



US 20020160857A1

(19) **United States**

(12) **Patent Application Publication**
Budzynski

(10) **Pub. No.: US 2002/0160857 A1**

(43) **Pub. Date: Oct. 31, 2002**

(54) **ENERGY ABSORBING DEVICE**

Publication Classification

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(51) **Int. Cl.⁷** **A63B 53/04**

(52) **U.S. Cl.** **473/342**

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ABSTRACT

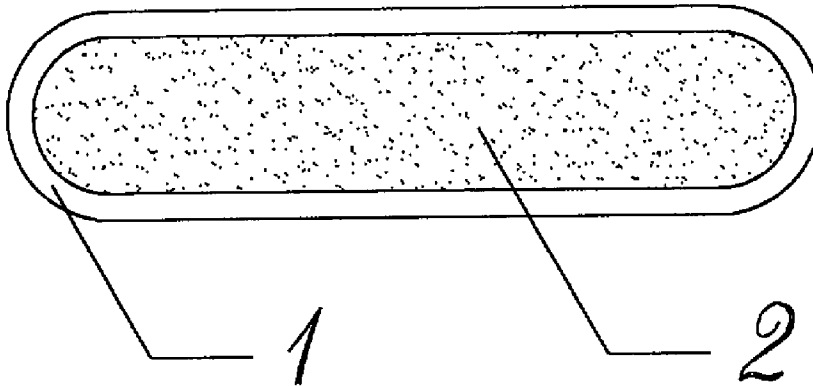
(21) **Appl. No.: 10/067,182**

(22) **Filed: Feb. 4, 2002**

Related U.S. Application Data

(60) **Provisional application No. 60/226,321, filed on Feb. 5, 2001.**

Disclosed is a devise to absorb the impact of objects or surfaces struck for sporting purposes. A combination of geometric shapes connects to form a framework consisting of voids that enlarge the volume of the impact area. Energy from an impact filters from one shape to the next reducing the shock waves associated with the connection of the object struck.



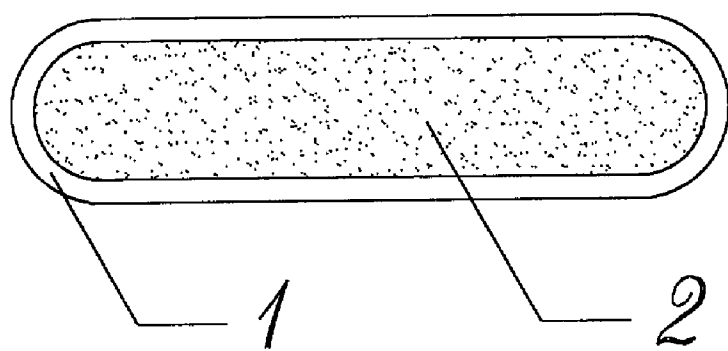


Fig. 1

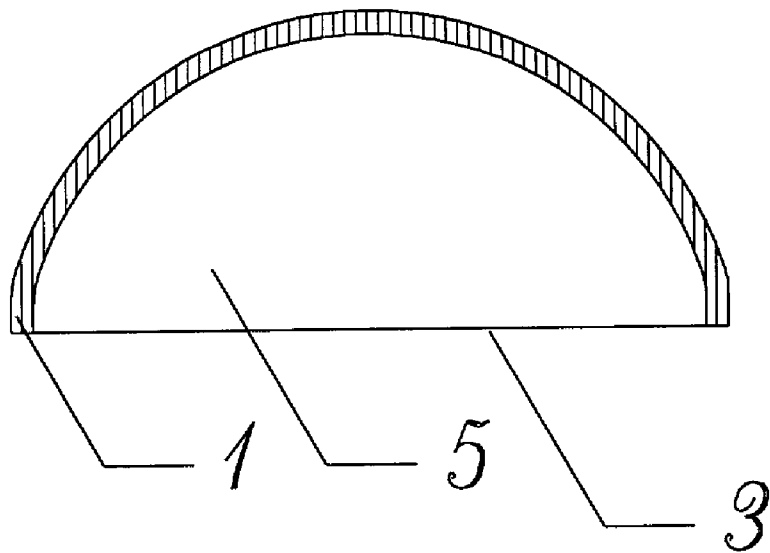


Fig. 2

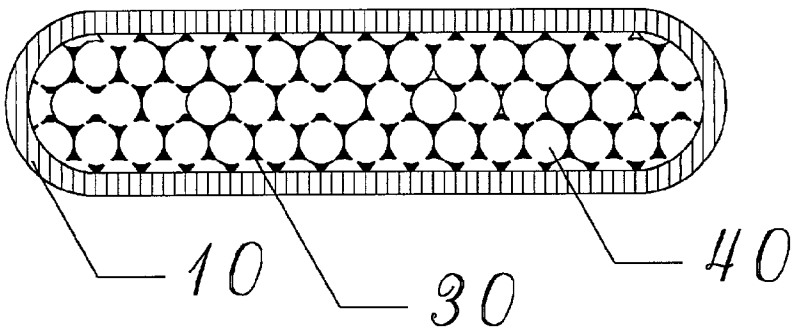


Fig. 3

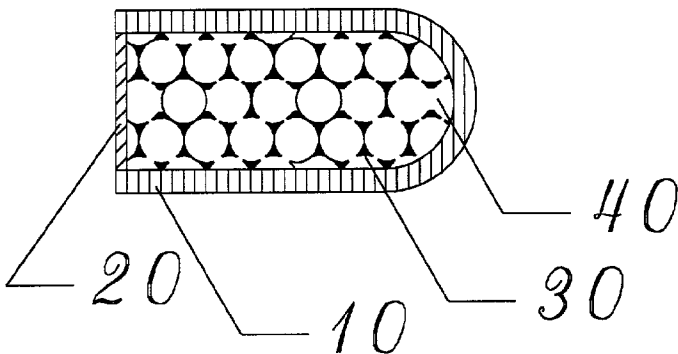


Fig. 4

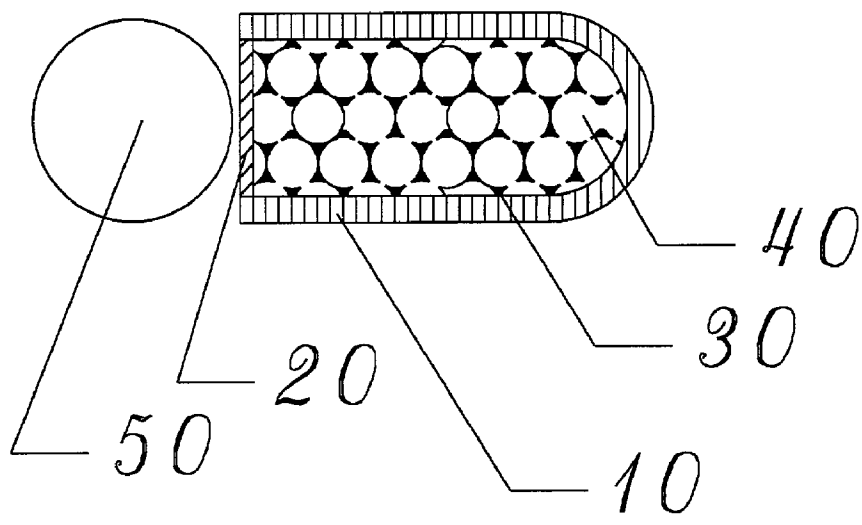


Fig. 5

ENERGY ABSORBING DEVICE

BACKGROUND OF INVENTION

[0001] Sporting enthusiasts recognize the advantage and importance of improving their game by controlling equipment performance. When striking objects with a club or running and jumping a shock wave is produced with each reaction. Accuracy and timing are effected by attempts to correct the deviations caused by each impact with the stationary target or structure. Several designs provide energy absorption during impact with layers of laminated material. Other methods engage a cavity void of material along the entire impact surface of the devise as a means of controlling the impact.

[0002] Numerous designs have been patented or marketed which have incorporated resilient or flexible faceplates to either improve feel (i.e. absorb high frequency vibration) or enlarge the sweet spot (i.e. the intended strike point) by making a hard face more flexible (e.g., via slotting). Slots cast or milled behind the sole or faceplate are incorporated to allow deflection and thus enlarge the sweet spot in the strike zone.

[0003] By absorbing the energy through a system of connecting shapes that connect proportionally to their size and form reduced rebound from impact was achieved thus controlling the movement with increased timing and accuracy.

SUMMARY OF INVENTION

[0004] The present invention relates to an energy absorbing devise utilized in sporting activities comprising of a striking face with an intended strike point and a system of geometric shapes combined into a matrix to absorb the impact and reduce the shock of objects contacting the devise.

BRIEF DESCRIPTION OF DRAWINGS

[0005] FIG. 1 is a frontal view of the energy absorbing devise wherein a protective outer layer contains an insert utilized to strike an object or surface composed of a material covering geometric shapes, said shapes connecting within the cavity of the devise are surrounded by voids or a medium no greater in hardness.

[0006] FIG. 2 is a top sectional view of the energy absorbing devise protective cavity to protect the inner geometric shapes from accidental damage and define the flat striking area. The cavity shape will vary depending upon the required impact application and configuration of the energy absorbing matrix.

[0007] FIG. 3 is a front cross section depicting the protective material surrounding the energy absorbing devise comprising of geometric shapes connected in a random of set pattern. The geometric shapes have voids between each shape that may either be a material of less hardness than the geometric shapes or the geometric shapes have voids between each shape with no material in said voids. An object or surface can contact any portion or the entire portion of the strike zone upon impact.

[0008] FIG. 4 is a side cross section depicting the protective material surrounding the energy absorbing devise

with a strike plate for impacting objects or surfaces. Geometric shapes connecting in a pattern filling the cavity of the striking devise with voids between each shape that may either be a material of less hardness than the geometric shapes or the geometric shapes have voids between each shape with no material in said voids.

[0009] FIG. 5 is a side cross section depicting the protective material surrounding the energy absorbing devise with a strike plate for impacting objects or surfaces. Geometric shapes connecting in a pattern filling the cavity of the striking devise with voids between each shape that may either be a material of less hardness than the geometric shapes or the geometric shapes have voids between each shape with no material in said voids. Direction of motion indicates the strike face contacts an object or surface absorbing the energy of the impact on strike face surface.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0010] The subject invention relates to an energy absorbing devise, which reduces the shock when objects or surfaces impact the devise on the strike plate housing the energy absorbing devise. The principles apply to sporting activities that prove a non-absorbed shock is prone to reduce response time and performance while striking an object or surface, compared to similar devises with energy absorbing capabilities, the response time and performance were enhanced when the shock of impact was reduced or eliminated.

[0011] More specifically, objects or surfaces contacted by an apposing force that has the energy absorbed upon impact allow for increased concentration and reduced stress while performing said impact like hitting balls, running and jumping during sporting activities.

[0012] The present invention absorbs energy along the entire strike area or a portion of the strike area depending upon the object or surface that contacts the devise. More specifically, the energy is absorbed through a series of connecting or adjoining or a combination of connecting and or adjoining geometric shapes to form a chain event of energy absorption away from the impact zone therefore reducing possible inaccuracies in sporting performance or timing.

[0013] With respect to inserts in embodiments, which require striking face energy absorption, preferred inserts have the capability of transferring the shock wave of impact away from the strike zone with elastomeric material or a combination of materials and voids whereas an impact of objects and embodiments with equal or approximate hardness will deflect with proportional shock waves and little or no energy absorption.

[0014] Referring to FIG. 1, an energy absorbing devise of the present invention is shown. The energy absorbing devise has a strike zone (2) that is the intended strike point with an outer protective shell (1). While the shape of the illustrated energy absorbing devise can be depicted as a capsule, the overall shape of the embodiment is not critical with respect to the present invention. For example, the design could incorporate square ends with the strike point asymmetrical with respect to the perimeter.

[0015] In FIG. 1, a protective housing (1) is in communication with the strike plate (2) to form an energy absorbing

device that can be utilized in present form or be incorporated into a shape best utilized to strike particular object(s) or surface(s). The total area of the strike plate (2) is relatively flat in comparison to the other sides of the energy absorbing device protective shell (1). The shell is comprised of a material of hardness greater than the matrix composition and formed into a shape surrounding the energy absorbing device leaving the strike plate (2) exposed.

[0016] Referring to FIG. 2, the protective housing covering the device (1) with a cavity (5) to communicate the energy absorbing matrix and a flat area comprising of the strike zone (3). The width, length and height of the energy absorbing device will depend upon the striking application and size of the object or surface being impacted.

[0017] Various levels of energy absorption can be configured depending upon the composition of the object or surface being impacted or the velocity of the impact. Referring to FIG. 3, the energy absorbing device protective housing (10) is in communication with the energy absorbing matrix comprised of geometric shapes of malleable material (40) and voids (30) connecting or adjoining to form a random or set pattern. Voids between the connecting and adjoining geometric shapes (30) have no material in said voids or voids consist of a material hardness 50% or less of said geometric shapes (40). Each geometric shape (40) may be unique with flat, sharp or rounded surfaces of varying or symmetrical size forming one complete matrix or a series of random or symmetrical shapes until the cavity as in the embodiment of FIG. 2 is connected on each side by at least one or more geometric shapes and one or more voids.

[0018] Referring to FIG. 4, the strike plate (20) consists of a flat material of equal or less hardness of the geometric shapes (40) but not of a greater hardness than the protective coating (10) or hardness less than void material (30) if a void material is utilized. Energy absorbing matrix (40) and (30) are in communication with but not directly connected to strike plate (20) or protective coating (10). Strike plate (20) is connected to protective housing (10) by means of direct adhesion thereby containing the energy-absorbing matrix (40) and (30) without interfering with inherent properties.

[0019] FIG. 5 demonstrates the direction of motion of the energy absorbing device towards an object (50) that is spherical in shape like a ball for sporting activities. Striking face (20) contacts the object and is slightly depressed due to the force of impact. Energy from said impact travels from the area of contact into the matrix of geometric shapes (40) and voids (30) in a pattern from the center of the strike zone radiating away from the point of contact. The combination of shapes and voids that make up the matrix enable energy to be absorbed in a greater area with less mass than an object of similar volume consisting of a solid material. As shock waves from said impact pass through the geometric shapes (40) the capacity of the energy absorption may be greater than the geometric shapes can sustain. The voids (30) enable excess shock waves to be absorbed into the space or material

that is less dense than the material comprising the geometric shapes (40) therefore reducing the force of impact faster than a solid object of equal volume.

What is claimed is:

1. An energy absorbing device for sporting activities comprising:

- a. an energy-absorbing matrix comprising of geometric shapes directly connected or adjoining with empty or filled voids surrounding said directly connected or adjoining shapes in a random or set pattern.
- b. a strike plate flat in area covering the energy-absorbing matrix.
- c. a protective housing with a cavity surrounding the energy-absorbing matrix with a strike zone flat in area comprising of the strike plate.

2. The energy absorbing device of claim 1, wherein said geometric shapes may be unique or symmetrical with flat, sharp or rounded surfaces of varying or symmetrical size forming one complete matrix or a series of random or symmetrical shapes until the protective cavity is connected on each side by at least one or more geometric shapes and one or more voids.

3. The energy absorbing device of claim 1, wherein said geometric shapes are comprised of a malleable material.

4. The energy absorbing device of claim 1, wherein voids consist of no material or consist of a material fifty percent in hardness or less of said geometric shapes or a combination or combinations of both said configurations.

5. The energy absorbing device of claim 1, wherein the protective housing with a cavity and flat area for strike plate insert is comprised of material in hardness greater than the energy-absorbing matrix and strike plate.

6. The energy absorbing device of claim 1, wherein the strike plate is comprised of a flat area of material equal to or less in hardness than said geometric shapes intended for impacting objects or surfaces.

7. The energy absorbing device of claim 1, wherein the combination of shapes and voids that make up the matrix enable energy to be absorbed in a greater area with less mass than an object of similar volume consisting of a solid material. As shock waves from said impact pass through the geometric shapes the capacity of the energy absorption may be greater than the geometric shapes can sustain. The voids enable excess shock waves to be absorbed into the voids or material in said voids that is less dense than the material comprising the geometric shapes therefore reducing the force of impact faster than a solid object of equal volume.

8. The energy absorbing device of claim 1, wherein the device strikes object or objects or a surface or surfaces on a portion of or the entire strike face absorbing the force of impact through the strike plate into the energy-absorbing matrix.

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