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(54) **BAT HAVING A VIBRATION ISOLATION HANDLE**

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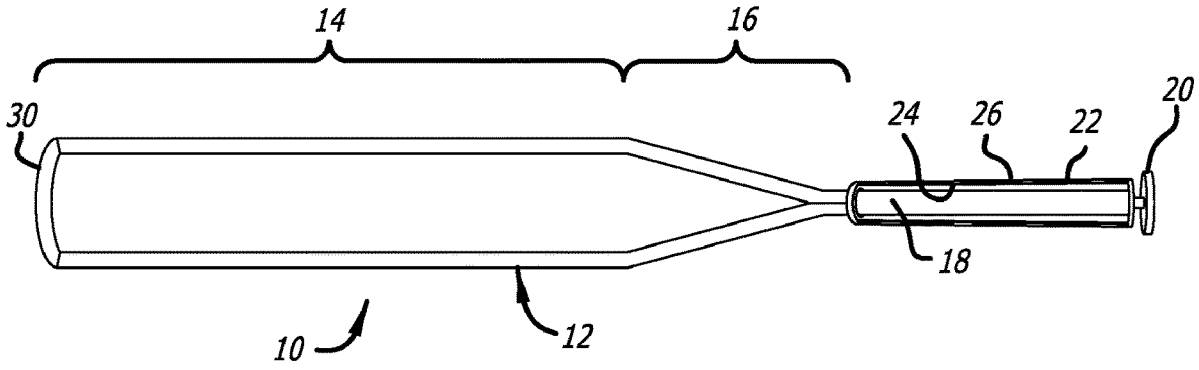
(57) **ABSTRACT**

A bat having a handle inner shaft and a grip sleeve surrounding and radially spaced from the handle inner shaft.



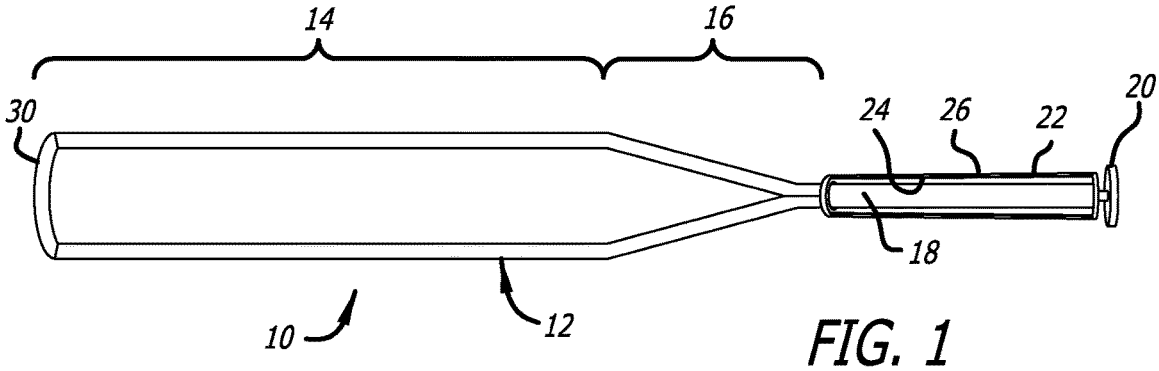


FIG. 1

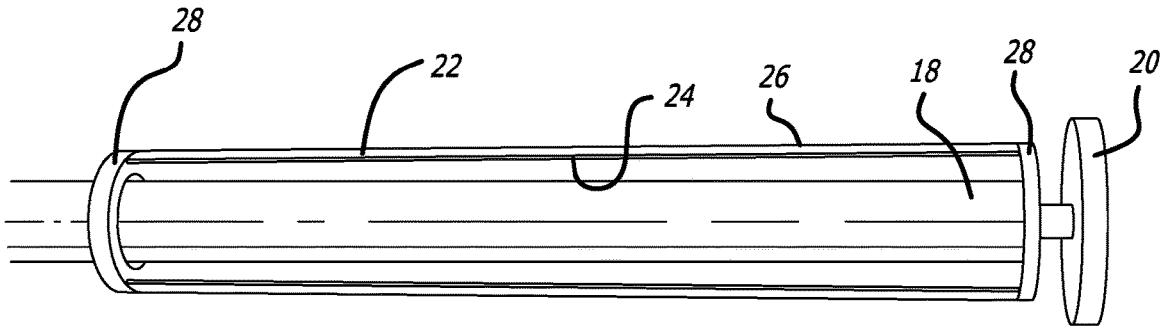


FIG. 2

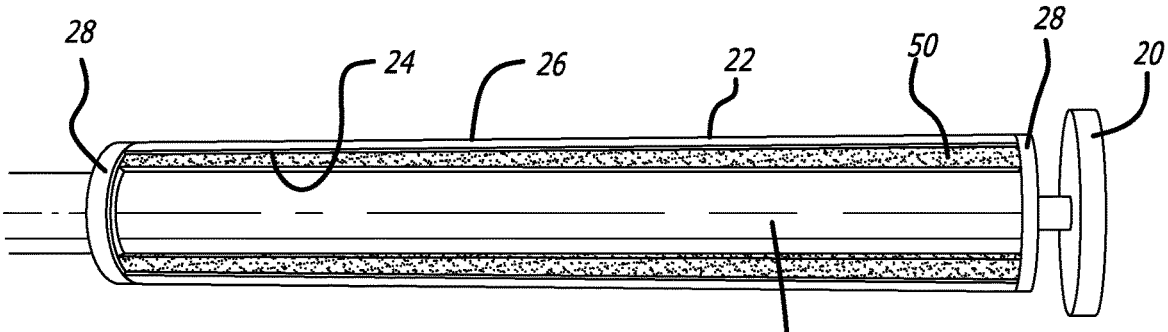


FIG. 3

BAT HAVING A VIBRATION ISOLATION HANDLE

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention is generally related to the field of baseball and softball and more specifically to a baseball or softball bat.

2. Description of the Related Art

[0002] High performance non-wood baseball and softball bats, hereinafter referred to simply as "baseball bats" or "bats", are primarily made from metal alloys, composite materials, or some combination thereof. These bats are tubular (hollow inside) so as to optimize their weight and they consist of three sections: a relatively narrow handle portion for gripping, a relatively wider distal portion for hitting, and a tapered mid-section connecting the handle and hitting portions. Originally metal alloy bats were fabricated as a single piece in that they solely consisted of a frame with nothing occupying the space within the frame. It was found that these bats outperformed traditional wooden bats because of a "rebound" effect present in metal alloy and composite bats. As the ball impacted the bat, the bat wall would absorb the energy from the impact by elastically deforming the wall at the point of impact. As the ball began to leave the bat the energy absorbed by the elastic deformation would be released by the wall returning to its original structure, in effect giving the ball an extra "push", thus the rebound effect.

[0003] When a ball forcibly impacts a bat, the bat will vibrate. A downside of the metal alloy and composite bats is the efficiency with which the vibration is transferred from the barrel of the bat to the handle gripped by the batter. Since the handle has a smaller diameter as compared to the barrel, the vibration may be amplified in the handle, causing a stinging sensation for the batter. Energy absorbed as vibrations also adversely affects bat performance. Vibration energy directly subtracts from flexing energy in that the more energy absorbed by vibration the less energy is available to be absorbed for flexing. Vibrations also adversely impact the rebound effect of multi-wall composite and aluminum bats by actively working against the wall flexing. Various patents have discussed this features and proposed solutions to dampen the vibration, as for example U.S. Pat. No. 6,863,628 to Brandt, incorporated by reference herein.

[0004] The present invention describes a handle assembly that isolates the vibration transferred from the barrel to the handle portion of the bat from a grip held by the batter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. **1** is a cross sectional view of a bat having the handle design of the present application.

[0006] FIG. **2** is an enlarged cross sectional view of the handle section of the bat handle of the present application.

[0007] FIG. **3** is an enlarged cross sectional view of the handle section of a second embodiment of the bat handle of the present application.

DETAILED DESCRIPTION OF THE INVENTION

[0008] While preferred embodiments of the present invention are depicted and described herein, it will be obvious to those skilled in the art that such embodiments are provided by way of example only. Numerous variations, changes, and substitutions will now occur to those skilled in the art without departing from the invention. It should be understood that various alternatives to the embodiments of the invention described herein may be employed in practicing the invention.

[0009] Referring to the cross sectional view of FIG. **1**, a bat **10** has a tubular frame **12** with a relatively large-diameter hitting barrel portion **14**, an intermediate tapering portion **16**, and a handle including a relatively small-diameter handle inner shaft **18** extending from and integrally formed with the tapering portion **16**, and a knob **20** affixed to the proximal end of the handle inner shaft **18** at the proximal end of the bat **10**. The bat **10** further includes a grip sleeve **22** surrounding and radially spaced from the handle inner shaft **18**, wherein the grip sleeve is isolated from the vibrations of the inner shaft **18**. The barrel portion **14** is closed by an end cap **30** affixed at the distal end of the bat **10**. The barrel portion **14** tapering portion **16** and handle inner shaft **18** may be configured as a one or two piece assembly, and the barrel portion **14** may include one or more walls and inserts as known in the art.

[0010] The small diameter handle inner shaft **18** is generally less than 0.65 inches in diameter and is preferably in the range of 0.40 inches to 0.65 inches in diameter. The outer diameter **26** of the grip sleeve **22** may range from about 0.7 inches up to about 1.2 inches depending on whether the bat is for youth sports, junior or adult sports. Bats for men may have a slightly larger diameter than bats made for woman. These factors inform the dimensions of the space or gap between the inner surface **24** of the grip sleeve **22** and the inner shaft **18**. Preferably, the width of the space or gap is in the range of at least **0.05** and up to about 0.3 inches. The grip sleeve **22** may be spaced from the handle inner shaft **18** by a pair of rings **28** inside the proximal and distal ends of the grip sleeve **22**. The rings **28** are preferably formed from a soft plastic or nylon material or a semi rigid elastomeric material that does not transmit vibration energy from the handle inner shaft **18** to the grip sleeve **22**. The ring **28** at the proximal end of the bat **10** preferably isolates the grip sleeve **22** from the knob **20**. The rings **28** and grip sleeve **22** isolate the players hands from the vibration energy transferred from the barrel portion **14** to the inner shaft **18**.

[0011] In a second embodiment depicted in the cross-sectional view of FIG. **2**, the bat **10** further includes a foam sleeve **50** positioned between the inner shaft **18** and the grip sleeve **22**. The foam may be a high or medium high density polymer foam that preferably extends the length of the grip sleeve **22** between the rings **28**. The foam sleeve **50** maintains the spacing as between the grip sleeve **22** and the inner shaft **18** without transferring vibrational energy, isolating the vibration from the player. While the a foam material is preferred, other low density polymers and elastomeric materials may fill the space between inner shaft **18** and the grip sleeve **22** provided that the material does not transfer the vibrational energy therebetween.

[0012] The embodiments disclosed herein are understood to be illustrative and not limiting in any sense. It is intended that the scope of the present invention is not limited by the

above described embodiments but by the claims and it covers all modifications equivalent to the claims.

1. A bat, comprising;

a barrel section, a tapering portion and a handle including a relatively small-diameter handle inner shaft extending from and integrally formed with said tapering portion, a knob affixed to a proximal end of the handle inner shaft, and

a grip sleeve surrounding and radially spaced from said handle inner shaft by a pair of rings oppositely disposed between said handle inner shaft and said grip sleeve.

2. The bat of claim **1**, wherein said handle inner shaft has a diameter less than 0.65 inches and the grip sleeve as an inner diameter at least 0.05 inches greater than the outer diameter of the handle inner shaft.

3. The bat of claim **1**, wherein said handle inner shaft has a diameter that is between 0.05 and 0.3 inches less than inner diameter of said grip sleeve.

4. The bat of claim **1**, further comprising a cylindrical foam insert positioned between said handle inner shaft and said grip sleeve.

5. The bat of claim **1**, wherein said pair of rings are formed from a soft plastic or nylon material or a semi rigid elastomeric material.

6. The bat of claim **3** wherein said cylindrical foam insert is formed from a high or medium high density polymer foam material.

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