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(54) **ECOLOGICAL AND WATER BIODEGRADABLE SINGLE-USE GOLF BALL WHICH TURNS INTO FOOD AND ITS MANUFACTURING PROCESS**

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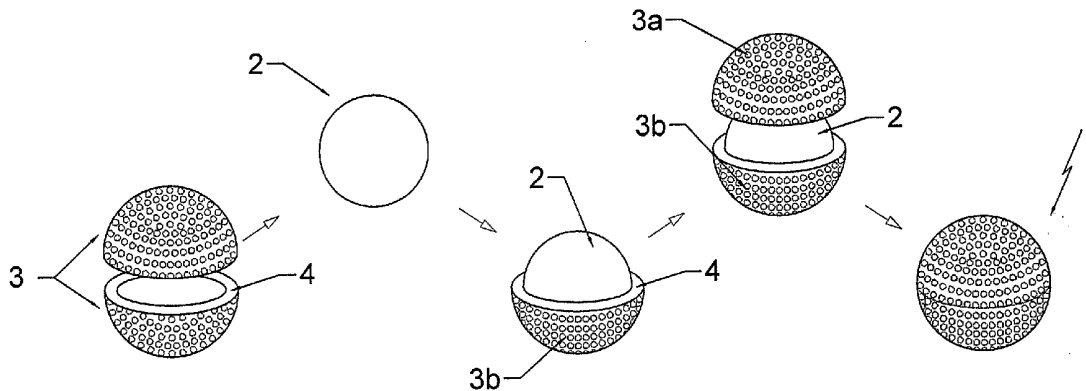
(57) **ABSTRACT**

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A single-use golf ball, which is ecological and biodegradable in water, both its cover and core. The golf ball's cover is made of several components, all biodegradable, non-toxic, ecological and for a single use. Its manufacturing process is carried out through a mixture prior to manufacturing, in an industrial mixing machine. This mixture has the following components: (a) 50-85% biopolymer PVA (an ecological biopolymer), and (b) 15-50% of several ecological additives.

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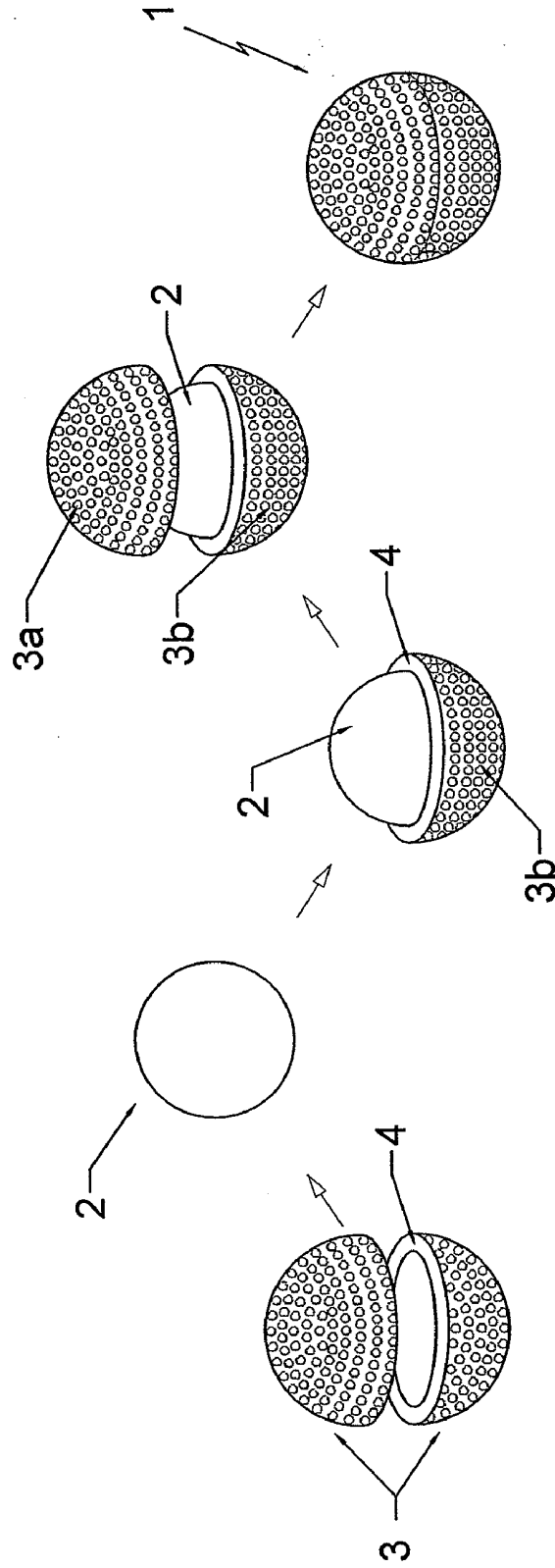


Fig. 1

**ECOLOGICAL AND WATER
BIODEGRADABLE SINGLE-USE GOLF BALL
WHICH TURNS INTO FOOD AND ITS
MANUFACTURING PROCESS**

OBJECT OF THE INVENTION

[0001] More specifically the invention refers to golf balls, for use in places where they are sure to get lost by falling into the water (e.g.: sea, ocean, lakes, rivers, ponds, swimming pools and the like), and therefore for single-use, which if abandoned, are biodegradable in water, either fresh or salt-water, and that when they degrade, in about 48 hours, they serve as food for living creatures.

[0002] Additionally the invention also refers to the manufacturing process of the single-use ball, both its outer cover, and its core.

[0003] In addition, the invention refers to the composition of the materials that form the outer cover of the ball and core.

STATE OF THE ART

[0004] Golf balls exist on the market, and therefore the state of the art of the balls, both physical composition of the materials they are made of, and the manufacturing process used, that enable the normal practice of the sport on golf courses. In addition, US patent no. 2007/0281799 refers to an "Environmentally-friendly golf ball", which comprises a central body or core, made of soluble material consisting of soya, corn, rice, beans and cereal powder, all components bound together with adhesive, made of rice flour and sweet potato gluten, and a cover made of soluble injected material on the outside.

[0005] PCT Patent no. WO 9709379 refers to a method for manufacturing a biodegradable plastic material, without a specific use, by mixing 70-85% of polyvinyl-alcohol (PVA), with a plasticizer and a stabiliser at a temperature of 106°-140° C. so that the resulting material is easily mouldable and suitable for manufacturing water-soluble and biodegradable products.

SCOPE OF THE INVENTION

[0006] This invention has been designed to obtain a totally specific product and process to manufacture the same, the main feature of which is the possibility of practicing real golf in places where there is international legislation forbidding it, and always bearing in mind sustainability and respect for the environment, as it is a single-use golf ball, its end, i.e., its useful life is very short, as it is used outside golf courses and always ends up in the water.

[0007] The single-use is a totally new purpose in the current state of the art, and is associated to its immediate biodegradability, with the additional feature of the ball's core being a specific food product for aquatic creatures, and it therefore disappears in the water, being eaten by water creatures, due to its composition. Therefore, the ball itself helps to improve the sustainability of the aquatic environment.

[0008] In contrast to the current State of the Art, the ball referred to in this invention is designed to be used in places such as beaches, piers, cruise liners, ships, yachts, sea platforms, etc. either in fresh or salt water, where up to now it was not possible to launch balls freely, because if they were to fall outside the playing area they could pollute the bed of the sea, river or lake, and therefore it was necessary to have protective elements (nets) to catch the balls.

[0009] In addition, there is specific international legislation applicable to ships, which forbids launching and disposing of plastic substances into the sea, this is specifically APPENDIX V of the IMO (INTERNATIONAL MARITIME ORGANISATION) MARPOL Convention that refers to the prevention of marine pollution by waste issued from ships.

[0010] In contrast to the State of the Art described in the previous section, this invention has been designed with the following aims:

[0011] A single-use ball.

[0012] A ball to be used exclusively in areas where it will surely fall into water (ocean, sea, river, lake, pond and the like).

[0013] The ball's cover is ecological and biodegradable, resulting in a "non-toxic" collection of biodegradable components when it degrades.

[0014] The core of the ball is composed of food, especially designed for feeding fish, composed of certified and tested food for living creatures.

DESCRIPTION OF THE INVENTION

[0015] The purpose of this invention is:

[0016] An ecological and water biodegradable single-use golf ball.

[0017] The manufacturing process of the aforementioned ball, both its cover and core.

[0018] The materials used to make the cover and core of the ball.

[0019] The single-use golf ball's cover is made of several components, all biodegradable, non-toxic, and for a single use, and its manufacturing process is carried out through a mixture prior to manufacturing, in an industrial mixing machine. This mixture has the following components:

[0020] 50-85% biopolymer PVA (an ecological biopolymer), and

[0021] 15-50% of several ecological additives.

[0022] This mixture gives the outer layer or external cover of the ball, the hardness and resistance necessary to bear the force of the golf club when it hits the ball, as well the characteristic texture, size, weight and colour of conventional golf balls.

[0023] Regarding resistance to impact, tests carried out with balls manufactured in accordance with the invention show average impact resistance results of 780 J/m², which can be considered excellent, carried out using the IZOD (ASTM D256, ISO 180) impact test, which measures impact resistance of a material against a pendulum.

[0024] Basically the thickness of the ball's cover or external layer will be 5.3 mm (±0.5 mm), and the diameter of the core will be 32 mm (±0.5 mm).

[0025] With the aforementioned parameters, the distance achieved when launching these balls, using standard golf clubs, in comparison to the current practice clubs, made of non biodegradable and toxic plastic, 80% in long metal and wooden clubs, and 100% in short irons, totally different and better values than those achieved with the embodiments enumerated in the state of the art.

[0026] The external cover is composed of several components, all biodegradable and non-toxic, and its manufacturing process is carried out in several production processes, the first being the preliminary mixture of the components in an industrial mixer, which are 50-85% polyvinyl-alcohol (an ecological biopolymer) and 15-50% several ecological additives, and then extrusion and injection.

[0027] To carry out this mixture of components that make up the external cover of the product, the polyvinyl-alcohol is mixed (at ambient temperature) for 10-25 minutes, with all the aforementioned components, at a constant speed to achieve perfect homogenization.

[0028] When the mixture has been obtained, it is then extruded. The extrusion process is carried out at a temperature of 150° C.-220° C., thereby obtaining a pellet apt for injection. This pellet is injected into a mould with two semi-spherical cavities, which together form the hollow volume of the external cover. Injection is carried out at a temperature of 154° C.-219° C.

[0029] The mould used contains two identical parts; semi-spherical inside, with the same external dimensions as a conventional golf ball, and the external surface of the ball has the typical dimples.

[0030] Once the two parts are obtained by injection, as described above, they are fitted together. To do this, first the core is placed inside one of the two halves, then the ball is closed and then the two semi-spheres are sealed together, which is carried out by applying an ecological adhesive, e.g., polyvinyl-alcohol or the like.

[0031] Other details and characteristics shall be shown throughout the description below referring to drawings attached to this report which are shown for illustrative but not limiting purposes only in a drawing of the invention.

DESCRIPTION OF THE DRAWINGS

[0032] FIG. 1 shows a perspective view of the different parts of the ball (1) object of the invention, comprising a cover (3) formed by two shells (3a-3b) and a spherical core (2).

DESCRIPTION OF A PREFERRED POSSIBLE EMBODIMENT OF THE INVENTION

[0033] In one of the possible embodiments of the invention, its purposes are:

[0034] Manufacturing the cover (3) of the ball (1).

[0035] The composition of the cover (3).

[0036] Manufacturing the core (2).

[0037] The composition of the core (2).

[0038] The cover (3) is composed of two semi-spherical halves (3a-3b), made by mixing the following products, which are both biodegradable and non-toxic, namely:

[0039] Polyvinyl-alcohol: 50-85%.

[0040] Several ecological additives: 15-50%.

[0041] The manufacture of the external cover (3), formed by the shells (3a-3b), begins by making a prior mixture with the aid of an industrial mixer, using the components described in the above paragraph. This mixture is made cold, i.e. at ambient temperature.

[0042] The polyvinyl-alcohol, as has been indicated, is mixed 10-25 minutes, with all the other components (ecological additives) at a constant speed until perfect homogenization is achieved.

[0043] At the same time, the core is manufactured (2), specifically designed to serve as food for aquatic creatures in general, composed especially of mineral extracts, fish oils, salts, proteins (up to 32%), and carbohydrate; and an external cover (3) made of two semi-spherical halves (3a-3b) joined solidly together, each of which has been manufactured with non-toxic ecological and biodegradable components, referred to above. The core (2) is manufactured by mixing the different components mentioned above, and then compacting until it forms a spherical core of 32 mm (± 0.5 mm) diameter.

[0044] When the two semi-spherical parts (3a-3b) that make up the cover (3) have and the mass of the core (2) been produced, the core (2) is placed inside one of the two shells (3a-3b), and it is sealed with an ecological adhesive product, e.g. polyvinyl-alcohol, applied to the edge (4) of one of the shells (3a-3b).

[0045] Having sufficiently described this invention using the drawings attached, it is easy to understand that any modification may be made to the detail which may be deemed to be appropriate, whenever these changes do not alter the essence of the invention summarised in the following claims.

1. An ecological and water biodegradable single-use golf ball turning into food, comprising a biodegradable cover formed with two semi-spherical halves and a biodegradable core, for several uses, located inside the cover, wherein the single-use ball is manufactured by injection moulding of a pellet obtained by prior extrusion of a mixture obtained from polyvinyl-alcohol and several ecological additives, the extrusion is carried out at a temperature of 150-220° C., obtaining a pellet suitable for subsequent injection, which is injected into a mould formed by two hollow semi-spherical halves that form the external cover as a layer, the injection carried out at a temperature of 154° C.-219° C.

2. A single-use golf ball according to the claim 1, wherein, firstly, to manufacture the cover of the ball, polyvinyl-alcohol and the ecological additives are mixed for 10 to 25 minutes in an industrial mixer at ambient temperature and a constant speed, until perfect homogenization is achieved.

3. A single-use golf ball according to the claim 1, wherein, once the two semi-spherical parts forming the cover of the ball have been obtained, and a core mass has been obtained, the core is placed inside one of the two shells and then the edges of the shells are sealed together with an ecological adhesive.

4. A single-use golf ball according to claim 3, wherein, the adhesive used to stick the two shells together by their edges is an ecological adhesive.

5. A single-use golf ball according to the claim 1, wherein, the cover of the ball is 4.8-5.8 mm thick.

6. A single-use golf ball according to the claim 1, wherein, the diameter of the core serving as food is 31.5-32.5 mm.

7. A single-use golf ball according to claim 4, wherein the ecological adhesive comprises, polyvinyl-alcohol.

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