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Ou

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[54] **SPORTSBALL AND MANUFACTURING METHOD THEREOF**

[76] Inventor: **Tsung Ming Ou**, No. 32, Lane 56, Chung Cheng 2nd Road, Kaohsiung, Taiwan

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[51] **Int. Cl.**[6] **A63B 41/10**; B65H 54/64

[52] **U.S. Cl.** **473/605**; 156/170

[58] **Field of Search** 473/594, 595, 473/598, 599, 603, 604, 605, 607, 608, 609, 613; 273/DIG. 20; 156/170, 169, 171, 172

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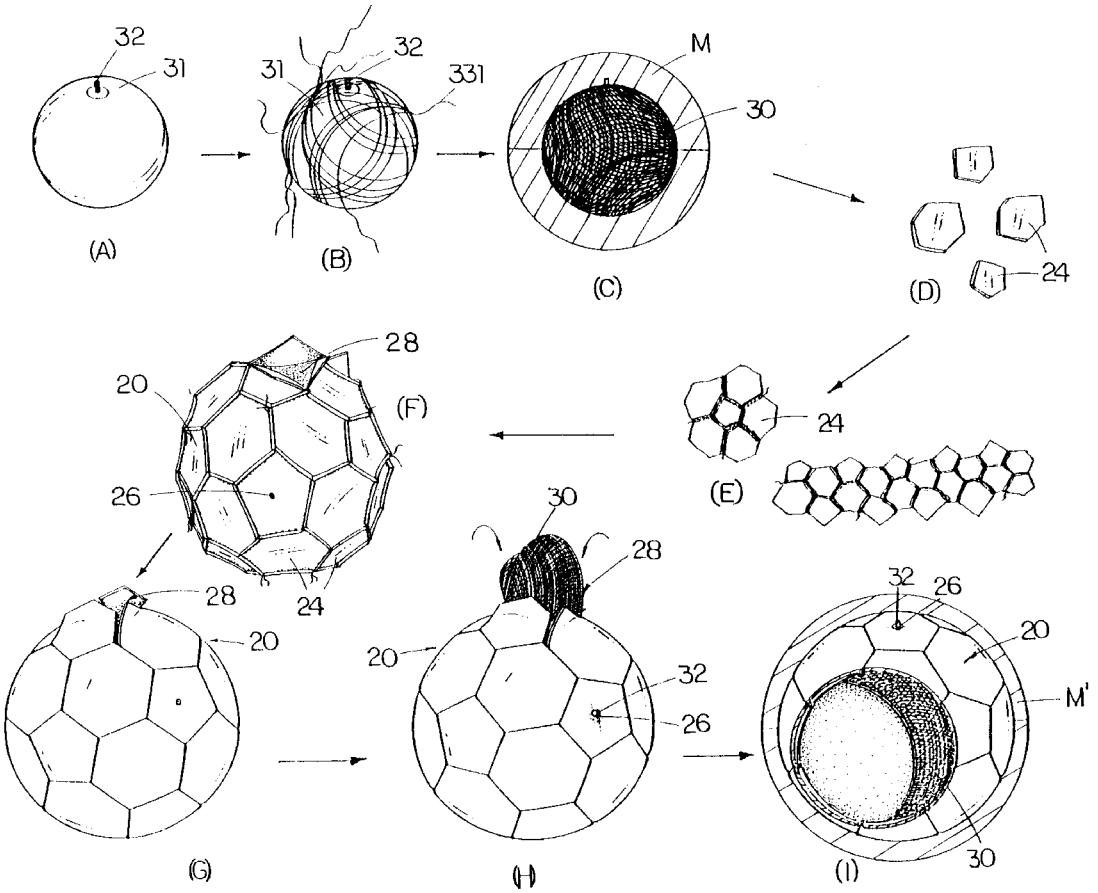
Primary Examiner—Steven B. Wong

Attorney, Agent, or Firm—David & Raymond; Raymond Y. Chan

[57] **ABSTRACT**

A sportsball includes a ball cover and a bladder. The ball cover has a valve hole provided thereon and consists of a plurality of panels connected edge to edge by machine sewing to form a roundness shape. Each of the panels has a predetermined shape and is made of leather or synthetic leather, wherein the synthetic leather has an outer coating layer, an inner lining layer, and an intermediate layer which is integrally formed between the outer coating layer and the inner lining layer and is strengthened and supported by the inner lining layer. The bladder is disposed inside the ball cover and includes a rubber made bladder ball, an exterior web layer integrally adhered on an outer surface of the bladder ball, and a valve stem which is mounted on the bladder ball and is extended through the valve hole of the ball cover to connected thereto for air inflation. The web layer includes at least an elongating strengthened thread evenly wound around and around the outer surface of the bladder ball. Therefore, the strengthened thread is overlapped with each other to form the web layer to entirely embrace the bladder ball for supporting the ball cover and resisting the stress and impact force of the sportsball.

9 Claims, 5 Drawing Sheets



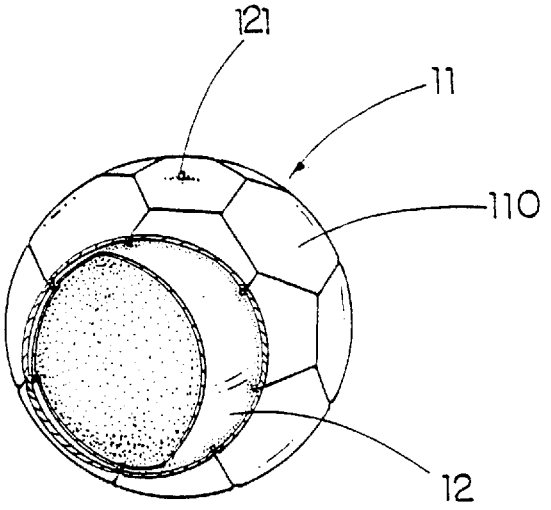


FIG. 1
PRIOR ART

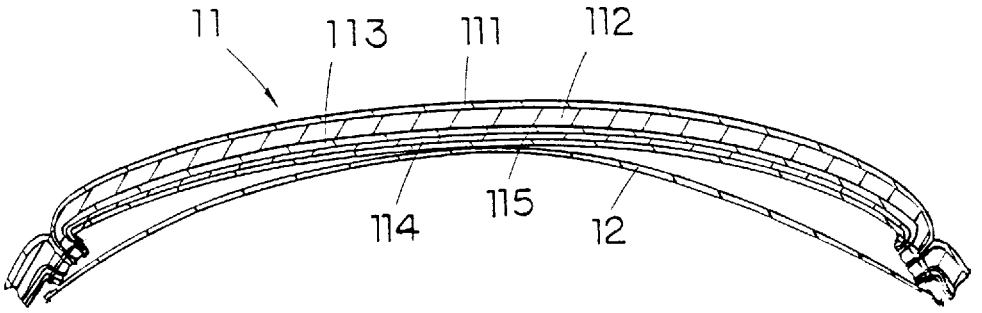


FIG. 2
PRIOR ART

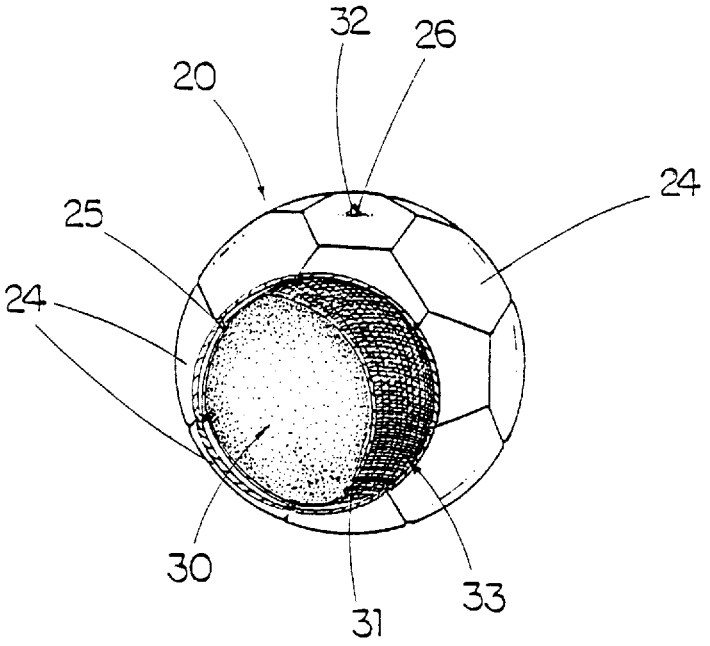


FIG. 3A

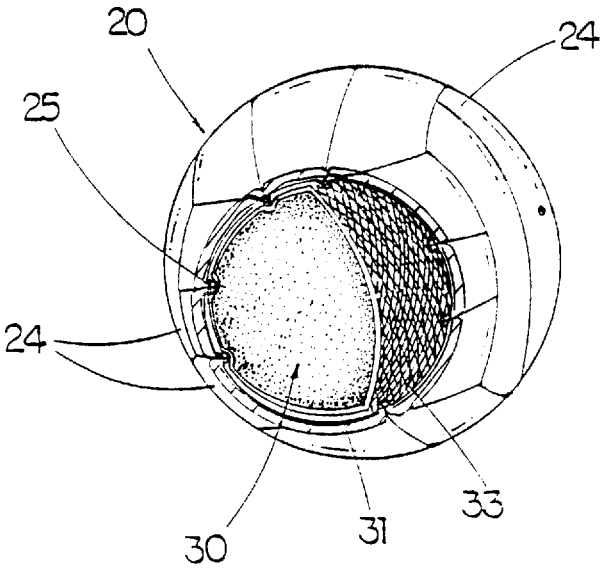


FIG. 3B

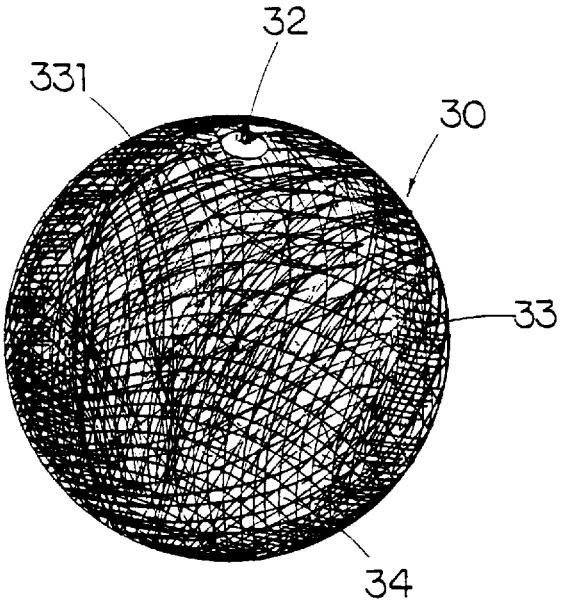


FIG. 4

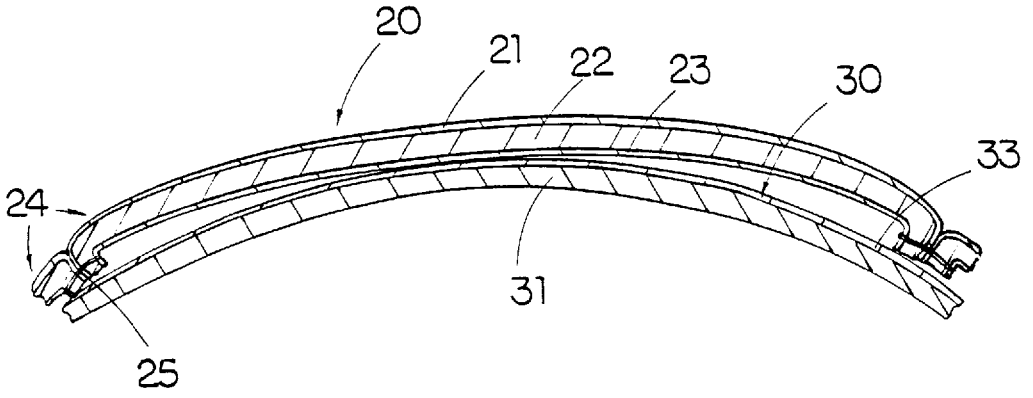


FIG. 5

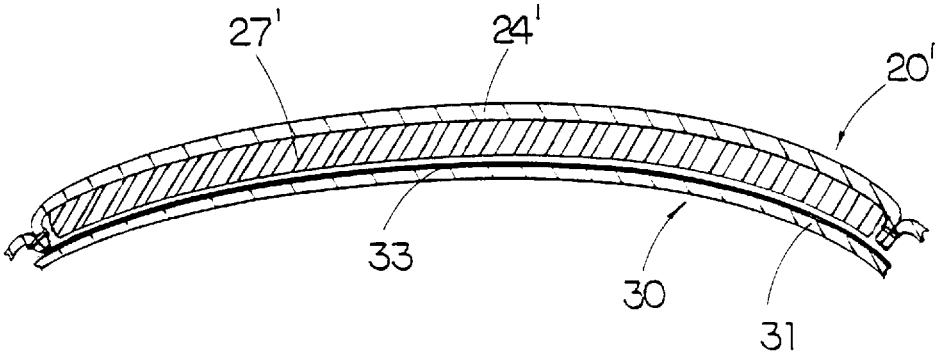


FIG. 6

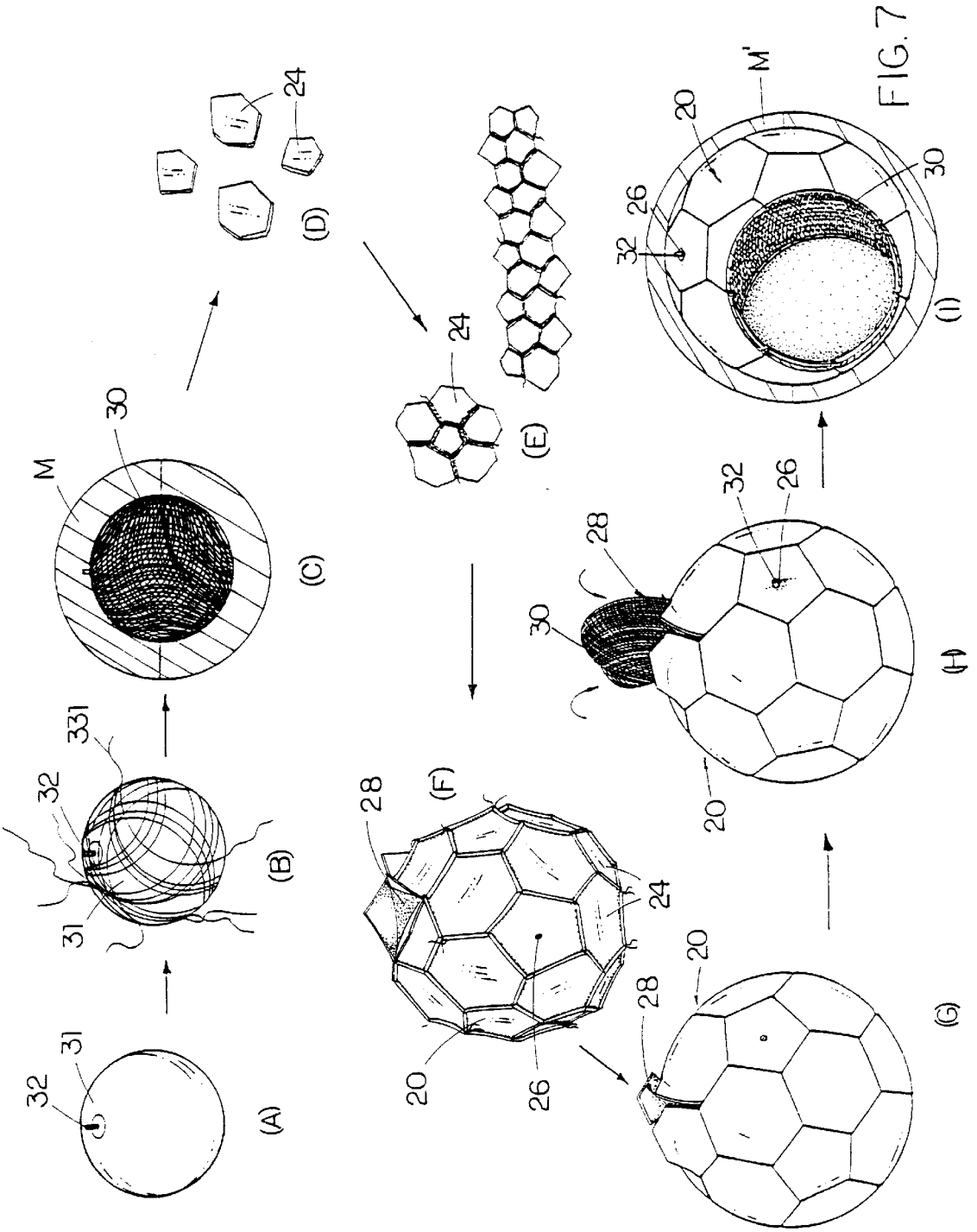


FIG. 7

SPORTSBALL AND MANUFACTURING METHOD THEREOF

BACKGROUND OF THE PRESENT INVENTION

The present invention relates to sportsballs, and more particularly to a durable sportsball adapted for mass production, moreover the sportsball can retain its spherical shape and distribute the impacting stress throughout the ball.

Sportsball such as soccer ball and volleyball, as shown in FIGS. **1** and **2**, generally comprises a ball cover **11** and a bladder **12** disposed within the ball cover **11**. The ball cover **11** is made of leather or synthetic leather such as polyurethane (PU) or polyvinyl chloride (PVC). As shown in FIG. **2**, the synthetic leather is composed of an outer coating layer **111** , an intermediate foaming layer **112** and an inner lining layer **113** to strengthen and support the foaming layer **112**. The bladder **12** is a spherical rubber ball having a valve stem **121** affixed thereon.

The leather or synthetic leather is cut into a plurality of panels **110** with predetermined shape. For soccer ball, the most common shape of the panel **110** is pentagon and hexagon. In other words, the ball cover **11** of a soccer ball is made of 12 pieces of pentagonal panels and 20 pieces of hexagonal panels by hand sewing edge to edge. The spherical ball cover **11** of a volleyball consists of 18 pieces of rectangular panels hand sewn edge to edge. The inflatable bladder **12** is placed inside the ball cover **11** and its valve stem **121** is extended outside the ball cover **11** for air inflation. When air is pumped into the bladder **12** through the valve stem **121**, the air inflates the bladder **12** to prop up the ball cover **11** and retain its roundness. Therefore, an inflated sportsball has a bouncing feature. The more air is inflated into the bladder **12**, the sportsball has a better bounce.

The rigidity and durability of a conventional sportsball as described above merely depend on the structure of the ball cover **11** but not the soft rubber bladder **12**. The structure of the ball cover **11** must be tough enough to absorb all the impact forces. Therefore, the panels **110**, either made of leather or synthetic leather, must be further strengthened by affixing at least two more layers of coarse lining **114**, **115** thereon in order to better support the ball cover **11** and resist the stress. The roundness and re-enforcement of the sportsball depend on the strength of the lining cloth. Hence, the material used for the lining cloth is very important, that it may increase the material cost of the conventional sportsballs. Basically, the additional linings **114**, **115** are glued layer by layer on the inner lining layer **113** of the synthetic leather or the inner side of the leather before cutting into the panels **110**, which increases a manufacturing adhesion step for the conventional sportsball.

However, the additional coarse linings **114**, **115** not only increase the thickness of the ball cover **11**, but also increase the hardness of the ball cover **11**. Accordingly, the thick and hard panels **110** increase the difficulty of sewing the panels together by sewing machines, especially during sewing around the sharp comers of the panels **110**, that is the weakest portion of the ball cover **11**. It is the reason that why most of the formal or classic sportsballs are still hand made. The workers have to sew the panels **110** together one by one by hand. Normally, a skillful worker can only complete the sewing process of two sportsballs per a working day. It is extremely uneconomic and time consuming that would highly increase the manufacturing cost of the sportsballs.

Another serious shortcoming of the hand sewing sportsball is that it is nearly impossible to evenly sew the panels together under same tightness. Therefore, when the sportsball is inflated, the ball cover **11** would be propped by the bladder **12** to protrude outwardly at some less tightly constructed portions of the ball cover **11**, so that the roundness of the sportsball is adversely affected. Moreover, the sewing threads may more easily be broken during heavy impact, so that thickened sewing threads should be used. In fact, no hand made sportsball is in absolutely spherical shape, that may affect the performance of the conventional sportsball. When the sportsball is hit on such protruded portion, it may not bounce to the desired direction. Besides, those weaker portions of the sportsball will more easily be worn out and those sewing threads at such portions may also more easily be broken.

Since the linings **114**, **115** are made of cloth, they tend to stretch while the sportsball is hit. At that time, the sportsball would lose its spherical shape because of the lining stretching. Practically, the inflated bladder **12** is directly propped on the additional linings **114**, **115**, therefore the major stress supporting area of the sportsball is the connecting surface between the additional linings **114**, **115** and the leather or synthetic leather of the ball cover **11**. It is well known that the stress resisting ability and the durability of cloth material are poor. In other words, the additional linings **114**, **115** are not strong enough to endure those inflating stress and impact stress, especially during the impacting of the sportsball. The additional linings **114**, **115** will rip apart sooner or later that would cause the sportsball to be worn off and damaged.

Furthermore, the leather or the thickened and hardened synthetic leather ball cover **11** of the conventional soccer ball may make the soccer player feels hurt and pain during heading, especially to children and those training players. The volleyball which is constructed by such conventional ball cover **11** may also cause the volleyball player feels pain and uncomfortable during servicing, spiking and blocking. For children and training soccer players or volleyball players, such thickened and hardened ball cover **11** of the conventional sportsball would be too rigid and hard for them.

SUMMARY OF THE PRESENT INVENTION

It is an object of the present invention to provide a sportsball which ball cover is well supported by a strengthened bladder. Therefore, no additional lining is required to adhered onto the ball cover that, it can lower the material cost and manufacturing cost of the sportsball.

It is still an object of the present invention to provide a sportsball which major stress supporting portion is the strengthened bladder.

It is still an object of the present invention to provide a sportsball which bladder has a better flexibility and impact resisting ability.

It is still an object of the present invention to provide a sportsball which is more durable and has a softer ball cover to reduce the painful during heading, especially suitable for children and training players.

It is yet an object of the present invention to provide a sportsball which has a better roundness even when it is over-inflated for 15 to 20% more than the standard pressure.

It is yet an object of the present invention to provide a sportsball made of leather, in which since the stress supporting and impact resisting portion is the strengthened bladder, but not the ball cover, the expensive leather panels of the ball cover can be made thinner to lessen the cost, and that an additional soft sponge pad layer can be adhered on an inner surface of the leather panel to soften and reinforce the leather ball cover.

It is yet an object of the present invention to provide a manufacturing method of a sportsball which enables the ball cover to be sewn by sewing machine, and thus it is suitable for mass production.

Accordingly, a sportsball of the present invention includes a ball cover and a bladder. The ball cover has a valve hole provided thereon and consists of a plurality of panels connected edge to edge by machine sewing to form a roundness shape. Each of the panels has a predetermined shape and is made of synthetic leather, wherein the synthetic leather has an outer coating layer, an inner lining layer, and an intermediate layer which is integrally formed between the outer coating layer and the inner lining layer and is strengthened and supported by the inner lining layer. The bladder which is disposed inside the ball cover includes a rubber made bladder ball, an exterior web layer integrally attached on a predetermined area of an outer surface of the bladder ball, and a valve stem which is mounted on the bladder ball and is extended through the valve hole of the ball cover to connected thereto for air inflation. The web layer includes at least an elongated strengthened thread evenly wound around and around the outer surface of the bladder ball. Therefore, the strengthened thread is overlapped to form the web layer to entirely embrace the bladder ball for supporting the bladder ball and resisting the stress and impact force applied to the sportsball.

The panels of the ball cover can also be made of thin leather with a pad layer adhered underneath for providing the softness and thickness of the ball cover.

A specific manufacturing method is used to produce the sportsball of the present invention which comprises the following steps:

(1) Inflate a rubber bladder ball which has a valve stem provided thereon.

(2) Coat at least an elongated strengthened thread such as nylon threads with glue.

(3) Wind the nylon thread evenly around and around an outer surface of the rubber ladder ball until the bladder ball is embraced by a web layer of the nylon thread to form a strengthened bladder.

(4) Heat the bladder in a mold until the web layer is permanently and rigidly united with the outer surface of the bladder ball.

(5) Cut a ball cover material, such as leather or synthetic leather made of foaming PU or PVC sponge material, into a predetermined number of panels in predetermined shape. For soccer ball, 12 pieces of pentagonal panels and 20 pieces of hexagonal panels are cut. For volleyball, 18 pieces of panels in two kinds of rectangular shape are cut.

(6) Sew the panels edge to edge together by sewing machine to form a ball cover which has a valve hole provided thereon, wherein a section of the panels are not sewn together to form an inlet opening at this stage.

(7) Heat the ball cover and turn the ball cover right side out.

(8) Insert the strengthened bladder into the ball cover through the inlet opening.

(9) Align and glue the valve stem of the bladder with the valve hole of the ball cover.

(10) Semi-inflate the bladder to make sure that the inflated bladder would prop against the ball cover.

(11) Sew the inlet opening of the ball cover together by hand.

(12) Fully inflate the sportsball to more than a standard pressure within a shaping mold to ensure a permanent structure and shape of the bladder and ball cover.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a sectional perspective view of a conventional sportsball.

FIG. **2** is a partial enlarged sectional view of a conventional sportsball.

FIG. **3**A is a sectional perspective view of a sportsball which is a soccer ball according to a first preferred embodiment of the present invention.

FIG. **3**B is a sectional perspective view of a sportsball which is a volleyball according to a first preferred embodiment of the present invention.

FIG. **4** is a perspective view of the strengthened bladder of the sportsball according to the above first preferred embodiment of the present invention.

FIG. **5** is a partial enlarged sectional view of the sportsball according to the above first preferred embodiment of the present invention.

FIG. **6** is a partial enlarged sectional view of a leather sportsball according to a second preferred embodiment of the present invention.

FIG. **7** is a illustrating diagram of a manufacturing method of the sportsball of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. **3** to **4**, a sportsball having improved structure according to a first preferred embodiment of the present invention is illustrated. The sportsball, which is a soccer ball as shown in FIG. **3**A or a volleyball as shown in FIG. **3**B, comprises a ball cover **20** and a strengthened bladder **30** disposed within the ball cover **20**. The ball cover **20** is made of leather or synthetic leather such as polyurethane (PU) or polyvinyl chloride (PVC). As shown in FIG. **5**, the synthetic leather is composed of an outer coating layer **21**, an intermediate layer **22** and an inner lining layer **23** to strengthen and support the intermediate layer **22**.

The leather or synthetic leather is cut into a plurality of panels **24** with predetermined shape. For soccer ball, the most common shape of the panel **24** is pentagon and hexagon. In other words, the ball cover **20** of a soccer ball is made of 12 pieces of pentagonal panel and 20 pieces of hexagonal panel sewn edge to edge by sewing threads **25**. The spherical ball cover **20** of a volleyball consists of 18 pieces of rectangular panel sewn edge to edge with sewing threads **25**. The ball cover **20** has a valve hole **26** provided thereon.

The inflatable bladder **30**, which is disposed inside the ball cover **20**, comprises a rubber made bladder ball **31** and a valve stem **32** mounted thereon and extended through the valve hole **26** of the ball cover **20** to connected thereto for air inflation. In accordance with the present invention, the bladder **30** further comprises an exterior web layer **33** integrally attached on an outer surface of the bladder ball **31**. As shown in FIG. **4**, the bladder ball **31** is entirely embraced by the web layer **33**. The web layer **33** comprises at least an elongating strengthened thread **331** (usually a plurality of strengthened threads **331** being applied), such as nylon threads, evenly wound around and around the outer surface of the bladder ball **31**, therefore the strengthened thread **331** is overlapped with each other to form the web layer **33**.

In order to enable the strengthened thread **331** being permanently affixed on the outer surface of the bladder ball **31**, before winding onto the bladder ball **31**, the strengthened thread **331** are coated with glue for adhering to the outer

surface of the bladder ball **31** and each other. Moreover, the bladder ball **31** with the adhering strengthened thread **331** thereon are together cured by heating in a mold, so that the adhering strengthened threads **331** will be hardened to form the web layer **33** which is permanently united with the rubber bladder ball **31** integrally.

Due to the presence of the valve stem **32** on the bladder **30**, the sportsballl may lose balance when it is flowing in air, i.e. the sportsball would fall down with the valve stem **32** always directing downwards. In order to ensure a better balance for the sportsball, as shown in FIG. **4**, a rubber pad **34** having the same weight of the valve stem **32** is further integrally adhered to an end, which is opposite to the valve stem **32**, of the bladder **30** in order to symmetrically balance the weight of the bladder **30**.

Just like the fishing net structure or the spider web structure, web structure is one of the most strengthened and rigid constructions, that can support high stress and resist high impact force. Thus, the web layer **33** highly reinforces the soft and weak rubber bladder ball **31**. In other words, the bladder **30** of the present invention is strengthened by the web layer **33** and has a better flexibility and impact resisting ability.

When air is pumped into the bladder **30** through the valve stem **32**, the air inflates the bladder **30** to prop up the ball cover **20**, as shown in FIG. **3**. According to the present invention, the strengthened bladder **30** can support and retain the ball cover **20** in the desire roundness even though the bladder **30** is over-inflated up to 15–20% more than the standard pressure of the sportsball. Moreover, the supporting force of the bladder **30** applied to the ball cover is evenly distributed, so that the sportsball can has an even roundness to fulfill most players' desire.

An essential feature of the present invention is that, the web layer **33** of the bladder **30** not only strengthens the bladder ball **31**, but also provides a reinforced supporting to the ball cover **20**. Therefore, the major stress supporting area of the sportsball is the strengthened bladder **30** which is strong enough to resist and absorb most of the impact force. The sewing threads **25** of the ball cover **20** become more durable and would not be over-stress by overinflation, and thus the sportsball is more durable and has a longer life span. The additional supporting linings of the conventional ball cover can thus be eliminated. The synthetic leather of each panel **24** of the ball cover **20** of the present invention does not need to adhere those additional linings. Accordingly, the thickness and the hardness of the conventional synthetic leather panels are reduced. In other words, the panels **24** of the ball cover **20** of the present invention is softer that enables the manufacturer to utilize thinner sewing threads **25** to sew the panels together by means of the sewing machines. For a skilled sewing machine worker, he or she can complete the sewing process of 50 sportsballs in average within one working day. The manufacturing cost and time can thus be greatly reduced. The softer ball cover **20** structure of the present invention provides a cushion effect that can reduce the painful during heading for soccer players or during spiking for volleyball players, especially suitable for the children and training players.

In view of the conventional leather made sportsball, the panels are all made of thickened leather in order to resist the stress and impact force of the sportsball. Those leather panels are thick and hard, so that the leather panels must mostly be sewn by hand. Referring to FIG. **6**, a second embodiment of a leather made sportsball is illustrated. The leather sportsball also comprises a strengthened bladder **30** as specified in the above first embodiment and a leather ball cover **20'** which is made of a plurality of leather panels **24'**. Due to the stress and impact force resisting features of the strengthened bladder **30** of the present invention, the leather panels **24'** can be made thinner which is adapted to be sewn by sewing machine. Each panel **24'** of the ball cover **20'** further comprises a pad layer **27'** adhered underneath the panel **24'**. The pad layers **27'** can be made of EVA or foaming PU or PVC to increases the overall thickness and softness of the panels **24'** of the ball cover **20'**, so that all objectives of the present invention can also be achieved.

A specific manufacturing method is used to produce the sportsball of the present invention, as illustrated in FIG. **7**, which comprises the following steps:

(1) Inflate a rubber bladder ball **31** which has a valve stem **32** provided thereon, as shown in FIG. **7**A.

(2) Coat at least an elongating strengthened threads such as nylon thread **331** with glue.

(3) Wind the nylon thread **331** evenly around and around an outer surface of the rubber bladder ball **31**, as shown in FIG. **7**B, until the bladder ball **31** is embraced by a web layer **33** of the nylon thread **331** to formna bladder **30**, as shown in FIG. **7**C.

(4) Heat the inflated bladder **30** in a mold M until the web layer **33** is permanently and rigidly united with the outer surface of the bladder ball **31**.

(5) Cut a ball cover material, such as leather or synthetic leather made of foaming PU or PVC sponge material, into a predetermined number of panels **24** in predetermined shape, as shown in FIG. **7**D. For soccer ball, 12 pieces of pentagonal panel and 20 pieces of hexagonal panels are cut. For volleyball, 18 pieces of panel in two kinds of rectangular shape are cut.

(6) Sew the panels **24** edge to edge together by sewing machine to form a ball cover **20** which has a valve hole **26** provided thereon, wherein a section of the panels **24** are not sewn together to form an inlet opening **28** at this stage, as shown in FIGS. **7**E and **7**F.

(7) Heat the ball cover **20** and turn the ball cover **20** right side out, as shown in FIG. **7**G.

(8) Insert the strengthened bladder **30** into the ball cover **20** through the inlet opening **28**, as shown in FIG. **7**H.

(9) Align and glue the valve stem **32** of the bladder **30** with the valve hole **26** of the ball cover **20**, as shown in FIG. **7**H.

(10) Semi-inflate the bladder **30** to make sure that the bladder **30** can prop against the ball cover **20**, as shown in FIG. **7**H.

(11) Sew the inlet opening **28** of the ball cover **20** together by hand to form the sportsball, as shown in FIG. **7**I.

(12) Fully inflate the sportsball to more than a standard pressure within a shaping mold M' to ensure a permanent structure and shape of the bladder **30** and the ball cover **20**, as shown in FIG. **7**I.

As specified above, the valve stem **32** on the bladder **30** may cause the sportsball losing balance when it is flowing in air, i.e. the sportsball would fall down with the valve stem **32** always directing downwards. The following step can be applied after the above step (3) in order to ensure a better balance for the sportsball:

(a) Adhere a rubber pad **34** having the same weight of the valve stem **32** integrally to an end, which is opposite to the valve stem **32**, of the bladder **30** in order to symmetrically balance the weight of the bladder **30**.

In accordance with the above described embodiments, the improved sportsball manufactured by the above method provides various remarkable features as follows.

The ball cover **20** of the sportsball is well supported by the strengthened bladder **30**. Therefore, no additional lining is required to adhered onto the ball cover **20** that, it can lower the material cost and manufacturing cost of the sportsball.

The major stress supporting portion of the improved sportsball is the strengthened bladder **30** which has a better flexibility and impact resisting ability. Therefore, the sportsball is more durable, and that the ball cover **20** can reduce the painful during heading, especially suitable for children and training players.

The improved sportsball of the present invention has a better roundness even when it is over-inflated for 15 to 20% more than the standard pressure.

Even though the improved sportsball is made of leather, since the stress supporting And impact resisting portion is the strengthened bladder, but not the ball cover, the expensive leather panels of the ball cover can be made thinner to lessen the cost, and that an additional soft sponge pad layer can be adhered on an inner surface of the leather panel to soften and reinforce the leather ball cover.

According to the improved structure of the sportsball, the ball cover **20** is able to be to be sewn by sewing machine, and thus it is suitable for mass production.

I claim:

1. A manufacturing method of a sportsball, comprising the steps of:

(a) inflating a rubber bladder ball which has a valve stem provided thereon;

(b) coating at least an elongating strengthened thread with glue;

(c) winding said strengthened thread evenly around and around an outer surface of said rubber bladder ball to overlap with each other until said bladder ball is embraced by a web layer of said strengthened thread to form a bladder, wherein said overlapped strengthened thread is adhered with each other and to said outer surface of said bladder ball;

(d) heating said bladder in a mold until said strengthened thread is hardened to form said web layer which is permanently and rigidly united with said outer surface of said bladder ball integrally;

(e) cutting a ball cover material into a predetermined number of panels in predetermined shape;

(f) sewing said panels edge to edge together by a sewing machine to form a ball cover which has a valve hole provided thereon, wherein a section of said panels are not sewn together to form an inlet opening;

(g) heating said ball cover and turn said ball cover right side out;

(h) inserting said strengthened bladder into said ball cover through said inlet opening;

(i) aligning and gluing said valve stem of said bladder with said valve hole of said ball cover;

(j) semi-inflating said bladder to make sure that said bladder is propped against said ball cover;

(k) hand sewing said inlet opening of said ball cover together to form the sportsball; and

(l) fully inflating said sportsball to more than a standard pressure within a shaping mold to ensure a permanent structure and shape of said bladder and said ball cover.

2. A manufacturing method of a sportsball, as recited in claim **1**, after step (c), further comprising an additional step of adhering a rubber pad having a same weight of said valve stem integrally to an end, which is opposite to said valve stem, of said bladder in order to symmetrically balance said bladder.

3. A manufacturing method of a sportsball, as recited in claim **1**, in which said strengthened thread is a nylon thread.

4. A manufacturing method of a sportsball, as recited in claim **2**, in which said strengthened thread is a nylon thread.

5. A manufacturing method of a sportsball, as recited in claim **1**, in which each of said panels of said ball cover (are) is made of thin leather which has a pad layer adhered underneath.

6. A manufacturing method of a sportsball, as recited in claim **2**, in which each of said panels of said ball cover (are) is made of thin leather which has a pad layer adhered underneath.

7. A manufacturing method of a sportsball, as recited in claim **1**, in which said panels of said ball cover are made of synthetic leather.

8. A manufacturing method of a sportsball, as recited in claim **7**, in which said panels of said ball cover are made of foaming polyurethane.

9. A manufacturing method of a sportsball, as recited in claim **7**, in which said panels of said ball cover are made of foaming polyvinyl chloride.

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