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(54) **GOLF CLUB ASSEMBLY AND GOLF CLUB WITH SUSPENDED FACE PLATE**

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(57) **ABSTRACT**

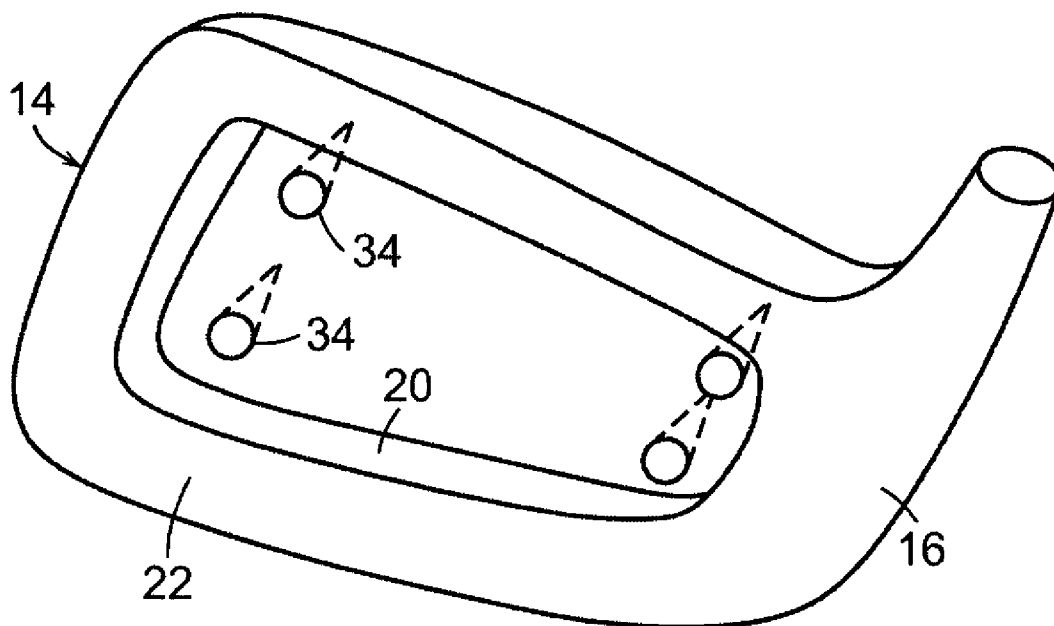
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A golf club head includes a body member having a front surface, a major recess formed in the front surface, and a plurality of minor recess formed in a surface of the major recess. A face plate includes a front surface, a rear surface, and a plurality of projections extending outwardly from the rear surface. The face plate is received in the major recess, and each projection is received in a corresponding minor recess. A layer of resilient material may be disposed between each projection and the corresponding minor recess.

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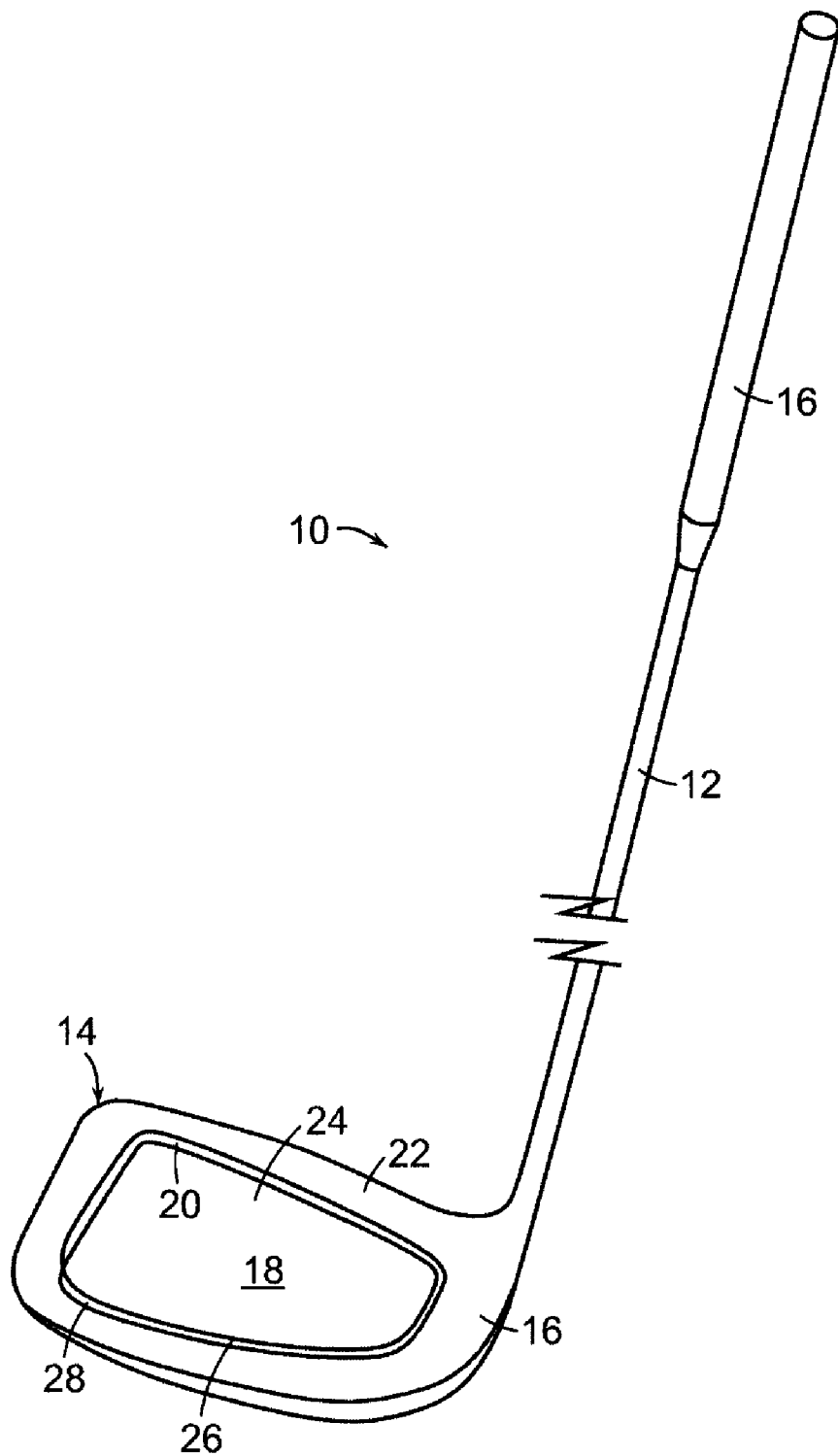


FIG. 1

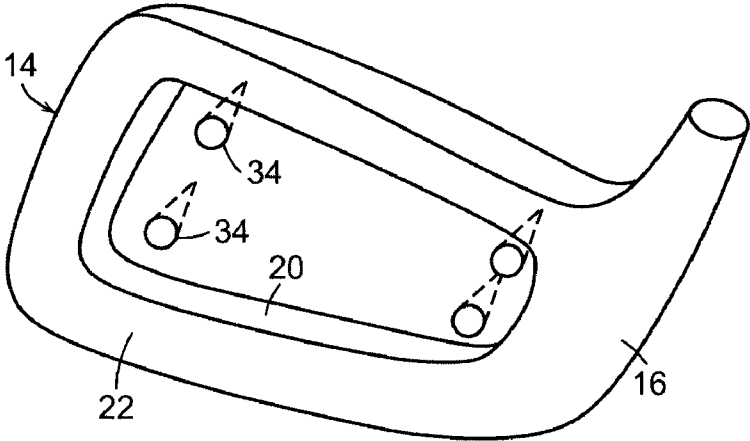


FIG. 2

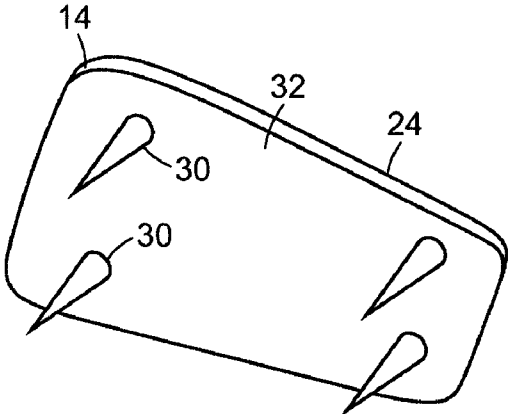


FIG. 3

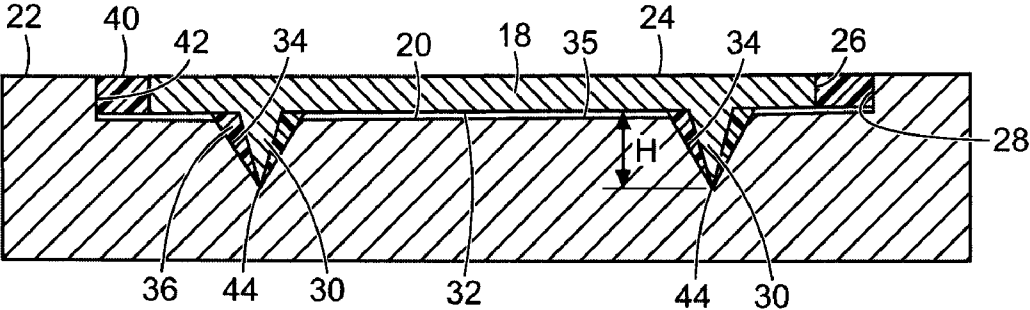


FIG. 4

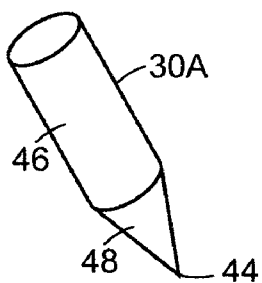


FIG. 5

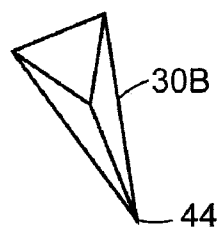


FIG. 6

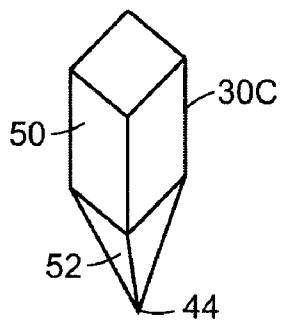


FIG. 7

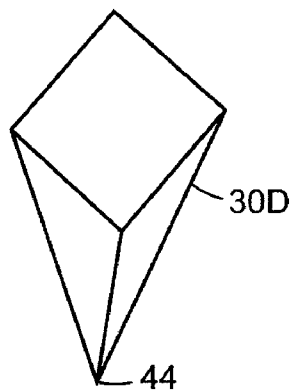


FIG. 8

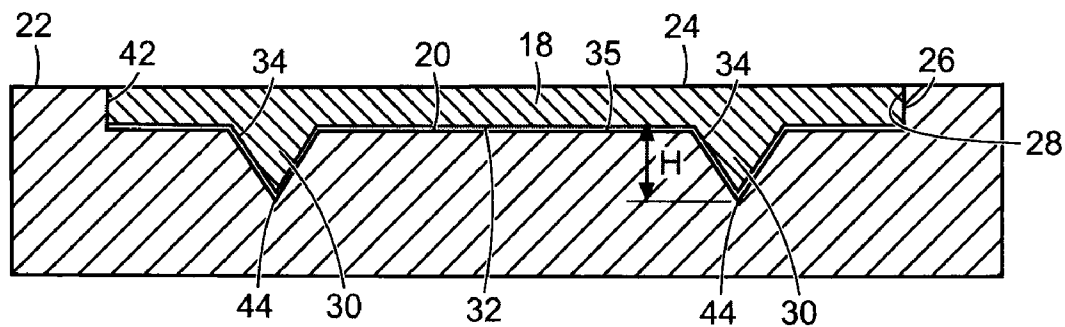


FIG. 9

## GOLF CLUB ASSEMBLY AND GOLF CLUB WITH SUSPENDED FACE PLATE

### FIELD

[0001] Aspects of this invention relate generally to golf clubs and golf club heads, and, in particular, to a golf club and golf club head with a face plate suspended on the club head.

### BACKGROUND

[0002] Golfers tend to be sensitive to the “feel” of a golf club. The “feel” of a golf club comprises the combination of various component parts of the club and various features associated with the club that produce the sensations experienced by the player when a ball is swung at and/or struck. Club weight, weight distribution, swing weight, aerodynamics, swing speed, and the like all may affect the “feel” of the club as it is swung and strikes a ball. “Feel” also has been found to be related to the vibrations produced when a club head face strikes a ball to send the ball in motion. These vibrations are transmitted from the club head through the shaft to the user’s hands. If the user senses undesirable vibrations, the user may flinch, give up on his/her swing, decelerate the swing, lose his/her grip, and/or not completely follow-through on the swing, thereby affecting distance, direction, and/or other performance aspects of the swing and the resulting ball motion. User anticipation of these undesirable vibrations can affect a swing even before the ball is hit.

[0003] Isolating or optimizing the vibration created at the face of the club head from the shaft would result in an improved “feel” for the user. It would be desirable to provide a golf club head that reduces or overcomes some or all of the difficulties inherent in prior known devices. Particular advantages will be apparent to those skilled in the art, that is, those who are knowledgeable or experienced in this field of technology, in view of the following disclosure of the invention and detailed description of certain embodiments.

### SUMMARY

[0004] The principles of the invention may be used to provide a golf club with a face plate suspended on the head of the golf club. In accordance with a first aspect, a golf club head includes a body member having a front surface, a major recess formed in the front surface, and a plurality of minor recess formed in a surface of the major recess. A face plate includes a front surface, a rear surface, and a plurality of projections extending outwardly from the rear surface. The face plate is received in the major recess, and each projection is received in a corresponding minor recess. A layer of resilient material may be disposed between each projection and the corresponding minor recess.

[0005] In accordance with another aspect, a golf club head includes a body member having a front surface, a major recess formed in the front surface, and a plurality of minor recess formed in a surface of the major recess. A face plate has a front surface, a rear surface, a peripheral edge, and a plurality of projections extending outwardly from the rear surface. The face plate is received in the major recess, with each projection being received in a corresponding minor recess, and a tip of each projection being in direct contact with the body member. The rear surface and peripheral edge of the face plate are spaced from the body member. A first layer of resilient material is disposed between each projection and the correspond-

ing minor recess, and a second layer of resilient material is disposed between the peripheral edge of the face plate and the body member.

[0006] In accordance with a further aspect, a golf club assembly includes a shaft, and a club head secured to a first end of the shaft. The club head includes a body member having a front surface, a major recess formed in the front surface, and a plurality of minor recess formed in a surface of the major recess. A face plate has a front surface, a rear surface, and a plurality of projections extending outwardly from the rear surface. The face plate is received in the major recess, and each projection is received in a corresponding minor recess. A layer of resilient material is disposed between each projection and the corresponding minor recess.

[0007] By providing a face plate suspended on the club head of a golf club according to certain embodiments, the amount of vibration sensed by the hands of a user when a golf ball is struck with the golf club can be reduced. As such the “feel” of the club for the user may be improved making the user more comfortable with their swing.

[0008] These and additional features and advantages disclosed here will be further understood from the following detailed disclosure of certain embodiments.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is a perspective view of a golf club with a suspended club head face plate according to an illustrative aspect.

[0010] FIG. 2 is a perspective view of the club head of the golf club of FIG. 1, shown with the face plate removed.

[0011] FIG. 3 is a rear perspective view of the face plate of the golf club of FIG. 1.

[0012] FIG. 4 is a section view of the club head and face plate of the golf club of FIG. 1.

[0013] FIG. 5 is a perspective view of an alternative embodiment of a projection of the face plate of the golf club of FIG. 1.

[0014] FIG. 6 is a perspective view of another alternative embodiment of a projection of the face plate of the golf club of FIG. 1.

[0015] FIG. 7 is a perspective view of yet another alternative embodiment of a projection of the face plate of the golf club of FIG. 1.

[0016] FIG. 8 is a perspective view of a further alternative embodiment of a projection of the face plate of the golf club of FIG. 1.

[0017] FIG. 9 is a section view of an alternative embodiment of a club head and face plate of a golf club.

[0018] The figures referred to above are not drawn necessarily to scale, should be understood to provide a representation of particular embodiments of the invention, and are merely conceptual in nature and illustrative of the principles involved. Some features of the golf club with a suspended face plate depicted in the drawings have been enlarged or distorted relative to others to facilitate explanation and understanding. The same reference numbers are used in the drawings for similar or identical components and features shown in various alternative embodiments. Golf clubs with a suspended face plate as disclosed herein would have configura-

tions and components determined, in part, by the intended application and environment in which they are used.

#### DETAILED DESCRIPTION

**[0019]** An illustrative embodiment of a golf club **10** is shown in FIG. **1** and includes a shaft **12** and a golf club head **14** attached to the shaft **12**. Golf club head **14** may be any driver, wood, or the like. Shaft **12** of golf club **10** may be made of various materials, such as steel, aluminum, titanium, graphite, or composite materials, as well as alloys and/or combinations thereof, including materials that are conventionally known and used in the art. Additionally, the shaft **12** may be attached to the club head **14** in any desired manner, including in conventional manners known and used in the art (e.g., via adhesives or cements at a hosel element, via fusing techniques (e.g., welding, brazing, soldering, etc.), via threads or other mechanical connectors, via friction fits, via retaining element structures, etc.). A grip or other handle element **16** is positioned on shaft **12** to provide a golfer with a slip resistant surface with which to grasp golf club shaft **12**. Grip element **16** may be attached to shaft **12** in any desired manner, including in conventional manners known and used in the art (e.g., via adhesives or cements, via threads or other mechanical connectors, via fusing techniques, via friction fits, via retaining element structures, etc.).

**[0020]** Club head **14** includes a plurality of components. As illustrated, this example golf club head **14** includes a body member **16** with a face plate **18**. Face plate **18** is received in a major recess **20** formed in a front surface **22** of body member **16**. In certain embodiments, a front surface **24** of face plate **18** is flush with front surface **22** of body member **16**. A peripheral edge **26** of face plate **18** is spaced from major recess **20** of body member **16**, forming a gap **28** therebetween.

**[0021]** In certain embodiments, face plate **18** and body member **16** are formed of the same material. It is to be appreciated, however, that face plate **18** and body member could be formed of dissimilar materials as well. Suitable materials for each of face plate **18** and body member **16** will become readily apparent to those skilled in the art, given the benefit of this disclosure.

**[0022]** As seen in FIGS. **2-4**, a plurality of projections **30** extend outwardly from a rear surface **32** of face plate **18**. Each projection **30** is received in a corresponding minor recess **34** formed in a front facing surface **35** of major recess **20**. In the illustrated embodiment, projections **30** are unitary, that is, of one-piece construction with face plate **18**. It is to be appreciated that projections **20** may be separate elements secured to rear surface **32** of face plate **18** by welding, with adhesive, or by any other suitable fastening means.

**[0023]** In certain embodiments, projections **30** have a height **H** of between approximately 0.5 mm and approximately 7 mm, more preferably between approximately 1 mm and approximately 5 mm, and most preferably approximately 4 mm.

**[0024]** A first layer **36** of resilient material **38** is disposed in each minor recess **34** between a corresponding projection **30** and the minor recess **34**, as seen in FIG. **4**. A second layer **40** of resilient material **38** is disposed about peripheral edge **26** of face plate **14** between a sidewall **42** of major recess **20** and peripheral edge **26** of face plate **14**.

**[0025]** Resilient material **38** is a resilient, pliable, and flexible material that serves to isolate elements of club head **14** from one another, thereby reducing the vibration transmitted from one element to another. In certain embodiments, resil-

ient material **38** is urethane. Other suitable materials for resilient material **38** include elastomers, rubbers, composites, and viscoelastic polymers. Other suitable materials for resilient material **38** will become readily apparent to those skilled in the art, given the benefit of this disclosure.

**[0026]** The use of projections **30**, corresponding minor recesses **34**, and resilient material **38** serves to provide a way to suspend face plate **14** above body member **16**, and isolate the vibrations created by the impact of a golf ball with face plate **14** from the remainder of golf club **10**, and in particular shaft **12** so that the vibrations felt by the user are reduced.

**[0027]** In certain preferred embodiments, as illustrated in FIG. **4**, a tip **44** of each projection **30** is in direct contact with body member **16**, and rear surface **32** of face plate **14** is spaced from front facing surface **35** of major recess **20**.

**[0028]** In this embodiment, there are four projections **30** and corresponding minor recesses **34** in which projections **30** are received. It is to be appreciated that any number of projections **30** and corresponding minor recesses **34** can be formed on face plate **14** and body member **16**, respectively.

**[0029]** Another embodiment of a projection **30A** is illustrated in FIG. **5**, in which projection **30A** is formed of a cylindrical base portion **46** and a conical top portion **48**, which terminates in tip **44**.

**[0030]** Yet another alternative embodiment of a projection **30B** is illustrated in FIG. **6**, in which projection **30B** is a triangular pyramid, which terminates in tip **44**.

**[0031]** A further embodiment of a projection **30C** is illustrated in FIG. **7**, in which projection **30C** is formed of a base portion **50** having a rectangular cross-section and a top portion **52**, which terminates in tip **44**.

**[0032]** Yet another embodiment of a projection **30D** is illustrated in FIG. **8**, in which projection **30D** is a quadrilateral pyramid, which terminates in tip **44**. For each embodiment with any of projections **30A-D**, minor recesses **34** have a shape corresponding to the shape of the projection to be received therein.

**[0033]** Another embodiment is illustrated in FIG. **9**, in which face plate **18** is received in major recess **20** without any resilient material between face plate **18** and body member **16**. In the illustrated embodiment, rear surface **32** of face plate **14** is spaced from front facing surface **35** of major recess **20**. It is to be appreciated that rear surface **32** may be in direct contact with front facing surface **35** in certain embodiments. Tip **44** is illustrated as being in contact with body member **16** within minor recess **34**. It is to be appreciated that the entire surface of projection **30** may be in contact with minor recess **34** in certain embodiments.

**[0034]** By varying the geometry of projections **30**, minor recesses **34**, as well as the points of engagement of face plate **14** with body member **16**, and incorporating resilient material within club head **10** in certain embodiments but not in others, the vibrations distributed throughout club head **10** may be varied, and, ultimately, fine-tuned or optimized for a particular player or players.

**[0035]** Thus, while there have been shown, described, and pointed out fundamental novel features of various embodiments, it will be understood that various omissions, substitutions, and changes in the form and details of the devices illustrated, and in their operation, may be made by those skilled in the art without departing from the spirit and scope of the invention. For example, it is expressly intended that all combinations of those elements and/or steps which perform substantially the same function, in substantially the same

way, to achieve the same results are within the scope of the invention. Substitutions of elements from one described embodiment to another are also fully intended and contemplated. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

- 1. A golf club head comprising:
  - a body member having a front surface, a major recess formed in the front surface, and a plurality of minor recesses formed in a surface of the major recess; and
  - a face plate having a front surface, a rear surface, a peripheral edge, and a plurality of projections extending outwardly from the rear surface, the peripheral edge of the face plate being spaced from the body member and defining a gap about the entire peripheral edge between the face plate and the body member, the face plate being received in the major recess, and each projection being received in a corresponding minor recess.
- 2. The golf club head of claim 1, wherein a tip of each projection is in direct contact with the body member.
- 3. The golf club head of claim 1, wherein the projections and minor recesses are cone shaped.
- 4. The golf club head of claim 1, wherein the front surface of the face plate is flush with the front surface of the body member.
- 5. The golf club head of claim 1, further comprising a layer of resilient material disposed between each projection and the corresponding minor recess.
- 6. The golf club head of claim 5, further comprising an additional layer of resilient material positioned between a peripheral edge of the face plate and the major recess.
- 7. The golf club head of claim 5, wherein the rear surface of the face plate is spaced from the body member.
- 8. The golf club head of claim 5, wherein the resilient material is urethane.
- 9. The golf club head of claim 5, wherein the resilient material is an elastomer.
- 10. A golf club head comprising:
  - a body member having a front surface, a major recess formed in the front surface, and a plurality of recesses formed in a surface of the major recess;
  - a face plate having a front surface, a rear surface, a peripheral edge, and a plurality of projections extending outwardly from the rear surface, the face plate being received in the major recess, each projection being received in a corresponding minor recess with a tip of each projection being in direct contact with the body member, and the rear surface and peripheral edge of the face plate being spaced from the body member; and

- a first layer of resilient material disposed between each projection and the corresponding minor recess, and a second layer of resilient material being disposed between the peripheral edge of the face plate and the body member.
- 11. The golf club head of claim 10, wherein the resilient material is urethane.
- 12. The golf club head of claim 10, wherein the resilient material is an elastomer.
- 13. The golf club head of claim 10, wherein the projections and minor recesses are cone shaped.
- 14. A golf club assembly comprising:
  - a shaft; and
  - a club head secured to a first end of the shaft and comprising:
    - a body member having a front surface, a major recess formed in the front surface, and a plurality of minor recesses formed in a surface of the major recess;
    - a face plate having a front surface, a rear surface, a peripheral edge, and a plurality of projections extending outwardly from the rear surface, the peripheral edge of the face plate being spaced from the body member and defining a gap about the entire peripheral edge between the face plate and the body member, the face plate being received in the major recess, and each projection being received in a corresponding minor recess; and
    - a layer of resilient material disposed between each projection and the corresponding minor recess.
- 15. The golf club assembly of claim 14, wherein a tip of each projection is in direct contact with the body member.
- 16. The golf club assembly of claim 14, wherein the projections and minor recesses are cone shaped.
- 17. The golf club assembly of claim 14, wherein the front surface of the face plate is flush with the front surface of the body member.
- 18. The golf club assembly of claim 14, further comprising an additional layer of resilient material positioned between a peripheral edge of the face plate and the major recess.
- 19. The golf club assembly of claim 14, wherein the rear surface of the face plate is spaced from the body member.
- 20. The golf club assembly of claim 14, wherein the resilient material is urethane.
- 21. The golf club head of claim 14, wherein the resilient material is an elastomer.

\* \* \* \* \*