OUTER COVERING FOR A BALL

The invention relates to the outer covering for a ball (1), in particular for a football, comprising a plurality of joined together, in particular, sewn, sections (2, 3, 4). The invention is characterised by a first group of essentially similar shaped sections (2) having an essentially circular shape which form or cover a spherical cap of the outer covering of the ball (1), or having an essentially ring-like shape which form or cover a spherical area of the outer covering of the ball (1) in order to produce said type of outer covering for a ball with the least possible amount of sections and the smallest number of joining points of several sewn parts. Two adjacent sections (2) of the first group are joined via a section (3) of a second group to an essentially similar shaped section, which adapts to one of the bordering shapes of the section (2) of the first group, and they have an elongate shape.
Fig. 3
OUTER COVERING FOR A BALL

[0001] The invention relates to a ball cover, in particular for footballs, which exhibits a number of portions which are joined, in particular sewn, together.

[0002] Ball covers of this kind have been known for a long time in the state of the art, for which reference is made by way of example to US 2007/0225094 A1.

[0003] FIG. 1 shows a perspective view of a known ball cover which is formed from a number of portions which are made of leather or of plastic for example, and with which the surface of the ball, i.e. a sphere or a surface of an ellipsoid, is parquetted. In the case of the ball cover 1 shown in FIG. 1, use is made of hexagons 19 and pentagons 20 which are joined together. Five hexagons 19 are arranged around each pentagon 20 adjoining its side faces. With this, three seams come together at every corner of the hexagons 19 and pentagons 20, namely at the meeting point 21. Such a ball cover 1 consists for example of 32 portions (20 hexagons and 12 pentagons) exhibiting 40 such meeting points 21 of three seams.

[0004] In addition, the state of the art describes a large variety of ways in which the surface portions forming the ball cover can be shaped.

[0005] In DE 196 29 727 C2 the surface of the ball is formed from circular portions between which are arranged correspondingly cut connecting portions which each join four circular portions.

[0006] DE 195 35 636 A1 parquets the surface of the ball with a large number of polygons. Here circle-like structures are formed by a number of triangles e.g. by 10, and a plurality of these circle-like structures are joined together by further polygons.

[0007] Further ball covers with particular designs of portions are known for example from DE-PS 418 700, DE-PS 622 592, DE-PS 682 750, DE 44 08 047 A1, DE 44 34 751 A1 and DE 89 08 027 U1.

[0008] For all the known ball covers, three criteria must be borne in mind in order to be able to manufacture a ball which is economical and also exhibits good playing properties.

[0009] Firstly, it must be remembered that the number of portions with which the spherical surface is parquetted must not be excessively large. A ball cover can only be manufactured economically if this applies. If there are too many portions which each have to be joined, for example sewn, together, a large amount of work is necessary to manufacture the ball cover which makes the manufacturing costs high.

[0010] It is also disadvantageous when there are a large number of meeting points of seams. When the ball is used in the wet the ball cover can absorb water, in particular at the points at which a plurality of seams meet, which has a negative effect on the playing properties. A good ball should absorb little water so that its playing properties are not changed even when used in damp surroundings. Thus, it is important to ensure that the surface of the ball exhibits as few meeting points of a plurality of seams as possible.

[0011] Lastly, the circularity of the ball or ball cover is very important. The ball should be as round as possible, i.e. as far as possible exhibit the precise shape of a sphere or an ellipsoid. This can only be achieved approximately because the individual portions are essentially flat and are only shaped like a ball by the internal pressure in the ball through their elasticity.

[0012] Through its very design, a ball of the kind named initially which is composed of hexagons and pentagons has a certain degree of circularity error which is illustrated in FIG. 10. There, the section through the ball cover according to FIG. 1 is shown along a great circle and centrally through a pentagon 20 and two hexagons 19 over a quarter of the circumference of the ball. The illustration shows the distances between the centre of the ball 22 and the middle of the portion and to the meeting points of two portions. Here, the portions are drawn flat, i.e. deformation in the shape of a ball by the pressure in the interior of the ball is not taken into account.

[0013] The radius $r_{10}$ is the distance from the centre of the ball 22 to the middle of the pentagon 20: in one embodiment example it is 103.3 mm. The distance $r_{0}$ denotes the distance between the centre of the ball 22 and the middle of a hexagon 19 and in the embodiment example this radius is 106.1 mm. The radius $r_{3}$ describes the distance from the centre of the ball 22 to the junction point between a pentagon 20 and a hexagon 19 and in the embodiment example is 108.7 mm. $r_{4}$ is the distance between the centre of the ball 22 and the connecting point between two hexagons 19: in the embodiment example the value is 110.2 mm. The ratio between the largest and the smallest radius—in the present case between the radius $r_{4}$ and the radius $r_{3}$—indicates the circularity error of the ball cover 1: in the embodiment example the ratio is 1.067.

[0014] It is important to ensure that this ratio is as close as possible to the value 1 so that the circularity of the ball cover is as great as possible.

[0015] In the light of the known embodiments of a ball cover, the underlying object of the invention is to create a ball cover of the kind named initially in which all three named criteria are satisfied in optimum fashion, i.e. so that the ball cover exhibits the smallest possible number of portions which have to be sewn together, so that the number of meeting points of a plurality of seams is as small as possible, and also so that the circularity of the ball is as great as possible.

[0016] The means by which this object is achieved by the invention is characterised by a first group of essentially identically shaped portions with an essentially circular shape which form or cover a spherical cap of the ball cover, or with an essentially circular ring like shape which form or cover a spherical zone of the ball cover, so that in each case two neighbouring portions of the first group are each joined through a portion of a second group of essentially identically shaped portions which exhibit an elongated shape matching the adjoining shape of the portions of the first group.

[0017] Preferably, at least four portions of the first group are arranged distributed uniformly on the surface of the ball cover; in one preferred form of embodiment six portions of the first group are arranged distributed uniformly on the surface of the ball cover.

[0018] In a further variant of the ball cover according to the invention, at least some of the portions of the first group, preferably all the portions of the first group, essentially exhibit a circular ring like shape and concentric portions of
a third group with an essentially circular shape are arranged in the interior of the circular ring. Here, provision can be made so that at least some of the portions of the first group, preferably all the portions of the first group, are each made of a portion of a circular ring interrupted at a single point on the circumference, and the sides of the part of the circular ring facing the point of interruption are joined, in particular sewn, together. In addition, provision can be made so that when the portion of the first group is flat and free of stress, the point of interruption extends over an angular range of between 20° and 130°, preferably between 40° and 50°, with six portions of the first group and between 60° and 70° with four portions of the first group.

[0019] As an alternative to this, provision can also be made so that at least some of the portions of the first group, preferably all the portions of the first group, are each made of a portion of a circular ring which is interrupted at a plurality, preferably at three or four points on the circumference, and the sides of the part of the circular ring facing the points of interruption are joined, in particular sewn, together. When the part of the circular ring is manufactured as explained previously, by joining together the ends of a single point of interruption of a portion of a circular ring, a plurality of segment like elements with the shape of part of a circular ring, preferably of the same size, can be joined together in order to form the complete part of the circular ring. Here, preferably four segments forming part of the circular ring of the same size are used when the ball cover is provided with six portions of the first group; advantageously three segments forming part of the circular ring of the same size can be used when the ball cover is provided with four portions of the first group.

[0020] Here, preferably, the outer radius of the part of the circular ring formed by the portions of the first group is at least double the inner radius of the part of the circular ring.

[0021] With regard to the portions of the second group having an elongated shape, the following variants have proved themselves:

[0022] Firstly, provision can be made so that the portions of the second group are strip shaped. Here, each portion of the second group can exhibit a length which is at least double the greatest breadth of the portion. In addition, each portion of the second group can be symmetrical with respect to two axes standing at right angles to one another.

[0023] One good way of parquetting the surface of the ball cover is favored if according to the variant each portion of the second group exhibits a point formed by two straight lines or two arcs of a circle on both transverse sides. The straight lines or arcs of a circle can enclose an angle in relation to one of the axes of between 35° and 110°, preferably between 40° and 60°, in particular preferably between 47° and 49°, with four portions of the first group and between 56° and 59° with six portions of the first group.

[0024] The lateral boundary of the two longitudinal sides of each portion of the second group can be formed by an arc of a circle or by an arc of an ellipse. The portions of the second group can also exhibit a greater breadth in their end regions than in their middle region. Preferably, the greatest breadth of each portion of the second group is at least double the smallest breadth of the portion.

[0025] The ball cover or its parts are advantageously made of plastic, in particular of thermoplastic or duroplastic material, or of rubber. The plastic can be polyethylene, polypropylene, polybutene, polyamide, polyurethane, polyvinylchloride, polyolefin, ethylene-vinyl-acetate or a mixture of at least two of these plastics. The ball cover or its parts can also be made of leather or synthetic leather. In addition, synthetic material is also suitable for the ball cover, for example, a woven fabric made of nylon or cotton.

[0026] The proposed ball cover is characterized by a relatively small number of portions which parquet the surface of the ball. In addition, the number of meeting points of seams is relatively small. Finally, the ball cover has good circularity.

[0027] In addition, it is essential that the required portions for the parquenting of the surface of the ball exhibit a relatively simple contour which makes the manufacturing and handling during processing simple.

[0028] In addition, the ball cover according to the invention advantageously also has very high formal stability.

[0029] An embodiment example of the invention is shown in the drawing in which:

[0030] FIG. 1 shows a perspective view of a ball cover according to the state of the art;

[0031] FIG. 2 shows a perspective view of a ball cover according to one form of embodiment of the design according to the invention;

[0032] FIG. 3 shows a larger illustration of the ball cover according to FIG. 2;

[0033] FIG. 4 shows a plan view of a portion of the first group lying flat;

[0034] FIG. 5 shows a plan view of a portion of the second group lying flat;

[0035] FIG. 6 shows a plan view of a portion of the third group lying flat;

[0036] FIG. 7 shows a larger illustration of a plan view according to FIG. 5;

[0037] FIG. 8 shows a spherical zone of the ball cover, as formed or covered by a portion of the first group;

[0038] FIG. 9 shows a spherical cap of the ball cover, as formed or covered by a portion of the third group;

[0039] FIG. 10 shows a section through the ball cover according to FIG. 1 according to the state of the art along a great circle and centrally through a pentagon and two hexagons and

[0040] FIG. 11 shows the section corresponding to FIG. 10 through the ball cover according to FIG. 2.

[0041] FIG. 2 shows an embodiment example of the ball cover 1 according to the invention. FIG. 3 shows the ball cover 1 enlarged. As can be seen, the surface of the ball is provided with three differently shaped portions 2, 3 and 4, all of which are sewn together. As an alternative to being sewn, the portions can also be glued or welded.

[0042] The ball cover 1 can be used for footballs or volleyballs and for any other balls.

[0043] A first group of portions 2 has an essentially circular ring like shape forming or covering a spherical zone
of the ball cover 1. A spherical zone 23 is illustrated in FIG. 8. This is the surface of the spherical layer shown in perspective in this figure. In the embodiment example six portions 2 of the first group are arranged distributed uniformly over the surface of the ball cover. Another preferred form of embodiment (not shown) only exhibits four portions 2.

[0044] Portions 4 of a third group are arranged centrally within the opening formed by portion 2. This third group of portions 4 is essentially circular in shape and forms or covers a spherical cap of the ball cover 1. A spherical cap 24 is shown in FIG. 9. This is the surface of the spherical segment shown in perspective in this figure. In the embodiment example six portions 4 of the third group are arranged within the portions 2.

[0045] The junction between two portions 2 is produced through portions 3 of a second group. The portions 3 have a shape matching the adjoining shape of the first group 2. In addition, they are elongated or strip shaped. In the illustrated ball cover, a total of twelve portions 3 of the second group are used. With these, there are meeting points 21 at which three seams meet—as can be seen in FIG. 3. Whereas there are only 20 such points here, the ball cover according to the state of the art exhibits 32 such points which are critical with regard to absorption of water. This improves the consistency of the playing properties of the ball cover according to the invention.

[0046] In FIGS. 4, 5 and 6 the three groups of portions 2, 3 and 4 are shown separately in the form of surfaces which are spread and lie flat and only adopt the shape shown in FIG. 3 after being sewn together.

[0047] FIG. 4 shows the appearance of the basic part from which a circular ring like portion 2 (see FIG. 3) is formed. A part of a circular ring exhibits an interruption at point 5 on the circumference. This interruption extends over an angle $\beta$ which preferably lies between 20° and 130° and with six portions 2 preferably around roughly 45°. The sides 6 and 7 facing the point of interruption are then sewn together to form the portion 2. Here, one side 6 or 7 or both sides can be straight or be provided with an arc of a circle. FIG. 4 shows that both sides 6, 7 are slightly circular so that the portion 2 essentially exhibits the shape of a spherical zone 23 (see FIG. 8) after the sides 6, 7 are sewn together. Otherwise, the shape of the part of the circular ring is determined by the radii $R_1$ and $R_2$. In the embodiment example, the outer radius $R_1$ is 78.2 mm while the inner radius $R_2$ is 28.2 mm.

[0048] The portions 3 of the second group are illustrated in FIG. 3 and—in greater detail—in FIG. 7. The portion 3 is elongated or strip-shaped. Here, the length $L$ of the portion 3 is at least double the greatest breadth $B$ of the portion 3. The portion 3 is also symmetrical with respect to two axes 8 and 9 which stand at right angles to one another. A pointed widening is provided on each of the two transverse sides 10 of the portion 3, i.e. a point 13 which is formed by two straight lines 11 and 12 or by two arcs of a circle. In the embodiment example, two straight lines 11 and 12 are provided which enclose an angle $\alpha$ of 57° in relation to the axis 8.

[0049] The lateral boundaries 14 of the portions 3 in the area of their longitudinal sides 15 are formed by arcs of an ellipse, possibly also by arcs of a circle, the size of which is chosen so that when sewn together with the portions 2 they match the circular shape defined by the outer radii $R_1$ of the portions 2. In the embodiment example with six portions 2, the length of the arc $s$ is a quarter of the circumference which is defined by the outer edge of the circular ring portion 2. In the case of four portions 2, the length of the arc would be a third of the circumference.

[0050] As can be seen further, as a result, the portions 3 are shaped so that in the end region 16 and 17 they have a greater breadth $B$ than in their middle area 18 where the breadth is designated $b$. Here, the greatest breadth $B$ of each portion 3 is at least double the smallest breadth $b$. In the embodiment example, the breadth $b$ is 14 mm.

[0051] In relation to the ball cover sketched in FIG. 1, it should be mentioned that the length $L$ of the portions 3 is greater than the diameter of the hexagons 19, as a result of which the proposed ball cover has higher formal stability.

[0052] Lastly, FIG. 6 shows a portion 4 of the third group which consists of a part of a circle. In the embodiment example, the radius $R_3$ of the part is 24.0 mm. This radius can also be significantly greater and more than 30 mm. This is the case in particular when a valve for filling the bladder has to be incorporated in one of the portions 4.

[0053] Thus, the ball cover 1 only exhibits relatively few portions (namely 24 compared with the 32 of the ball cover according to FIG. 1), and the number of meeting points of three seams, which is 20, is significantly less than in the case of the ball cover according to FIG. 1 where there are 32 points.

[0054] In addition, through the design, the circularity of the ball cover 1 in the solution according to the invention is better than in the case of the ball according to FIG. 1. As already stated (refer to the statements in connection with FIG. 10), there a minimum radius $r_{11}$ of 103.3 mm is combined with a maximum radius $r_{13}$ of 110.2 mm. Thus, the maximum radius is 106.7% of the minimum radius.

[0055] The ratios in the case of the ball in the embodiment example according to the invention are shown in FIG. 11.

[0056] For the ball cover 1 according to FIGS. 2 and 3, the section through the ball cover in FIG. 11 runs along a great circle and is drawn so that the axis 9 (see FIG. 7) runs along the section. The illustration shows the distances between the centre 22 of the ball and the portions 2, 3 and 4, with the portions drawn flat, i.e. taking no account of the deformation in the shape of a ball due to the pressure in the interior of the ball.

[0057] The radius $r_{11}$ is the distance between the centre 22 of the ball to the middle of the portion 4 (portion of a circle); in the embodiment example it is 107.5 mm. The distance $r_{12}$ is the distance between the centre 22 of the ball and the middle of the portion 2 (circular ring), and in the embodiment example this radius is 107.2 mm. The radius $r_{13}$ is the distance from the centre 22 of the ball to the middle of the portion 3 and in the embodiment example is 109.0 mm. $r_{14}$ is the distance between the centre 22 of the ball and the connection point between the portions 2 and 4, in the embodiment example the value is 109.8 mm. The ratio between the largest and smallest radius—in the present case between the radius $r_{14}$ and the radius $r_{12}$—indicates in turn
the (maximum) circularity error of the ball cover 1; in the embodiment example the ratio is 1.024, i.e. the maximum radius is 102.4% of the minimum radius. As a result, the circularity of the ball is a lot better than with the previously known ball according to FIG. 1 (106.7%).

[0058] Preferably, a variant is provided in which the radius \( R_1 \) of the portion 4 is between 15% and 45% of the (average) radius of the ball cover 1. The average radius means the arithmetic average value of the four radii named in FIG. 11.

[0059] Here, the inner radius \( R_2 \) of the portion 2 is advantageously between 110% and 130%, preferably between 113% and 117% of the radius \( R_3 \) of the portion 4 in the embodiment example described with six portions 2. With four portions 2 this will preferably lie between 118% and 122% of the named radius.

[0060] The outer radius \( R_1 \) of the portion 2 is preferably between 60% and 90%, in particular, between 70% and 80% of the (average) radius of the ball cover 1.

[0061] The length \( L \) of the portion 3 in the case of the embodiment example with six portions 2 is preferably between 90% and 220%, in particular, between 100% and 120% of the (average) radius of the ball cover 1. When only four portions 2 are provided, the length \( L \) is preferably between 180% and 220% of this radius.

[0062] The smallest breadth \( b \) of the portion 3 is advantageously between 10% and 20%, preferably between 12% and 17%, of the length \( L \) of the portion 3.

[0063] The named numerical information is purely exemplary and can change in other embodiment examples.

LIST OF REFERENCES

[0064] 1. Ball Cover
[0065] 2. Portion
[0066] 3. Portion
[0067] 4. Portion
[0068] 5. Point on the Circumference
[0069] 6. Side
[0070] 7. Side
[0071] 8. Axis
[0072] 9. Axis
[0073] 10. Transverse Side
[0074] 11. Straight line or arc of a circle
[0075] 12. Straight line or arc of a circle
[0076] 13. Point
[0077] 14. Lateral Boundary
[0078] 15. Longitudinal Side
[0079] 16. End Region
[0080] 17. End Region
[0081] 18. Middle Region
[0082] 19. Hexagon
[0083] 20. Pentagon
[0084] 21. Meeting Point of Seams
[0085] 22. Centre of Ball
[0086] 23. Spherical Zone
[0087] 24. Spherical Cap
[0088] α Angle
[0089] β Angle
[0090] \( R_1 \), Outer radius of portion 2
[0091] \( R_2 \), Inner radius of portion 2
[0092] \( R_3 \), Radius of portion 4
[0093] L, Length of portion 3
[0094] B, Greatest breadth of portion 3
[0095] b, Smallest breadth of portion 3
[0096] \( r_{15} \), Radius
[0097] \( r_{25} \), Radius
[0098] \( r_{16} \), Radius
[0099] \( r_{26} \), Radius
[0100] \( r_{17} \), Radius
[0101] \( r_{18} \), Radius
[0102] \( r_{19} \), Radius
[0103] \( r_{14} \), Radius
[0104] s, Length of arc

1. Ball cover (1), in particular for footballs, which exhibits a number of portions (2, 3, 4) which are joined, in particular sewn, together, characterised by a first group of essentially identically shaped portions (2) with an with an essentially circular ring like shape which form or cover a spherical zone of the ball cover (1), with in each case two neighbouring portions (2) of the first group being joined by means of a portion (3) of a second group of essentially identically shaped portions which exhibit an elongated shape matching the adjoining shape of the portions (2) of the first group, wherein in the interior of the circular ring like shaped portions (2) of the first group portions (4) of a third group are arranged having an essentially circular shape and being arranged concentrically to the portions (2) of the first group.

2. Ball cover according to claim 1, characterised in that at least four portions (2) of the first group are arranged distributed uniformly on the surface of the ball cover (1).

3. Ball cover according to claim 2, characterised in that six portions (2) of the first group are arranged distributed uniformly on the surface of the ball cover (1).

4. Ball cover according to one of claim 1, characterised in that at least some of the portions (2) of the first group, preferably all the portions (2) of the first group, are made from a part of a circular ring interrupted at a point on the circumference (5), with the sides (6, 7) of the part of the circular ring facing the point of interruption being joined, in particular sewn, together.

5. Ball cover according to claim 4, characterised in that when the portion (2) of the first group is flat and free of stress, the point of interruption extends over an angular range (\( \beta \)) of between 20° and 130°, preferably between 40° and 50° with six portions (2) of the first group and between 60° and 70° with four portions (2) of the first group.
6. Ball cover according to claim 3, characterised in that at least some of the portions (2) of the first group, preferably all the portions (2) of the first group, are made from a part of a circular ring interrupted at a plurality, preferably three or four points on the circumference, with the sides of the part of the circular ring facing the points of interruption joined, in particular sewn, together.

7. Ball cover according to claim 4, characterised in that the outer radius (R₁) of the part of the circumferential ring formed by the portions (2) of the first group, is at least double the inner radius (R₂) of the part of the circular ring.

8. Ball cover according to one of claim 1, characterised in that the portions (3) of the second group are elongated in shape or strip-shaped.

9. Ball cover according to one of claim 1, characterised in that each portion (3) of the second group exhibits a length (L) which is at least double the greatest breadth (B) of the portion (3).

10. Ball cover according to one of claim 1, characterised in that each portion (3) of the second group is symmetrical with respect to two axes (8, 9) standing at right angles to one another.

11. Ball cover according to one of claim 1, characterised in that each portion (3) of the second group exhibits a point (13) formed by two straight lines or two arcs of a circle (11, 12) on both transverse sides (10).

12. Ball cover according to claim 11, characterised in that the straight lines or arcs of a circle (11, 12) enclose an angle (α) with one of the axes (8) of between 35° and 110°, preferably between 40° and 60°, in particular preferably between 47° and 49° with four portions (2) of the first group, and between 56° and 59° with six portions (2) of the first group.

13. Ball cover according to one of claim 1, characterised in that the side boundary (14) of the two longitudinal sides (15) of each portion (3) of the second group is formed by an arc of an ellipse or by an arc of a circle.

14. Ball cover according to one of claim 1, characterised in that the portions (3) of the second group exhibit a greater breadth (B) in their end regions (16, 17) than in their middle region (18).

15. Ball cover according to claim 14, characterised in that the greatest breadth (B) of each portion (3) of the second group is at least double the smallest breadth (b) of the portion (3).

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