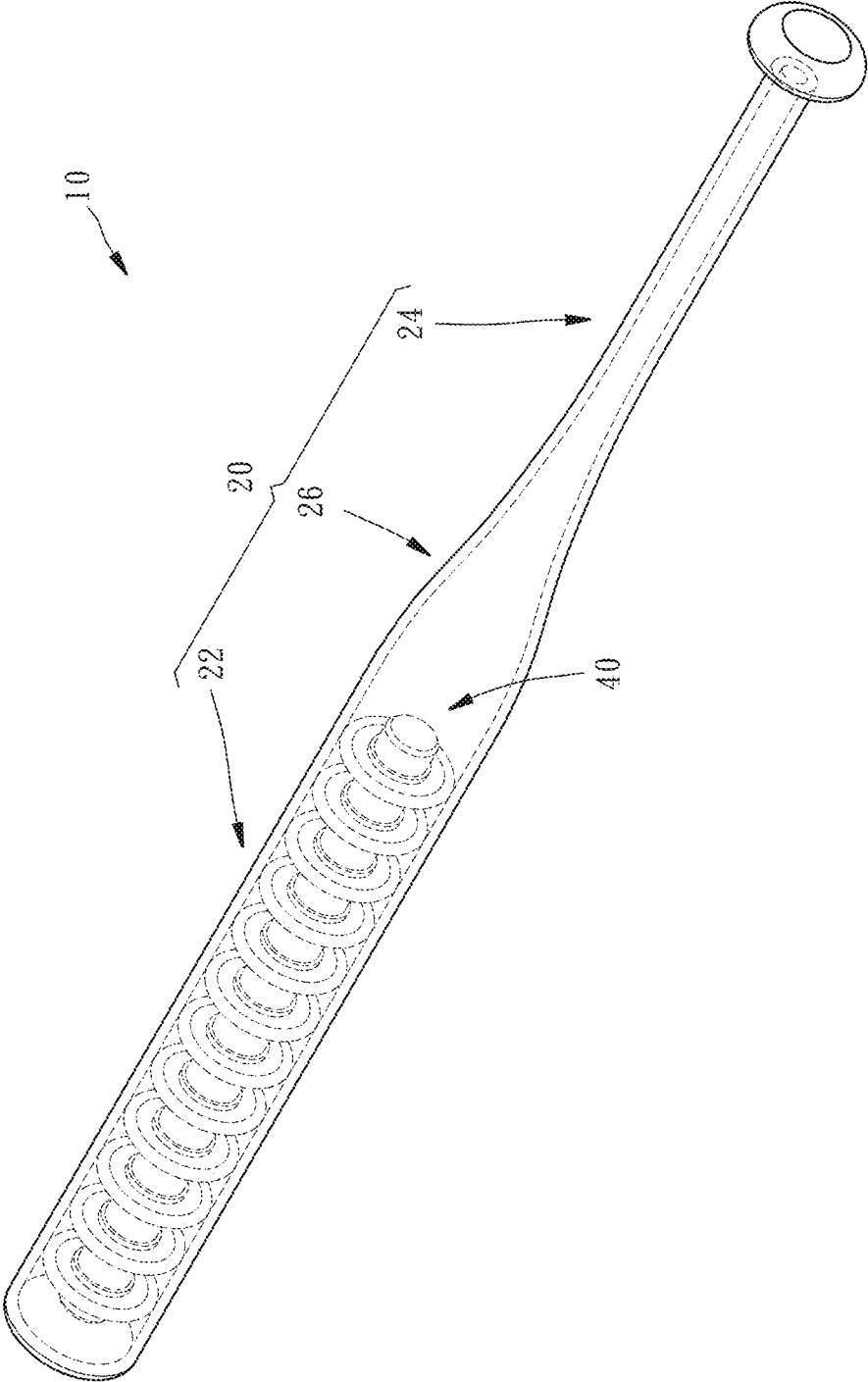


FIG. 1

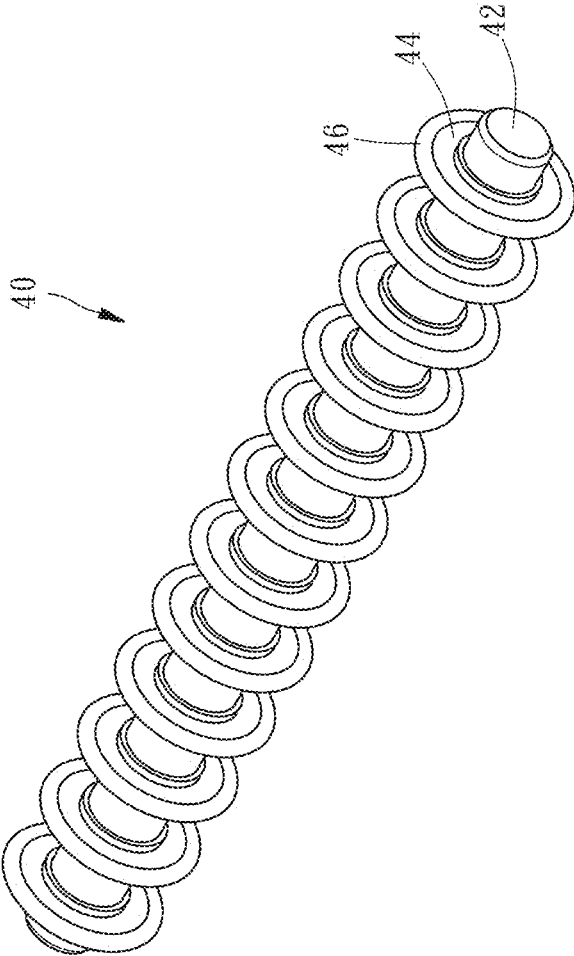


FIG. 2

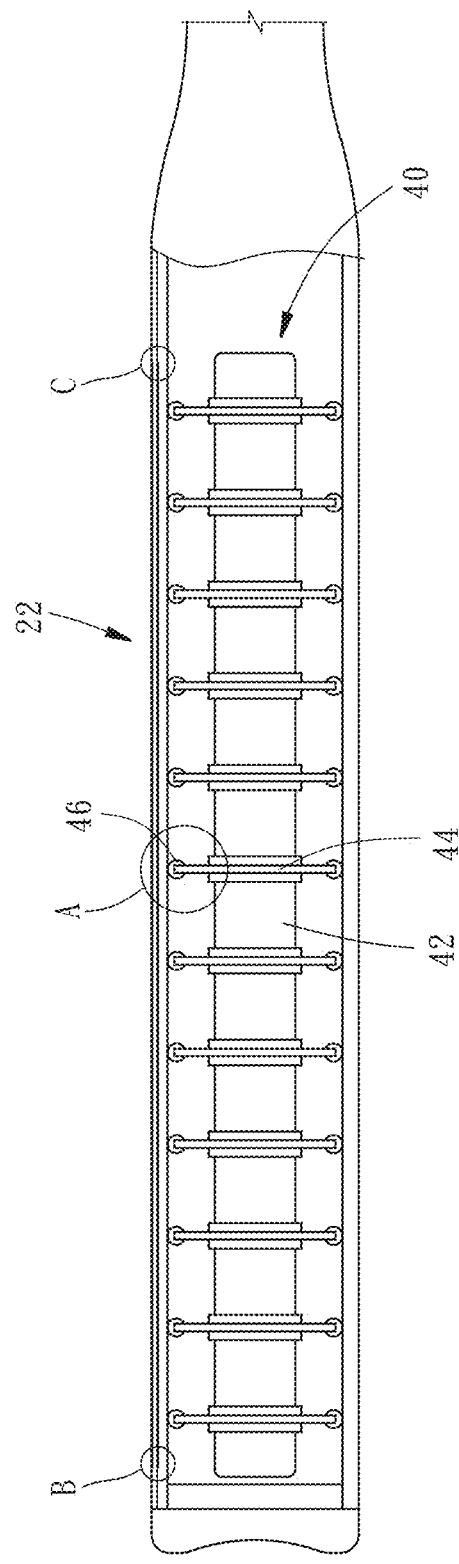


FIG. 3

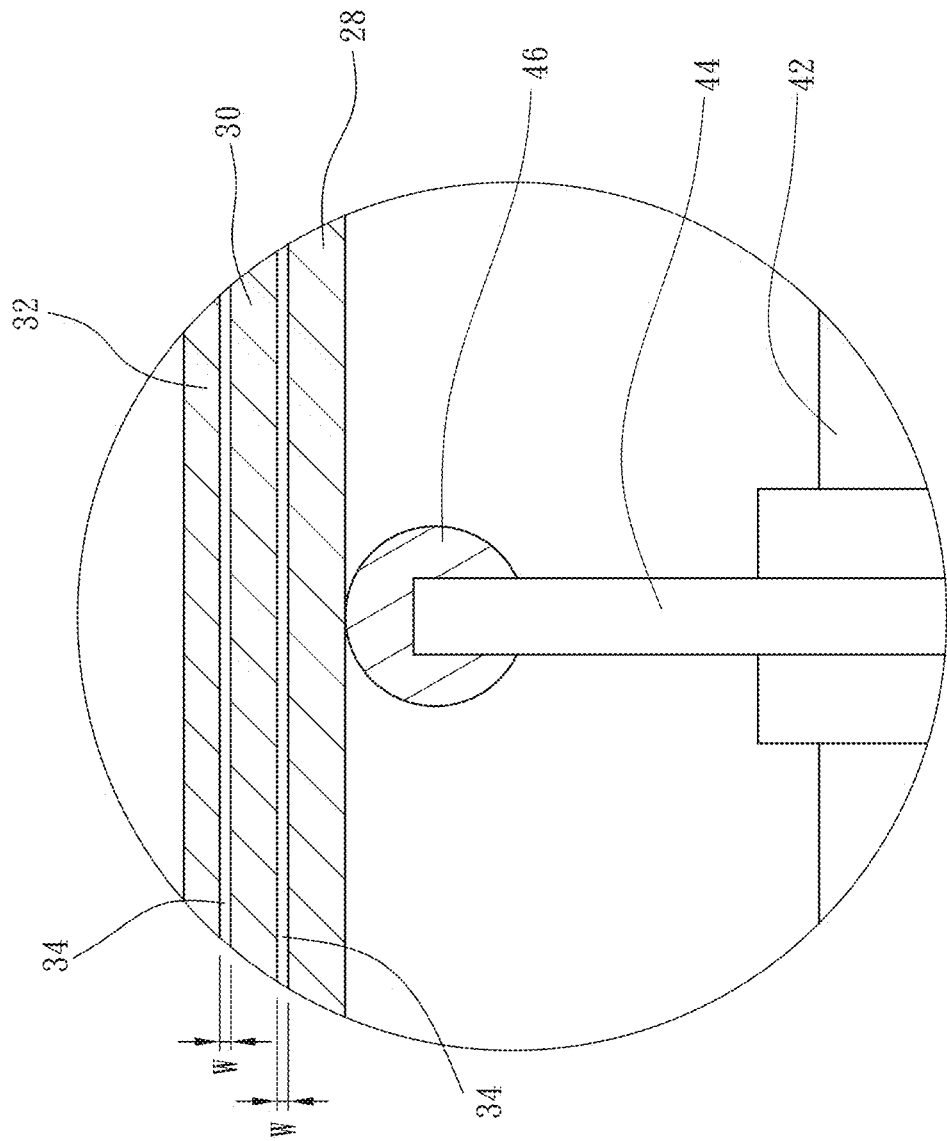


FIG. 4

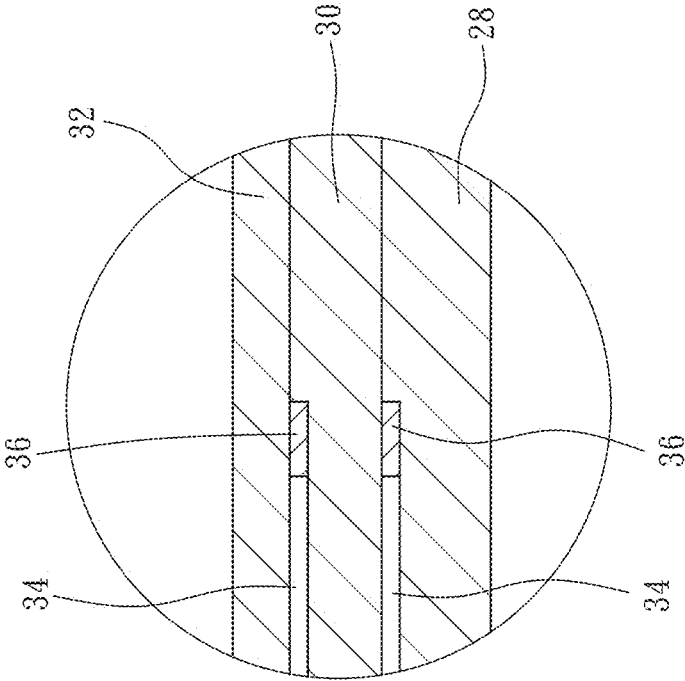


FIG. 5

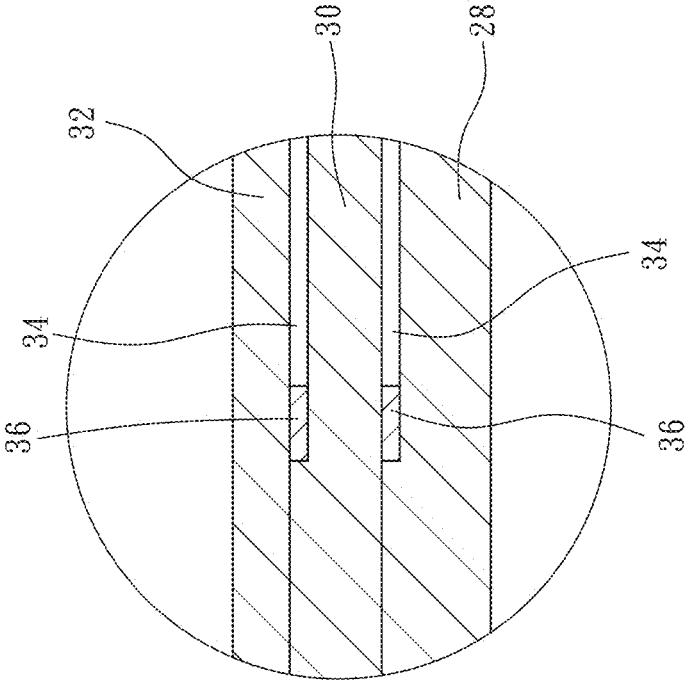


FIG. 6

COMPOSITE BALL BAT

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to ball bat technology, and more particularly to a composite ball with reduced weight and improved hitting effect.

2. Description of the Related Art

[0002] Generally speaking, ball bats are mainly divided into two types, wooden ball bats and aluminum ball bats. As for the wooden ball bat, due to the heavy weight of the wooden ball bat, the average hitter is more strenuous when swinging the ball bat, and the swing speed is slower, so the shot is often not strong enough. As for the aluminum ball bat, it is lighter than the wooden ball bat in weight and has a higher rebound coefficient relative to the wooden ball bat, so it can hit the ball farther with its own good elasticity. However, the disadvantage of aluminum ball bats is that the rigidity is weak. As a result, depressions are prone to occur at the impact. In order to solve the problems of the aforementioned conventional ball bats, ball bats made of composite materials have been developed in recent years, but the current composite ball bats are difficult to achieve a balance between weight reduction and improvement of the hitting effect, so composite ball bats are not widely used.

SUMMARY OF THE INVENTION

[0003] The present invention has been accomplished under the circumstances in view. It is the main object of the present invention to provide a composite ball bat, which can achieve a good balance between weight reduction and improvement of the hitting effect.

[0004] To achieve this and other objects of the present invention, a composite ball bat comprises a bat body and a core material. The bat body is made of a multilayer fiber composite material, comprising a hollow barrel, a handle and a tapered section joining the hollow barrel to the handle. The tapered section has an outer diameter reducing gradually from the barrel toward the handle. The core material is mounted in the hollow barrel of the bat body, comprising a rod member, a plurality of rings and a plurality of elastic bands. The axial direction of the rod member is parallel to the axial direction of the bat body. The rings are attached onto the rod member and spaced along the axial direction of the rod member. The elastic bands are wrapped around the outer periphery of the rings in a one-to-one manner.

[0005] As can be seen from the above, the composite ball bat of the present invention uses the bat body made of a multilayer fiber composite material to increase the rigidity and reduce weight, and uses the core material set in the hollow barrel to improve the hitting effect and enhance structural strength, and also uses the elastic bands to provide shock absorbing effects, thereby achieving the purpose of the present invention.

[0006] Preferably, the multilayer fiber composite material comprises an outer layer, an inner layer and at least one intermediate layer. The thickness of the inner layer is greater than the thickness of each intermediate layer, and the thickness of the intermediate layer is great than the thickness of the outer layer. In this way, because the outer layer is thin, it is easy to deform and has poor elasticity and the contact

time of the outer layer with the ball can be increased to improve the ball control performance, and, because the inner layer is thicker, it has better elasticity but is not conducive to ball control. This way of using multilayer gradients can have both advantages. In addition, the use of the multilayer fiber composite material in the amount of deformation can provide a better rebound force than a single layer.

[0007] Preferably, a buffer space is defined in the hollow barrel between each adjacent two layers of the multilayer fiber composite material. That is, there is a buffer space between the inner layer and the intermediate layer, and another buffer space between the intermediate layer and the outer layer. These two buffer spaces are used to buffer the shock force generated when hitting the ball.

[0008] Preferably, the opposing front and back ends of the hollow barrel embed a spacer between each adjacent two layers of the multilayer fiber composite material, so that a buffer space is partitioned by the two spacers embedded in the front and back ends of the hollow barrel within the adjacent two layers of the multilayer fiber composite material.

[0009] Preferably, each adjacent two layers of the multilayer fiber composite material beyond the hollow barrel are bonded together to ensure sufficient rigidity.

[0010] Preferably, the rings are arranged at equal intervals along the axial direction of the rod member, so that the elastic bands can be evenly distributed in the sweet spot of the hollow barrel.

[0011] The detailed structure, characteristics, assembly or use of the composite ball bat provided by the present invention will be described in the subsequent detailed description of the preferred embodiment. However, those with ordinary skill in the art should be able to understand that the detailed description and the specific preferred embodiment listed in the implementation of the present invention are only used to illustrate the present invention, not to limit the scope of patent applications for this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a perspective view of a composite ball bat in accordance with the present invention.

[0013] FIG. 2 is an elevational view of the core material provided by the present invention.

[0014] FIG. 3 is a sectional view of a part of the composite ball bat in accordance with the present invention.

[0015] FIG. 4 is an enlarged view of part A of FIG. 3.

[0016] FIG. 5 is an enlarged view of part B of FIG. 3.

[0017] FIG. 6 is an enlarged view of part C of FIG. 3.

DETAILED DESCRIPTION OF THE INVENTION

[0018] The applicant first states here that throughout the specification, including the preferred embodiment described below and the claims in the scope of patent application, the terms related to directionality are based on the directions in the drawings. Secondly, in the preferred embodiment and drawings to be described below, the same element numbers represent the same or similar elements or their structural features.

[0019] Referring to FIG. 1, a composite ball bat 10 in accordance with the present invention comprises a bat body 20 and a core material 40.

[0020] The bat body 20 comprises a hollow barrel 22, a handle 24 and a tapered section 26. The tapered section 26 joins the hollow barrel 22 to the handle 24. The outer diameter of the tapered section 26 reduces gradually from the hollow barrel 22 toward the handle 24.

[0021] As shown in FIG. 4, the bat body 20 is made of a multilayer fiber composite material. In terms of the number of layers, three or four layers can be used according to actual needs. In the present preferred embodiment, there are three layers, namely, the inner layer, the intermediate layer and the outer layer. The thickness of the inner layer 28 is greater than the thickness of the intermediate layer 30, and the thickness of the intermediate layer 30 is greater than the thickness of the outer layer 32. In this way, because the outer layer 32 is thin, it is easy to deform and has poor elasticity and the contact time of the outer layer 32 with the ball can be increased to improve the ball control performance, and, because the inner layer 28 is thicker, it has better elasticity but is not conducive to ball control. This way of using multilayer gradients can have both advantages. In addition, the use of the multilayer fiber composite material in the amount of deformation can provide a better rebound force than a single layer. But it is not limited to the above arrangement, the thickness of each of the multiple layers of the multilayer fiber composite materials can also be the same.

[0022] In addition, as shown in FIGS. 4-6, the front and back ends of the hollow barrel 22 embed a spacer 36 (the material used here is polyurethane but can also be silicone or rubber) between each adjacent two layers of the multilayer fiber composite material, so that a buffer space 34 is partitioned by the two spacers 36 embedded in the front and back ends of the hollow barrel 22 within the adjacent two layers of the multilayer fiber composite material. That is, there is a buffer space 34 between the inner layer 28 and the intermediate layer 30, and another buffer space 34 between the intermediate layer 30 and the outer layer 32. These two buffer spaces 34 have the same width W, and the both buffer spaces 34 are closed, so the air inside will create a cushioning effect like an air cushion. In this way, when the composite ball bat 10 hits the ball, not only the deformation of the multilayer fiber composite material is used to absorb the impact force of the ball, but also the two buffer spaces 34 can be used to increase the shock absorption effect. As for the positions other than the hollow barrel 22 (that is, the positions of the tapered section 26 and the handle 24), the adjacent two layers of the multilayer fiber composite material are bonded together, that is, the inner layer 28 and the intermediate layer 30 are bonded to each other, and the intermediate layer 30 and the outer layer 32 are bonded to each other to ensure that the bat body 20 has sufficient rigidity. In addition, it is worth mentioning here that the aforementioned fiber composite material may be carbon fiber, glass fiber, or other polyester fiber, and in this embodiment, carbon fiber is used as an illustration.

[0023] The core material 40 is mounted in the hollow barrel 22 of the bat body 20. As shown in FIGS. 2 and 3, the core material 40 can be made of fiber composite material or plastic or foam material. The core material 40 comprises a rod member 42 and a plurality of rings 44. The rod member 42 and the rings 44 are made of the aforementioned materials. The rod member 42 is parallel to the axial direction of the bat body 20. The rings 44 are attached onto the rod member 42 and spaced along the axial direction of the rod

member 42. The distance between each adjacent two rings 44 can be adjusted according to actual needs. In addition, the core material 40 further comprises a plurality of elastic bands 46 made of silicone rubber or rubber. The elastic bands 46 are wrapped around the outer periphery of the rings 44 in a one-to-one manner, and the outer peripheral surface of the elastic bands 46 can abut on the inner peripheral surface of the hollow barrel 22 of the bat body 20. As shown in the drawings, this structure enables the core material 40 to provide a direct support effect on the inner fiber composite material. Alternatively, a gap can be maintained between the core material 40 and the hollow barrel 22, the gap may be 1-4 mm, or preferably 1.5-3 mm, this structure can make the hollow barrel have a larger deformation space.

[0024] As can be seen from the above, the composite ball bat 10 of the present invention is provided with the core material 40 on the sweet spot of hollow barrel 22 on the one hand to improve the hitting effect and to enhance the structural strength, and on the other hand, the deformation of the multilayer composite material and the buffer space 34 between each adjacent two layers of the multilayer fiber composite material and the material properties of the elastic bands 46 are used to absorb the shock generated when hitting the ball. In this way, you can achieve a good balance between weight reduction and improvement of the hitting effect, thereby achieving the purpose of the present invention.

What is claimed is:

1. A composite ball bat, comprising:

a bat body made of a multilayer fiber composite material, said bat body comprising a hollow barrel, a handle and a tapered section joining said hollow barrel to said handle, the outer diameter of said tapered section reducing gradually from said hollow barrel toward said handle; and

a core material mounted in said hollow barrel of said bat body, said core material comprising a rod member, a plurality of rings and a plurality of elastic bands, the axial direction of said rod member being parallel to the axial direction of said bat body, said rings being attached onto said rod member and spaced along the axial direction of said rod member, said elastic bands being wrapped around the outer periphery of said rings in a one-to-one manner.

2. The composite ball bat as claimed in claim 1, wherein said multilayer fiber composite material comprises an outer layer, an inner layer and at least one intermediate layer, the thickness of said inner layer being greater than the thickness of each said intermediate layer, the thickness of each said intermediate layer being greater than the thickness of said outer layer.

3. The composite ball bat as claimed in claim 1, further comprising a buffer space defined in said hollow barrel between each adjacent two layers of said multilayer fiber composite material.

4. The composite ball bat as claimed in claim 2, further comprising a buffer space defined in said hollow barrel between each adjacent two layers of said multilayer fiber composite material.

5. The composite ball bat as claimed in claim 3, wherein said buffer spaces have the same width.

6. The composite ball bat as claimed in claim 3, wherein opposing front and back ends of said hollow barrel embed a spacer between each adjacent two layers of said multilayer

fiber composite material, so that a buffer space is partitioned by the two said spacers embedded in said front and back ends of said hollow barrel within the adjacent two layers of said multilayer fiber composite material.

7. The composite ball bat as claimed in claim 3, wherein each adjacent two layers of said multilayer fiber composite material beyond said hollow barrel are bonded together.

8. The composite ball bat as claimed in claim 4, wherein said buffer spaces have the same width.

9. The composite ball bat as claimed in claim 4, wherein opposing front and back ends of said hollow barrel embed a spacer between each adjacent two layers of said multilayer fiber composite material, so that a buffer space is partitioned by the two said spacers embedded in said front and back ends of said hollow barrel within the adjacent two layers of said multilayer fiber composite material.

10. The composite ball bat as claimed in claim 4, wherein each adjacent two layers of said multilayer fiber composite material beyond said hollow barrel are bonded together.

11. The composite ball bat as claimed in claim 1, wherein said rings are arranged along the axial direction of said rod member at equal intervals.

12. The composite ball bat as claimed in claim 1, wherein the multiple layers of said multilayer fiber composite material have the same thickness.

13. The composite ball bat as claimed in claim 1, wherein said core material is made of a fiber composite material.

14. The composite ball bat as claimed in claim 1, wherein said core material is made of a plastic material.

15. The composite ball bat as claimed in claim 1, wherein the outer peripheral surface of said elastic bands are abutted on the inner peripheral surface of said hollow barrel of said bat body.

16. The composite ball bat as claimed in claim 1, wherein the outer peripheral surface of said elastic bands is spaced from the inner peripheral surface of said hollow barrel of said bat body by a gap about 1-5 mm.

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