DEFORMABLE GRIP FOR A WRITING IMPLEMENT

Inventors: Ken Kostecki, Westchester, IL (US);
Jeffrey Hautzinger, Chicago, IL (US)

Correspondence Address:
MARSHALL, GERSTEIN & BORUN LLP
233 S. WACKER DRIVE, SUITE 6300
SEARS TOWER
CHICAGO, IL 60606 (US)

Appl. No.: 10/945,472
Filed: Sep. 20, 2004

Publication Classification

Int. Cl.
A46B 5/02 (2006.01)

U.S. Cl. ............................................ 401/6; 16/430

ABSTRACT

A deformable grip for a writing implement having a rigid barrel includes a grip layer connected to the rigid barrel. The grip layer is formed of a solid viscoelastic grip material having a hardness of approximately 1 to 80 Shore 00 durometer allowing the grip layer to achieve a deformed shape under manual pressure. The grip material further has a shape retention adapted to retain the deformed shape for at least 1 second. A coating is disposed over the grip layer and is formed of a coating material having a tensile strength of at least approximately 50 to 1000 psi and an elongation ratio of at least approximately 50 to 2000 percent. The grip may be formed over a majority of the barrel length to accommodate a variety of grip points and to improve comfort to a user.
DEFORMABLE GRIP FOR A WRITING IMPLEMENT

FIELD OF THE DISCLOSURE

[0001] The present disclosure generally relates to writing implements, and more particularly, to writing implements having deformable grips.

BACKGROUND OF THE DISCLOSURE

[0002] Various types of deformable grips are known which attempt to improve comfort during use of a writing implement. Some known grips employ a grip material that deforms under manual pressure, thereby to more closely conform to a user’s grip. While softer grip materials are more accommodating, use of such materials has been limited due to excessive tackiness exhibited by the softer materials.

[0003] To allow use of softer grip materials while avoiding issues caused by excessive tackiness, multiple layer grips are known in the art. The “Alpha-Gel” writing grip marketed by Mitsubishi Pencil Company, LTD., for example, provides a two-layer grip of resilient silicone elastomer skin filled with a soft silicone gel. The silicone gel provides primarily elastic deformation which tends to immediately return the grip to its non-deformed shape. As a result, the Alpha-Gel grip exerts a force that resists the manual pressure applied by the user, thereby generating excessive stress and causing hand fatigue. In addition, the Alpha-Gel grip is removably attached to the writing implement body, and therefore the grip is easily twisted out of position, damaged, or removed from the writing implement structure. Still further, the silicone skin material has limited tensile strength and flexibility, and therefore is easily torn or separated from the inner gel material. Also, the silicone skin does not bond well with the silicone gel, and therefore the grip is vulnerable to excessive wear.

[0004] Another known deformable grip is the “Sensa” pen developed by Willat Ergonomic Technologies, LLC. The Sensa pen has a silicone bladder filled with a highly viscous, liquid silicone gum. While the grip exhibits viscoelastic properties (i.e., deforms elastically but also has a shape retention that holds the deformed shape for a period of time before returning to the undeformed shape), manufacture of this grip is overly complex. The silicone bladder must first be formed and placed on the pen, and then the silicone gum must be manually filled into the bladder using a pneumatic or hydraulic syringe. In addition, the Sensa grip is susceptible to punctures during use, which may cause the silicone gum to leak, thereby minimizing the utility of the grip.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Exemplary aspects and features of deformable grips for writing implements in accordance with disclosure are described and explained in greater detail below with the aid of the drawing figures in which:

[0006] FIG. 1 is a perspective view of a writing implement having a deformable grip according to the present disclosure;

[0007] FIG. 2 is a side elevational view of the writing implement of FIG. 1;

[0008] FIG. 3 is a cross-sectional view of the writing implement taken along line 3-3 of FIG. 1; and

[0009] FIG. 4 is a cross-sectional view of the writing implement similar to FIG. 3 but showing the grip in a deformed shape.

DETAILED DESCRIPTION

[0010] Deformable grips for writing implements in accordance with this disclosure generally comprise a grip layer adhered to a structural portion of the writing implement, such as a barrel. A coating layer is disposed over the grip layer to provide a more durable skin for the grip and to mask any tackiness exhibited by the material used for the grip layer. The deformable grip may be formed on the writing implement using relatively inexpensive automatic processes. For example, the grip layer may be formed by low pressure casting while the coating may be sprayed over the grip layer, thereby to form a composite grip. Still further, the deformable grip may be formed over a majority of the barrel surface, thereby to accommodate a greater variety of grip positions and to more comfortably fit a user’s hand.

[0011] In the exemplary embodiment illustrated as FIGS. 1-4, a writing implement 10 includes an elongate, rigid barrel 12. The barrel 12 defines a chamber 14 for housing a marking medium, such as an ink stick cartridge 16. The cartridge 16 may include a writing tip 18 that extends from a front end 20 of the barrel 12. A rear end 22 of the barrel may include an actuator button 24 for selectively extending or retracting the writing tip 18, as is generally known in the art. While a retractable tip pen is shown, other types of pens, such as those having a removable cap, may be provided without departing from the scope of this disclosure. In addition, the writing implement 10 may include a clip 26.

[0012] The barrel 12 is preferably made of a rigid material to provide structural support for the writing implement 10. The barrel material may be plastic, metal, or other rigid material. Currently, it is preferred to form the barrel 12 of ABS plastic, which may be accomplished by injection molding, liquid injection molding, extrusion, or other known processes for forming rigid, structural elements out of plastic.

[0013] A deformable grip is disposed over at least a portion of the barrel 12 to improve comfort to a user’s hand during use. As best shown in FIG. 3, the deformable grip 30 includes a grip layer 32 and a coating layer 34. Materials for the grip and coating layers are selected so that the deformable grip 30 exhibits viscoelastic properties, wherein the material deforms elastically (similar to a solid) but also is slow to recover to its uncompressive shape (similar to a viscous liquid). In particular, the grip 30 readily yields under manual pressure to a deformed shape and has shape retention that holds the deformed shape for a period of time.

[0014] More specifically, the grip layer 32 may be formed of a grip material having desirable hardness and shape retention characteristics. For example, the grip material may have a hardness of approximately 1 to 80 Shore OO durometer. The range of hardness is preferably approximately 5 to 70 Shore OO durometer or approximately 10 to 50 Shore OO durometer. In particular, it has been found that a hardness of approximately 40 to 50 Shore OO durometer provides a comfortable grip.
When selecting a material having suitable hardness, care should be taken that it also exhibits other desirable characteristics such as shape retention, durability, and feel, among others. As used herein, shape retention is the ability of the material to hold a deformed shape momentarily before returning to a regular, undeformed shape. A typical undeformed shape is illustrated in FIG. 3, where the writing implement 10 is not held by a user. FIG. 4 illustrates a deformed shape where the user's fingers are applying pressure to the grip 30. The grip material should retain the deformed shape for at least approximately one second, and preferably at least approximately 5 seconds, if possible. It has been found that a two-part polyurethane gel exhibits the above characteristics; however other materials, such as silicone, may also exhibit the desired characteristics.

The coating layer 34 may comprise a coating material having sufficient strength and stretch to accommodate local deformation without tearing. In general, it is preferable to have as high of a tensile strength and elongation ratio as possible. In particular, the coating material may have a tensile strength of at least approximately 50 to 1,000 psi. The tensile strength range is preferably at least approximately 100 to 900 psi, and more preferably at least approximately 150 to 850 psi. As defined herein, the stretch of the material is determined by the elongation ratio, which compares the extended length of a material at its failure point to the relaxed length of the material. The coating material may have an elongation ratio of at least approximately 50 to 2,000%. Preferably, the elongation ratio of the coating material is at least approximately 100 to 1,500%, and more preferably at least approximately 200 to 1,000%. While the currently preferred coating material is a polyurethane, other materials, such as elastomeric coatings, may exhibit the desired characteristics for the coating layer.

In addition to the individual layer material characteristics noted above, the grip and coating materials may be selected to achieve other characteristics desired in the composite deformable grip 30. For example, it is advantageous for the grip and coating layers 32, 34 to adhere to one another. To improve bonding between the layers, similar materials may be used. For example, the grip and coating layers 32, 34 may be formed of polyurethane materials to promote bonding therebetween.

The grip layer material may further be selected to promote permanent adhesion to the barrel 12, thereby to improve durability of the grip. The barrel 12 and grip layer 32 materials may be selected such that a bond is formed therebetween. For example, the barrel may be formed of an ABS plastic, while the grip layer 32 is formed of a polyurethane material.

From the foregoing, a deformable grip exhibiting viscoelastic properties, minimal tackiness, and resistance to wear is disclosed. The grip includes a solid, viscoelastic grip layer. The grip layer is sufficiently soft to readily deform under manual pressure and exhibits a shape retention to minimize hand fatigue. The coating layer masks any tackiness exhibited by the grip layer material and provides a strong, flexible covering to extend the life of the grip.

The writing implement 10 may be formed by an automatic process, thereby simplifying manufacture. As noted above, the rigid barrel 12 may be formed using injection molding, liquid injection molding, or other similar processes. The grip layer 32 may be formed directly on at least a portion of the rigid barrel 12 so that the grip layer 32 bonds to the rigid barrel 12. While it has been found that low pressure casting provides desirable results, other processes, such as molding or other casting processes may be used. With the grip layer 32 in place, the coating layer 34 may be applied to the grip layer 32. Suitable processes for applying the coating layer include spray coating, plasma vapor depositing, dip applying, in-mold coating, and heat shrink tubing, among others.

In the currently preferred embodiment, the grip layer 32 is formed of a two-part polyurethane gel material that is low pressure casted in a mold defining a cavity surrounding a rigid structural member of the writing implement, such as the barrel 12. The two-part urethane gel is mixed, metered, and injected at a very low pressure into a silicone mold. After the polyurethane cures in approximately two to four minutes, the silicone mold is opened and the formed grip layer is removed and placed on a coating line.

In the coating line, barrels 12 with grip layers 32 formed thereon are coated with the coating material. For example, the barrel/grip layer assemblies may be advanced past one or more spray coating guns that completely coat the grip layer 32 with the sprayed material, and the coating layer is then dried. The coating material discharged by the spray coating gun is preferably a polyurethane material to promote bonding with the polyurethane gel used for the grip layer 32.

Accordingly, an automatic process is disclosed for forming a deformable grip directly on a barrel of a writing implement. The method does not require manual injection of a material or manual placement of the grip over the barrel, thereby reducing manufacturing costs and simplifying the manufacturing process.

The deformable grip 30 further may be sized to accommodate a variety of grip positions and to provide additional comfort to a user's hand in addition to the user's fingertips. As noted above, the grip and coating materials are selected to provide a viscoelastic grip. The grip 30 may be sized to extend over a majority of the length of the barrel 12. In the illustrated embodiment, the deformable grip 30 extends over approximately 80% of the barrel length.

More specifically, the deformable grip 30 has a tip end 36 positioned proximate the barrel front end 20 and a back end 38 positioned proximate the barrel rear end 22. In the illustrated embodiment, the tip end 36 is positioned approximately 1/2 inch from the writing tip 18 and a back end 38 of the deformable grip 30 is positioned approximately 1 inch from the barrel rear end 22, so that the deformable grip 30 has an overall length of approximately 4 inches. The additional length is provided for users to grasp the writing implement 10 at locations farther away from the writing tip 18, such as at a point located 1.5 inches or more from the writing tip. In addition, the portion of the deformable grip 30 located near the back end 38 provides a cushioned contact surface for the ease of the user's hand located between the thumb and forefinger.

While particular embodiments of the present disclosure have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the
spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this disclosure.

1. A deformable grip for a writing implement having a rigid barrel, the grip comprising:
   a grip layer connected to the rigid barrel, the grip layer being formed of a solid viscoelastic grip material having a hardness of approximately 1 to 80 Shore OO durometer allowing the grip layer to achieve a deformed shape under manual pressure, the grip material further having a shape retention adapted to retain the deformed shape for at least 1 second; and
   a coating disposed over the grip layer, the coating being formed of a coating material having a tensile strength of at least approximately 50 to 1000 psi and an elongation ratio of at least approximately 50 to 2000 percent.

2. The deformable grip of claim 1, in which the coating comprises a spray coating applied to the grip layer.
3. The deformable grip of claim 1, in which the grip material comprises silicone material.
4. The deformable grip of claim 1, in which the grip material comprises a polyurethane material.
5. The deformable grip of claim 4, in which the polyurethane material comprises a two-part urethane gel material.
6. The deformable grip of claim 1, in which the coating material and grip material adhere to one another.
7. The deformable grip of claim 1, in which the grip material comprises a polyurethane material and the coating material comprises a polyurethane material.
8. The deformable grip of claim 7, in which the grip layer is formed by low pressure casting, and in which the coating layer is formed by spray coating.
9. The deformable grip of claim 1, in which the grip material has a hardness of approximately 5 to 70 Shore OO durometer.
10. The deformable grip of claim 1, in which the grip material has a hardness of approximately 10 to 50 Shore OO durometer.
11. The deformable grip of claim 1, in which the coating material has a tensile strength of at least approximately 100 to 900 psi.
12. The deformable grip of claim 1, in which the coating material has a tensile strength of at least approximately 150 to 800 psi.
13. The deformable grip of claim 1, in which the coating material has an elongation ratio of at least approximately 100 to 1500 percent.
14. The deformable grip of claim 1, in which the coating material has an elongation ratio of at least approximately 200 to 1000 percent.
15. The deformable grip of claim 1, in which the grip material has a hardness of approximately 10 to 50 Shore OO durometer, and in which the coating material has a tensile strength of at least approximately 150 to 800 psi and an elongation ratio of at least approximately 200 to 1000 percent.
16. The deformable grip of claim 1, in which the grip layer is permanently adhered to the rigid barrel.
17. A method of forming a deformable grip for a writing implement having a rigid barrel, the method comprising:
   forming a grip layer directly onto a portion of the rigid barrel thereby to bond the grip layer to the rigid barrel, the grip layer being formed of a solid viscoelastic grip material; and
   forming a coating layer on the grip layer, the coating layer being formed of a coating material selected to bond with the grip material.
18. The method of claim 17, in which the grip material has a hardness of approximately 1 to 80 Shore OO durometer allowing the grip layer to achieve a deformed shape under manual pressure, the grip material further having a shape retention adapted to retain the deformed shape for at least 1 second.
19. The method of claim 18, in which the grip layer is formed on the rigid barrel by a forming process selected from a group of forming processes comprising casting and molding.
20. The method of claim 18, in which the grip material comprises a polyurethane material.
21. The method of claim 20, in which the polyurethane material comprises a two-part polyurethane gel material.
22. The method of claim 21 in which the grip layer forming comprises casting.
23. The method of claim 17, in which the coating material has a tensile strength of at least approximately 50 to 1000 psi and an elongation ratio of at least approximately 50 to 2000 percent.
24. The method of claim 23, in which the coating layer is formed on the grip layer by a coating process selected from the group of coating processes comprising spraying, plasma vapor depositing, dip applying, in-mold coating, heat shrink tubing, and elastic fabric forming.
25. The method of claim 23, in which the coating material comprises a polyurethane material.
26. The method of claim 25, in which the coating layer forming comprises spray coating.
27. The method of claim 17, in which the grip material comprises a polyurethane material and the coating material comprises a polyurethane material.
28. The method of claim 27, in which the grip layer forming comprises casting, and in which the coating layer forming comprises spray coating.
29. A writing implement comprising:
   a rigid barrel having a length;
   a writing tip coupled to the barrel; and
   a deformable grip disposed over the rigid barrel, the deformable grip extending over at least half of the rigid barrel length and being formed of a solid viscoelastic grip material.
30. The writing implement of claim 29, in which the grip material has a hardness of approximately 1 to 80 Shore OO durometer allowing the grip layer to achieve a deformed shape under manual pressure.
31. The writing implement of claim 30, in which the grip material further has a shape retention adapted to retain the deformed shape for at least 1 second.
32. The writing implement of claim 29, in which the grip material comprises a viscoelastic polyurethane having a hardness of approximately 40 to 50 Shore OO durometer.
33. The writing implement of claim 32, in which the polyurethane comprises a two-part polyurethane and the deformable grip is formed by casting.
34. The writing implement of claim 33, in which the deformable grip is formed around the barrel so that the deformable grip is permanently bonded to the barrel.

35. The writing implement of claim 32, further comprising a coating disposed over the deformable grip.

36. The writing implement of claim 35, in which the coating comprises a coating material having a tensile strength of approximately 50 to 1000 psi and an elongation ratio of approximately 50 to 2000 percent.

37. The writing implement of claim 29, in which the deformable grip covers at least 80 percent of the barrel length.

38. The writing implement of claim 29, in which the barrel has a tip end adjacent the writing tip and a back end opposite the writing tip, and in which the deformable grip defines a tip end spaced approximately ½ inch from the writing tip and a back end spaced approximately 1 inch from the barrel back end.

39. The writing implement of claim 29, in which the deformable grip defines an overall length of approximately 4 inches.

* * * * *