A bat for use in baseball or softball comprises a knob, a gripping area, a transition area and a hitting area, the gripping area having a cross-section shape selected from the group consisting of an ellipse and an oval.
BASEBALL/SOFTBALL BAT GRIP

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

This invention concerns baseball bats having reduced tendency toward breakage, greater ergonomic design for players’ hands, and more particularly relates to a baseball bat having a uniquely designed grip area.

[0002] 2. Background of the Art

Baseball bats and Softball bats, particularly those constructed of wood, are well known in the art. The most well known of wooden bats is the traditional ash bat which exhibits a fairly straight wooden grain surface and is found to be consistently in the range of 60 percent specific gravity. Such bats are very well known in the art. However their drawback is that they are very prone to chipping, denting or outright breaking during game play, and they transmit shockwaves to the hands of players in an inconsistent manner. Baseball players, particularly professionals, have adopted the practice of taping the barrel of ash bats in batting practice to prolong their usefulness by reducing surface deterioration.

[0005] As a result of this weakness in the bats, the typical professional hitter will go through an average of 73 ash bats during a typical major league baseball season of 162 games. Furthermore, the lower grades of wood, such as ash, which are utilized in such bats are generally not as resilient as in higher grades of wood, resulting in a ball not traveling as far once it has been hit with a specified degree of force and speed. A number of attempts have been made over the years to improve bat manufacturing techniques and make some design changes in the bats for various improvements.

[0006] As early as 1903 (U.S. Pat. No. 730,244) bats were having their surfaces treated to improve their durability, aerodynamics and action on the ball. Except for a rare exception or two, all bat designs have had a common structure, an elongate structure with a varying circular cross-section extending from a grip-securing knob, and grip section, a central hitting section and the end section of the bat. Even where bats are manufactured by lamination or fitted pieces, the cross-section tends to remain essentially circular in almost all cases, as shown by U.S. Pat. Nos. 310,248; 1,450,646; 1,706,680; 1,936,579; 2,039,221; 2,069,723; 3,129,003; and the like. U.S. Pat. No. 2,793,859 shows a laminated material that is compressed into a circular cross-section bat structure.

[0007] In some cases, special overlays are placed on the bat to assist the gripping action, as in U.S. Pat. No. 6,277,040. Other alterations in bat structure include the use of filament-reinforced covers over the grip area (as in U.S. Pat. No. 6,238,309), composition fill reinforcement (as in U.S. Pat. No. 6,471,608), and reinforced handles (as in U.S. Pat. No. 3,129,003).

[0008] U.S. Pat. No. 4,331,330 attempt to solve the problem of bat breakage by altering the cross-section of the bat in the hitting area. Various cross-sectional shapes are shown for the bat in the hitting area, the intent being to offer a greater “sweet spot” on the front of the bat. The design provides a defined curvilinear cross-section in the hitting area that has a relationship to the cross-section in the intermediate portion of the bat, while the gripping portion of the bat is never described.

[0009] U.S. Pat. No. 3,433,481, issued to Tanguay et al., is directed to reinforced baseball bat wrappings and indicates, at column 1, lines 35-45, that wrappings have been attempted in the art for such things as maple and mahogany bat designs.

[0010] Die cast aluminum and magnesium alloy bats are also known in the art, however such metal bats are not authorized for professional league play. Accordingly there is still a need in the art for a durable wooden bat construction with performance characteristics superior to that of ash such as durability and longevity.

[0011] Baseball bats approved for use in the professional major leagues are turned from a solid piece of wood and include a handle portion terminating at a first or lower end in an integral knob. An outwardly tapered intermediate portion extends from the handle portion and merges upwardly with a ball hitting barrel portion, said barrel portion terminating at a second or upper end.

[0012] The most widely used wooden bats are fabricated of a hardwood such as ash derived from ash trees having the scientific classification: family: Oleaceae; genus: Fraxinus. Ash wood is hard, strong and stiff, and possesses a relatively straight grain. Hardwoods in general have a cellular structure which includes vessels of a continuous elongated nature. When said vessels are cut transversely across the grain direction, the exposed open end is caused to have open pores. Because such pores extend the length of a piece of the wood in the direction of the grain, said hard woods are considered to be porous woods.

[0013] Such hardwood bats, however, are very prone to chipping, denting or outright breaking during game play. Lower grades of ash may not be as resilient as higher grades, resulting in a ball not traveling as far once it has been hit with a specified degree of force and speed.

[0014] The failure mode by which baseball bats break is not fully understood. However, it is clear that the point of impact with the ball, typically on the barrel of the bat, is not the likely location of the break. The most common location at which a baseball bat will break is in or near the handle portion, in a location where the bat is relatively small in diameter.

[0015] Upon impact with a ball, a baseball bat will vibrate. It is thought that, under typical strenuous conditions, the bat will momentarily assume a shape that is very slightly sinusoidal. Typically, there will be two nodes along the length of the bat, between which the bat will be deformed for a short period to a greater or lesser degree. Many factors may determine the amplitude and frequency of the vibration, including the structure of the bat, the grip strength and location by the player, the point of impact of the ball and the speed and direction of the ball and bat.

[0016] If the impact of the ball is sufficiently forceful, and various of the above factors combine unfavorably, the bat will break. Due to a combination of the forces involved and the strength characteristics of most bats, the location of the break is almost invariably at a location between the nodes, in the handle or in the area of transition between the handle and the barrel.
The red oak tree, family: Fagaceae; genus: Quercus; species: rubra, provides a porous hardwood. It is more abundant than ash, and has physical properties more desirable than ash for use in baseball bats. In particular, red oak is harder and more resilient than ash. However, prior efforts to fabricate approved baseball bats of red oak have been unsuccessful because of difficulties in drying thick billets without warping and/or cracking.

It is well known that wood can be impregnated with various agents in fluid form to achieve property modifications. Such impregnation treatments can be successfully applied to baseball bats. It is further known that various coatings and wrappings have been applied to the handle portion of baseball bats in an effort to minimize breakage or mitigate the effects thereof. Such expedients have either been unsuccessful, disapproved for Major Leage use, or have adversely affected desirable characteristics of the bat.

A ball bat has a cylindrically-shaped barrel that tapers to a narrower handle section, to which is attached an enlarged disk-shaped knob, which acts as a resting point for the heel of the bat holder’s lower hand as it grips the handle. Forces created when a swung bat hits a ball can cause severe discomfort to the bat holder’s palm, heel of the hand and fingertips. This “bat sting” is felt at the knob end of the bat, which generally is made of wood or aluminum. Bat holders have tried wrapping tape around the knob end (sometimes attempting to form a tapered configuration) to increase its “give” and thereby reduce discomfort. However, taping a bat, which requires patience and dexterity, is time-consuming and expensive. In addition, it must be redone on a regular basis. Further, taping a bat does not create a dependable, tapered grip for superior performance.

Numerous after-market devices have been developed to diminish “bat sting” and/or improve grip comfort. For example, U.S. Pat. No. 5,624,114 discloses a shock-dampening sleeve which covers all or part of the knob. However, the product cushions only the heel of the hand and does not produce a tapered grip. An unpatented product by Easton® Company is comprised of a thin tube of flexible material (which may tear when pulled over the knob) which must be wrapped with lengths of synthetic grip material.

In addition, bat manufacturers themselves have fabricated bats with special handles to provide more comfortable gripping. Worth® Company makes a bat with a smaller-than-average knob for players who use the lower portion of the knob for a gripping reference or the “double-fisted” grip. Mizuno® Company used to make a bat with an enlarged knob having a tapered region from the knob to the handle. However, a ball player must purchase the whole bat to obtain the desired gripping reference.

SUMMARY OF THE INVENTION

Baseball or softball bats are constructed with a gripping area or lower portion above the bat knob that is elliptical or semi-elliptical in cross-section, with the long axis of the ellipse intended to be approximately horizontal when the bat is swung with a level swing. The ellipse (used generic to a semi-ellipse) provides a consistent and better controlled hitting position by the batter’s hands and the ball, provide a better and more comfortable plane of force transmittal to the hand of the hitter, and can be used to assure that the same face of the bat (with grain in the bat controlled with respect to impact) contacts the ball.

BRIEF DESCRIPTION OF THE FIGURE

FIG. 1 shows an overlay of a conventional bat grip construction and a bat grip construction according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

A baseball bat or softball bat according to the present invention may be composed of any of the materials that can be normally used for construction of this well known class of product. These materials usually comprise a solid piece of wood, segments of wood secured together, laminated wood, core materials with wood overlay, natural as well as artificial wood (e.g., composite, fiber filled polymeric materials, fiberglass, etc.), and metal, such as aluminum and alloys. Certain benefits relating to positioning of grain structure will of course accrue to only those structures having grain such as natural wood and artificial wood products. The shape of the bat beyond the grip area is not material to the practice of the invention and may be designed according to all known designs, including, for example, all of those described above in the Background of the Art, which descriptions and patents are herein incorporated by reference for their descriptions of materials, designs and methods of manufacture.

A bat for use in baseball or softball according to the invention may comprise a knob, a gripping area, a transition area, and a hitting area, the gripping area having a cross-section shape selected from the group consisting of an ellipse and an oval. The knob will usually comprise between 1 and 5% of the length of the bat, the gripping area will comprise from 5-30% of the length of the bat, the transition area will comprise from 10 to 25% of the length of the bat, and the hitting area (including the distal end of the bat) will comprise from about 45-80% of the length of the bat. The bat preferably comprises wood, and the use of wood as sourced from either a single block of wood or wood materials joined together into a bat structure. The bat when made of wood preferably has the grain in the wood aligned with a longest dimension of the ellipse or oval. An axis along that longest dimension should be aligned within ±30° of the grain alignment, preferably within ±25° of the grain alignment, within ±20° of the grain alignment, within ±15° of the grain alignment, and most preferably within ±10° of the grain alignment.

A general description of the invention is a bat for use in baseball or softball. The bat may comprise a knob, a gripping area, a transition area, and a hitting area. The gripping area has a cross-section shape selected from the group consisting of an ellipse and an oval. It is preferred that the cross-section comprises an ellipse wherein the distance between focal points is at least 5% of a largest dimension of the cross-section, and preferably between 5-60% of the largest dimension of the cross-section of the ellipse in the plane of the cross-section. Where the cross-section comprises an oval, it is preferred that the ratio of the distance between a largest dimension of the cross-section and a shortest dimension of the cross-section is at least 1.05, preferably between 1.05 and 1.60, or between 1.10 and 1.50.
The bat may comprise wood, consist of wood, or consist essentially of wood. The bat may consist of a single block of wood. The grain in the wood is preferably aligned with a longest dimension of the ellipse or oval (e.g., on average, the longest dimension is within ±200 of the longest dimension of the ellipse or oval). . .

[0028] An ellipse or semi-ellipse (which for purposes of simplifying this description will be included within the term ellipse, and includes a shape wherein one half or a portion of the cross-section is approximately a semicircle and the other half or portion is approximately half an ellipse). The shape of oval will be treated separately, although this may be equally part of the invention where that common description is used) can be described by the relations of its focal points. An ellipse is mathematically defined as the locus of all points having a common total distance from two points. A circle is a unique situation of an ellipse wherein the two points [the focal points] are coincident, but in the practice of this invention, circles are excluded from the practice of this invention and excluded from the definition of ellipse. An ellipse having a separation between focal points that is at least 5% of the largest dimension in the cross-section of the portion of the bat where the ellipse is present is preferred, although differences in these relative dimensions up to 60% are useful. Preferred ranges are between about 8-45% differences between the focal points as compared to the largest dimension of the cross-section (which is usually measured along a line drawn through both focal points). The closer the focal points, the less the deviation of the profile of the ellipse from that of a circle, and the greater the distance between the focal points, the greater the deviation from a circle is the profile of the ellipse.

[0029] FIG. 1 shows the cross-section 2 of two superimposed cross-sections 4 and 6 of a bat grip area of a baseball bat or softball bat (neither shown). The circular cross-section 6 is typical of the cross-section of a bat. As that cross-section 6 is of uniform diameter, a batter grasping the bat has the same feel whatever the orientation of the grain of the wood 8 with respect to the grip. The cross-section 4 shows an elliptical cross-section of the grip area of a bat handle. The longest dimension of the cross-section lies along axis A-A, and the shortest dimension of the ellipse lies along axis B-B. A batter's hand would have his/her palm or upper portion of the palm lying against either of surface points 14 when gripping the bat. The bat may be symmetrical in the grip area, so that opposite ends along the axes A-A and B-B are essentially the same to the hitter. By having a non-circular curvature on this point where gripping against the palm is effected, gripping the bat will provide the batter with the same feel when hands are properly positioned, and will place the grain in the same orientation to the ground and approximately to the ball when the player has the same feel on the grip. The ball will tend to hit surface either of surfaces 10 or 12 when the bat is gripped as described above, or at least travel to impact the bat along a line parallel to axis A-A. By avoiding impact along a line perpendicular to axis A-A or closer to axis B-B, incidents of chipping or shearing of the bat along the grain 8 are reduced.

[0030] This structure of the bat grip area (that is the area of the bat adjacent the knob on the gripping end of the bat, and usually comprising from 5 to 30%, more usually from 10-20% of the length of the bat adjacent the knob) can provide ergonomic benefits to the player by providing a hitting surface that is more consistent, reducing variations in impact vibration to the hitter, reduce chipping wear on the bat, and provide other benefits in the use of the bat.

[0031] As noted above, variations among other portions and sections and compositions of the bats are within the province of choice to those skilled in the art. All of the materials described herein for use with bats of the prior art are useful in the practice of the present invention. Aluminum bats do not benefit from grain orientation, but the ergonomic benefits are still available in that construction.

What is claimed:
1. A bat for use in baseball or softball comprising a knob, a gripping area, a transition area, and a hitting area, the gripping area having a cross-section shape selected from the group consisting of an ellipse and an oval.
2. The bat of claim 1 wherein the cross-section comprises an ellipse wherein the distance between focal points is at least 5% of a largest dimension of the cross-section.
3. The bat of claim 1 wherein the cross-section comprises an ellipse wherein the distance between focal points is at least 5% of the largest dimension of the cross-section and less than 60% of the largest dimension of the cross-section.
4. The bat of claim 1 wherein the cross-section comprises an oval wherein the ratio of the largest dimension of the cross-section and a shortest dimension of the cross-section is at least 1.05.
5. The bat of claim 1 wherein the bat comprises wood.
6. The bat of claim 2 wherein the bat consists of wood.
7. The bat of claim 3 wherein the bat comprises wood.
8. The bat of claim 2 wherein the bat consists essentially of wood.
9. The bat of claim 2 wherein the bat consists of a single block of wood.
10. The bat of claim 5 wherein grain in the wood is aligned with a longest dimension of the ellipse or oval.
11. The bat of claim 6 wherein grain in the wood is aligned with a longest dimension of the ellipse.
12. The bat of claim 5 wherein a longest dimension of the oval or ellipse is oriented within ±25° of the grain alignment.
13. The bat of claim 6 wherein a longest dimension of the oval or ellipse is oriented within ±25° of the grain alignment.
14. The bat of claim 5 wherein a longest dimension of the oval or ellipse is oriented within ±150° of the grain alignment.
15. The bat of claim 6 wherein a longest dimension of the oval or ellipse is oriented within ±150° of the grain alignment.
16. The bat of claim 7 wherein a longest dimension of the oval or ellipse is oriented within ±100° of the grain alignment.
17. The bat of claim 8 wherein a longest dimension of the oval or ellipse is oriented within ±100° of the grain alignment.

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