

**DESCRIPTION****A PUNCHING BAG****5    FIELD OF THE APPLICATION**

The present application relates to punching bags, and more particularly to punching bags having a multi-layer and multi-material structure.

**10   PRIOR ART**

Punching bags were originally used by boxers or martial arts practitioners to improve overall punching techniques. Recently, punching bags are being used by people who are not practitioners, but want to receive the strength and aerobic benefits achieved through performing the motion of punching. Furthermore, punching bags are  
15 now used as source of stress relief by many people, since martial arts training programs have proved to be an effective way to improve health and fitness. Many people see positive results from martial arts training, such as improved cardiovascular endurance, increased muscular strength and tone, as well as weight loss. It also helps users gain a sense of inner strength and emotional balance.

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Conventional punching bags are available in a plurality of sizes and shapes, with all typically constituting a ball, pear or elongated cylindrical configuration, and formed of an outer skin, such as leather on a synthetic composite composition, with a filler material within the skin, such as an air bladder or other filler material, for  
25 example, water cotton or other synthetic fibrous material.

Usually, bags used for both pugilistic and kicking exercises are of the latter elongated cylindrical type which provide more surface area and which may weigh 30 Kg or more with densities in excess of 10 pounds per cubic foot, thereby providing for

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substantial firmness in the bag. One of the main reasons for such desired weight and firmness in a typical punching bag is to provide a desired degree of resistance upon bag contact from kicking and punching, and to simulate human contact in an athletic combat training. The weight of the punching bag also impacts on the training effect: if the bag is  
5 too heavy it cannot be easily moved, otherwise if the weight of the bag is too light it results in poor training effect.

To increase the overall training experience, the bags are projected to have a specific weight and are filed with a memory or compressible material, which also  
10 may reduce or adjust impact resistance to a degree contemplated for avoiding, or at least reducing injury.

A problem with such punching bags, however, due to its internal composition, it is difficult to maintaining consistency of shape and resistance during use,  
15 especially prolonged use over a period of time, or more particularly in maintaining placement or otherwise consistency in displacement of bag filling material. In fact, after repeated forceful contact with a training bag usually over most of its outer skin surface area, filler material may become displaced or moved out of its original more or less homogeneous placement making for a heavy or kicking bag with less than homogeneous  
20 resistance over its surface contact area.

Additionally, considering that the punching bags are usually suspended from a supporting member, the force of gravity also contributes to a gradual migration and shifting of filler material from the top portion of the bag to lower portions, especially  
25 when being pummelled by repeated punches and kicks and resulting in an uneven distribution of filler material with concomitant uneven and inconsistent resistance to contact, and a less than desired workout or practice session.

The present application intended to innovatively overcome such issues.

**SUMMARY**

The present application has arisen to mitigate the afore-described disadvantages of the prior art apparatus, therefore proving a punching bag able to retain  
5 its consistency of resistance and resilience throughout heavy and severe usage.

It is therefore an object of the present application a punching bag comprised by a multi-material, multi-layer structure. Such punching bag therefore provides a combination of materials that allow to achieve a consistency similar to a  
10 human body, creating a very realistic training experience. Additionally, to achieve the necessary weight of the bag, the body of the bag comprises of bladder structure with at least one bladder to be filled up with liquid.

In one advantageous configuration, the bladder structure comprises an array of four 20 litre water bladders. By dividing the bladders in 20-liter sections makes  
15 it easy for the user to fill up each bladder individually carry it and place it in the bag using, for example, an ergonomic carry handle on top of the bladder, increasing the user friendliness.

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**DESCRIPTION OF FIGURES**

Figure 1 – illustration of a full section view of an embodiment of the punching bag object to the present application, wherein the reference signs represent:

- 25           1 – punching bag;  
            1.1 – outer synthetic leather surface;  
            1.2 - first layer of foam;  
            1.3 - second layer of foam;  
            1.4 – bladder structure.

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Figure 2 – illustration of a longitudinal section view of an embodiment of the punching bag (1) object to the present application, wherein the reference signs represent:

- 1.1 – outer synthetic leather surface;
- 1.2 – first layer of foam;
- 5 1.3 – second layer of foam;
- 1.4 – bladder structure;
- 1.5 – bladder.

Figure 3 – representation of one embodiment of a bladder of the bladder structure forming the core part of the punching bag. The reference signs represent:

- 1.5 – bladder;
- 1.6 – valve set.

Figure 4 – representation of an embodiment of the punching bag attached to two surfaces, perpendicular to each other, wherein the reference signs represent:

- 1 – punching bag;
- 2 – anchoring module;
- 3 – first supporting surface;
- 4 – second supporting surface.

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### **DETAILED DESCRIPTION**

The more general and advantageous configurations of the present invention are described in the Summary of the invention. Such configurations are detailed below in accordance with other advantageous and/or preferred embodiments of implementation of the present invention.

In a preferred embodiment of the punching bag (1) of the present application, it is comprised by a body having an outer synthetic leather surface (1.1) and

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being formed by least two inner layers of foam. A first layer of foam (1.2) is formed adjacently to the synthetic leather surface (1.1) and a second layer (1.3) of foam being formed adjacently to the first layer of foam (1.2), towards the interior of the bag's body; the first and the second layer of foam (1.2, 1.3) have different densities.

5                   The core part is constituted by a bladder structure (1.4) comprised by at least one bladder, adapted to contain at least liquid storage.

                  A punching bag (1) according to this preferred embodiment is formed by a combination of materials that allows to achieve a consistency similar to a human body, creating a very realistic training experience. Moreover, the two-layered structure of foam (1.2, 1.3) has a tubular shape, being arranged along the entire surface of the bag (1), and not locally in specific sections of its body, forming a homogeneous layer able to maintain its placement and therefore offering a homogeneous resistance over the bag's surface contact area.

15                   In another embodiment, combinable with the preferred embodiment, the outer surface (1.1) of the punching bag (1) is a synthetic leather surface. This type of material is both eco-friendly and very durable. More particularly, the synthetic leather surface (1.1) may be made of a combination of a natural fibre matrix and at least 50% recycle PU polymer.

                  In another embodiment, combinable with any of the previously described embodiments, the first foam layer (1.2) is a medium-density foam. More particularly, said first foam layer (1.2) may have a thickness between 50 to 70mm.

25                   In another embodiment, combinable with any of the previously described embodiments, the second foam layer (1.3) comprises expanded polyethylene (EPE) foam of a high-density. Said second foam layer (1.3) may have a thickness between 30 to 50mm.

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The proposed multi-layer arrangement, with two types of foam, with different densities and thicknesses, allows to protect the bladder structure (1.4), and consequently, provides greater stability to the punching bag (1), in reaction of a user's strike.

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In another embodiment, combinable with any of the previously described embodiments, the at least one bladder (1.5) of the bladder structure (1.4) is a container for liquid storage, such as water. By having a water-like core, the punching bag (1) acquires a texture and resistance that resembles the human body. In addition, the  
10 water-like core also has the advantage of making the bag's deformation and reaction to a user's strike more realistic.

In another embodiment, combinable with any of the previously described embodiments, the bladder (1.5) is a membrane made of a PVC polymer and comprises  
15 at least one valve set (1.6) installed on one end of the container, connecting to the interior of said container. The valve set (1.6) may comprise an inlet and a thermosealed section, to achieve a liquid-tight seal. To be able to fill it up or empty each bladder (1.5) may have a flat 65mm valve. The valve (1.6) may also be collapsible and able to perform a double function: bidirectional for water filling and unidirectional for low end  
20 pressurization.

In another embodiment, combinable with any of the previously described embodiments, each bladder (1.5) has a volume of 20 litres. By dividing the bladders (1.5) in 20-litre sections makes it easy for the user to fill up each bladder (1.5) individually  
25 carry it and place it in the bag (1) using the ergonomic carry handle which may be installed on top of the bladder (1.5), increasing the user friendliness.

In another embodiment, combinable with any of the previously described embodiments, the body of the punching bag (1) has an elongated shape and the bladder  
30 structure (1.4) of the core part comprises an array of at least two bladders (1.5), being

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disposed lengthwise in one longitudinal axis. For that purpose, the bladders (1.5) of the array have a shape adapted to be staked one on top of the other. More particularly, each bladder (1.5) has a cylinder shape consisting of a top and bottom parallel circular bases joined by a curved surface, wherein, a top circular base of a first bladder is adapted  
5 to receive a bottom circular base a second bladder and so on forming a vertical pile of bladders (1.5). By having bladders (1.5) of a cylinder shape, it is possible to stack the required number of bladders (1.5) vertically, guaranteeing a proper balance and consequently the stability of the bag (1). For that purpose, each bladder (1.5) may also comprise a connecting piece, such as a connecting ring, in order to improve a better  
10 connection to the adjacent ones.

In another embodiment, combinable with any of the previously described embodiments, the bladder structure (1.4) comprises an array of four 4 bladders (1.5).

15 In another embodiment, combinable with any of the previously described embodiments, the bag (1) further comprises at least one sensing module adapted to determine the impact force of a user's strike. The at least one sensing module being composed by at least a set of accelerometers which are embedded in the first foam layer (1.2). The specific positioning of the sensors in this first layer of foam (1.2) guarantees,  
20 on the one hand, the correct positioning inside the multi-layer structure of the bag (1) to measure the impact force, and on the other hand, also guarantees an adequate mechanical protection of the sensors to impacts.

In another embodiment, combinable with any of the previously described  
25 embodiments, the bag (1) further comprises an anchoring module (2). The anchoring module (2) comprises anchoring means adapted to anchor the bag's body to a first surface (3). More particularly, in another embodiment, the anchoring module (2) further comprises anchoring means adapted to anchor the bag (1) to a second surface (4), wherein the first (3) and the second surface (4) are perpendicular to each other. Using  
30 this two anchor points and due to the punching bag's multi-layered structured, it is

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possible to more realistically replicate the bags deformation and reaction to a user's strike, which allows to improve the user experience during the training session.

## 5 **EXAMPLARY EMBODIMENT**

The punching bag (1) comprises a body composed of light grey synthetic leather with two different layers of foam (1.2, 1.3) and at the core an array of four water bladders (1.5). This combination of materials allows to achieve a consistency similar to the human body and create a very realistic training experience. The eco-friendly material  
10 chosen for the exterior of the bag is both eco-friendly and very durable, being a combination of natural fibre matrix that give strength and support as backing to the more than 50% recycled PU polymer that gives the exterior texture of the bag.

There are two types of foam that consist the interior of the punching  
15 bag's body: the first foam layer (1.2) right after the outer skin (1.1) is of a medium-density having a thickness between 50 to 70mm; the second layer, adjacent to the first foam layer is a hard foam made out of expanded Polyethylene (EPE). Between the foam layers (1.2, 1.3) are housed three accelerometers that determine the impact force of every blow made by the user.

20 To achieve the necessary weight of the bag's body of about 90 kg, so it can absorb the impacts of even some of the strongest users, the bladder structure (1.4) comprises an array of four 20 litre water bladders (1.5). By dividing the bladders (1.5) of the bladder structure (1.4) in 20 litre sections, makes it easy for the user to fill up each bladder (1.5) individually, carry it and place it in the bag (1) using an ergonomic carry  
25 handle on top of the bladder (1.5). Every water bladder (1.5) has a cylindrical shape and is made out of at least 0.8mm thick PVC polymer and thermosealed to achieve a water-tight seal. To be able to fill it up or empty each bladder (1.5) has a flat 65mm valve.

**CLAIMS****1. A punching bag (1) comprising:**

— a body having an outer leather surface (1.1); the body being formed by:

- 5           — least two inner layers of foam; a first layer (1.2) of foam being formed adjacently to the leather surface (1.1) and a second layer (1.3) of foam being formed adjacently to the first layer (1.1) of foam, towards the interior of the body; the first and the second layers (1.2, 1.3) of foam having different densities;
- 10           — a core part constituted by a bladder structure (1.5) comprised by at least one bladder (1.6); said bladder (1.6) being a container for liquid storage.

**2. The bag (1) according to claim 1, wherein the outer surface (1.1) is a synthetic leather surface.**

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**3. The bag (1) according to claim 2, wherein the vegan leather surface is made of a combination of a natural fibre matrix and at least 50% recycle PU polymer.**

**4. The bag (1) according to any of the previous claims, wherein the first**  
20 **foam layer (1.2) is a medium-density foam.**

**5. The bag (1) according to claim 4, wherein the thickness of the first foam layer (1.2) is between 50 to 70mm.**

25 **6. The bag (1) according to any of the previous claims, wherein the second foam layer (1.3) comprises expanded polyethylene (EPE) foam of a high-density.**

**7. The bag (1) according to any of the previous claims, wherein the at least one bladder (1.5) of the bladder structure (1.4) is a container for liquid storage.**

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8. The bag (1) according to claim 7, wherein the liquid is water.

9. The bag (1) according to claims 7 or 8, wherein the bladder (1.5) is a membrane made of a PVC polymer and comprises at least one valve set (1.6) installed on one end of the container, connecting to interior of said container; said valve set (1.6) comprising an inlet and a thermosealed section.

10. The bag (1) according to any of the claims 7 to 9, wherein the volume of a bladder (1.5) is 20 litres.

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11. The bag (1) according to any of the previous claims, wherein the body of the bag has an elongated shape and the bladder structure (1.4) of the core part comprises an array of at least two bladders (1.5), being disposed lengthwise in one longitudinal axis; the bladders (1.5) of the array having a shape adapted to be staked one on top of the other.

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12. The bag (1) according to claim 11, wherein the bladders (1.5) have a cylinder shape consisting of a top and bottom parallel circular bases joined by a curved surface; wherein, a top circular base of a first bladder being adapted to receive a bottom circular base a second bladder.

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13. The bag (1) according to claim 11 or 12, wherein the bladder structure (1.4) comprises an array of four 4 bladders (1.5); preferentially, each bag has an ergonomic carry handle and a connecting piece; preferentially, the connecting piece is a connecting ring.

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14. The bag (1) according to any of the previous claims further comprising at least one sensing module; said at least one sensing module being installed between the foam layers (1.2, 1.3).

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15. The bag (1) according to any of the previous claims further comprising an anchoring module (2); the anchoring module comprising anchoring means adapted to anchor the bag's body to a first surface (3); optionally, the anchoring module (2) further comprises anchoring means adapted to anchor the bag to a second surface (4);
- 5 the first and the second surfaces (3,4) being perpendicular to each other.