

TAKRAW BALLS

This invention relates to takraw balls and it particularly relates to synthetic takraw balls woven from strips of plastics material.

Background

5 Sepak Takraw is played by opposing teams passing a takraw ball across a chest-high net using feet, knees, head, shoulders etc., i.e. every part of the body except the player's hands and arms. The object of the game is to ground the ball in the opposing team's court; the rules of the game are similar to volleyball. Another form of takraw is hoop takraw, where only one team plays at a time and the players co-operate to pass the ball through a vertically
10 orientated hoop some 5 meters above the ground.

Traditional takraw balls are manufactured by conventionally weaving split rattan strips into a spherical basket. Rattan stalk is split into long strips of 3 to 4 millimetres wide and 3 to 4 millimetres thick. Then these rattan stalks are plaited spirally to form a circular band, like a spring coil of 8 to 12 turns. The number of turns will be determined from the
15 width of rattan strips used and the final tightness of the ball required. Newly plaited or woven rattan takraw balls are not round and have to be pressed by big tongs to force the rattan strips to squeeze into each other and form a round ball. It is then treated with coconut oil to prolong storage life.

Synthetic takraw balls are manufactured by forming strips of plastics material into
20 interwoven hoops.

It is an essential handling characteristic of the takraw ball for it to be as inelastic as possible. This is to obtain the maximum energy transfer when the ball is struck so that the ball's flight or trajectory is as far, fast or high as possible. A takraw ball's bounce characteristic is much closer to the essentially inelastic collision between billiard balls than
25 the elastic collision between a squash ball and racket. The woven structure of a takraw ball modifies its bounce characteristic. There is a small amount of relative movement between the strips that contributes to the essential "feel" of the ball, without which the ball is not a takraw ball.

A regulation Sepak takraw ball is defined as:

“shall be spherical of one woven layer having 12 holes, 20 intersections. It shall be made of synthetic fibre or natural rattan. If it is made of rattan, it shall consist of 9-11 strains. The circumference shall not be less than 0.42 m and not more than 0.44 m (0.43 m to 0.45 m for women). The weight before play shall not be less than 170 gm. and not more than 180 gm. (150 gm. to 160 gm. for women)”.

For more information see http://en.wikipedia.org/wiki/Sepak_takraw.

Prior Art

Document GB-A-2196861 (11 May 1988 – Boonchai Lorhpiat) describes the manufacture of synthetic takraw balls by weaving strips of plastics material into interwoven hoops.

Document WO-A-95/28206 (26 October 1995 – Satian Industries Co. Ltd.) describes a takraw ball woven from strips of composite material of which one part is of soft material and the other part of woven material; generally component parts are arranged and the strips are so woven that the outer surface of the ball is soft.

Document US-A-5,566,937 (22 October 1996 – Lorhpiat et al.) discloses a takraw ball woven from composite strips one component of which is an elastically deformable material and forms the ball surface and the other component of which is a springy material.

Document WO-A-2006/051248 (18 May 2006 - Satian Industries Co. Ltd.) describes a takraw ball woven from strips of springy material having soft material pads moulded into recesses in a strip outer face.

Document GB-A-2494478 (13 March 2013 - Satian Industries Co. Ltd.) describes a takraw ball woven from strips of plastics material with one side edge of sinusoidally undulating profile having troughs and peaks. The strip is shaped or otherwise constructed to be preferentially longitudinally flexible in peak regions whereby, when the strip is joined by its ends into a hoop, peak regions will bend more readily than other regions of the strip.

A “playability” problem of both the conventional rattan takraw ball and the above-described synthetic takraw balls is that their essential inelasticity makes them hard and playing takraw can be quite painful; especially for the novice. Clearly, this limits the popularity of the game as a participation sport.

A “durability” problem is that the hardness of the takraw ball can be dangerous. In conventional balls the rattan can unexpectedly break or splinter and cut the skin of a player. Similarly, the plastics takraw ball can break. Takraw can be played on almost any surface, not just the gymnasium floor of competition events or sand for beach takraw, and some
5 surfaces, such as concrete, can rapidly abrade/wear the surface of both types of ball; it is this that can particularly lead to ball breakage.

Documents US-A-5,566,937, WO-A-95/28206 and WO-A-2006/051248 address the playability problem by providing soft or springy material outer surfaces. However these soft/springy surfaces affect the durability and handling characteristics of the takraw ball.
10 Document GB-A-2196861 addresses the durability problem of conventional rattan balls by using plastic strips and WO-A-2006/051248 protects soft material pads by moulding the pads into recesses in the outer face of the strip. US 4,107,870 (Ausnit) discloses flexible strips which fasten together and can be used as a child’s constructional toy. The strips are elongate lengths of plastic and each has a short longitudinal slot formed near the centre of the strip to
15 allow another such strip or strips to be threaded through the slot.

Object of Invention

The present invention seeks to provide a synthetic plastic takraw ball having improved playability, durability and handling characteristics and to provide a synthetic plastic takraw ball which mimics a traditional rattan takraw ball.

Statement of Invention

A takraw ball in accordance with the present invention and embodiments thereof are set forth in the appended claims.

The length of the or each slot is preferably substantially greater than the width of the strip, the length of the or each slot more preferably being at least 1.2 times the width of the
25 strip.

Additionally or alternatively, the maximum width of the rattan-like sliver (especially in the case of a takraw ball side strip) may be less than half of the width of the takraw ball strip minus half of the width of a said generally longitudinal slot; or the thickness of the rattan-like sliver (especially in the case of a takraw ball centre strip) may be greater than or

equal to one third of its width, or is greater than or equal to one half of its width, or is greater than its width or preferably is substantially equal to its width.

Takraw balls woven from slotted side strips, and, optionally, slotted centre strips in accordance with the present invention have the outer surface essentially composed of rattan-like slivers. None of the above referred Documents disclose slotted side or centre strips and none disclose a takraw ball having a rattan-like outer surface; save for that shown in Fig. 24 of Document US-A-5,566,937, which is a takraw ball conventionally woven from synthetic rattan.

Drawings Description

Fig. 1 is an over plan of a takraw ball side strip in accordance with a first embodiment of the present invention;

Fig. 2 is an under plan of the takraw ball side strip of Fig. 1;

Fig. 3 is an enlarged cross-section on the line X-X of Fig. 2;

Fig. 4 is an over plan of a takraw ball centre strip in accordance with a second embodiment of the present invention;

Fig. 5 is an under plan of the centre strip of Fig. 4;

Fig. 6 is an enlarged section on the line Y-Y of Fig. 5, shown inverted (i.e. with the centre strip outer face uppermost);

Fig. 7 is a perspective view of a takraw ball woven from the takraw ball side strip of Fig. 1 and centre strip of Fig. 4.

Detailed Description

The takraw ball of the present invention is a development of the takraw balls described in Documents GB-A-2196861, WO-A-95/28206 and GB-A-2494478.

Figs 1 to 3 show a takraw ball side strip 10 to be a thin, elongate, generally flat moulding of springy, thermo-plastic material, such as an engineering plastic, having a convex-side edge 12 of constant radius and the opposite side edge 14 of undulating profile having five equispaced arcuate peaks 16 and intervening arcuate troughs 18. Each trough is also asymmetric, with a notch 20 to one side thereof.

One end 22 of the side strip 10 tapers to a point and has a hole 24 and the other end 26 has a depression 28 in the upper face 30. The depression 28 is shaped to accommodate the pointed end 22 and leave a flush upper surface when jointed. A pop rivet (not shown) is passed through hole 24 and a complementary hole 32 through depression 28 to join the ends
5 of the strip 10 together and form a frusto-conical hoop.

The strip is approximately 43.5 cm. long, has a maximum width of 2.5 cm. and a maximum thickness of 3 mm. It is moulded from a polyolefin blend, the proportions of which are varied to suit the particular application for which the takraw ball is to be used; from beginners to amateurs to professional competition players.

10 A region, indicated by dotted line 34, of the side strip outer face 30 generally proximate to a trough 18 and extending beyond the next peak 16 has three longitudinally extending grooves 36a,b,c that lend elasticity to the plastics strip material, control the weight of the ball and mimic the appearance of a traditional rattan takraw ball.

As will be explained later, peak region 34 is that part of the strip outer face that is
15 exposed when the strip has been woven into a takraw ball. The grooves 36a,b,c are in a staggered approximately parallel series longitudinally of the strip. Groove 36a proximate the convex side edge 12 generally conforms to the convex profile thereof, groove 36c proximate a sinusoidal side edge peak 18 generally conforms to the arcuate peak profile thereof and intervening groove 36b transitions from the convex to the arcuate peak profiles.

20 As shown by Fig. 3, the bottom of each groove 36a,b,c has a longitudinal slot 38a,b,c extending to the inner face 40 of the strip. The slots and grooves define four rattan-simulating slivers 42a.b.c.d.

A centre hoop 44, such as that described and shown by Figs 4 to 6 in Document GB-A-2,196,861, is formed from an elongate, narrow strip 46 moulded from suitable plastics
25 material to have straight side edges 48 and 50. The upper face 52 has a longitudinal groove 54, the lower face 56 is plain and rivet holes 58 and 60 are provided proximate each end 62, 64. Although only one groove 54 is illustrated, further grooves could be provided parallel to groove 54.

As shown by Fig. 7, a Thai takraw ball 66 consists of six bands 68 woven into a
30 spherical basket. Each band consists of a pair of frusto-conical side hoops 70 separated by a

centre hoop 72. The side hoops 70 are formed by jointed side strips 10 and the centre hoops 72 by jointed centre strips 44.

As can be seen, the peak regions 34 with grooves 36a,b,c, are exposed on the outer faces 30 of the side strips.

5 The outer surface of a takraw ball woven from side strips in accordance with the first embodiment of the present invention will mainly consist of the rattan-simulating slivers 42a,b,c,d.

These slivers 42a,b,c,d provide functions including:-

10 A. Reduction of pain for a player. The previous side strips described in any of Documents GB-A-2,196,861, WO-A-95/28206 and GB-A-2494478 are too rigid, especially in the exposed peak regions, such that, when a ball hits any part of a player's body, the contact area is likely to be a concentrated point with consequent high loading. The slivers deflect transversely away from one another under load to spread out the contact area, transmitting a lighter force per area to the player.

15 B. Provision of improved bouncing properties. Frictional forces are generated between overlying contact areas of woven side strips, due to relative movement in different directions. With the previous side strips these contact areas are large and generated frictional forces are consequently relatively large and contra to one another.

20 C. A measure of independent transverse movement; this reduces contact area and hence generated contra- frictional forces, with consequential improvement in bouncing properties.

 D. Improved sphericity. Each sliver will have a measure of independent longitudinal flexibility which, combined with the independent transverse movement, enables individual slivers to bend and separate slightly and by differing amounts and thus conform more closely to underlying strips.

25 Document GB-A-2494478, Page 2 lines 25-38 discloses:

“a takraw ball side strip is formed of an elongate, length of plastics material with one side edge of sinusoidally undulating profile having troughs and peaks, wherein the strip is shaped or otherwise constructed to be preferentially flexible in peak regions whereby, when

the strip is joined by its ends into a hoop, the peak region will bend more readily than other regions of the strip.

5 A side strip in accordance with the present invention bends more readily in peak regions than in trough regions whereby the hooped side strip is more nearly circular than prior art hooped side strips. A takraw ball woven from side strips in accordance with the present invention is more spherical than prior art balls as the peak regions are rounded, not flattened or angular.

Also, a side strip in accordance with the present invention eliminates one manufacturing step, thereby improving economy and providing an improved takraw ball.

10 In an embodiment, an inner face of the side strip is relieved in the peak region to provide more flexibility.”

This prior art side strip and a side strip in accordance with the present invention will each bend more readily, both longitudinally and transversely, in peak regions. However, the prior art side strip is transversely dimensionally fixed whereas the side strip of the present invention is transversely dimensionally variable in peak regions. Whilst a prior art side strip will improve sphericity (feature D), it will not improve to the same extent as a side strip in accordance with the present invention. Also, a prior art side strip does not exhibit above features A, B or C.

20 In accordance with a second, optional, embodiment of the present invention and as illustrated by Figs 4 to 6, the centre strip groove 54 is provided with, in the example for a Thai takraw ball, a series of five intermittent slots 74a.b.c.d.e each extending from the bottom of the groove to the lower strip face 56, thus providing two rattan-like slivers 76a,b extending longitudinally of the centre strip in intermittent regions 78; that is those regions on the centre strip which, when formed into a centre hoop and woven into a takraw ball will be exposed on the ball outer surface.

When compared to a takraw ball woven from slotted side strips in accordance with the present invention and prior art centre strips, the whole outer surface of a takraw ball woven from slotted side and centre strips in accordance with the present invention will essentially comprise rattan-like slivers and thus more closely mimic a traditional rattan takraw ball.

These combined side and centre slivers improve the features provided by side slivers alone.

5 In a third, unillustrated, embodiment of the present invention the centre strip is provided with a single slot along the length of the strip from proximate one end to proximate the other end. Such a strip obviates the need to accurately position a centre hoop so that the surface regions are exposed in the woven ball but the slivers in the formed hoop are more likely to separate and make weaving the ball more difficult. Otherwise a takraw ball woven with these continuously slotted centre strips will have much the same characteristics as one woven from intermittently slotted centre strips.

CLAIMS

1. A takraw ball strip (10, 46) comprising an elongate length of plastics material having one or more generally longitudinal slots (38a, 38b, 38c, 74a, 74b, 74c, 74d, 74e) opening between outer, upper (30,52) and inner, lower (40,56) strip faces;
5 characterised in that
 - i) a said slot (38a, 38c, 74a, 74b, 74c, 74d, 74e) and an adjacent strip side edge (12, 14, 48, 50), and/or
 - ii) an adjacent pair of said slots, (38a, 38b; 38b, 38c)
define(s) a rattan-like sliver (42a, 42b, 42c, 42d, 76a, 76b) of strip material
10 therebetween.
2. A takraw ball strip (10, 46) as defined in claim 1 in which the length of the or each slot (38a, 38b, 38c, 74a, 74b, 74c, 74d, 74e) is substantially greater than the width of the strip, the length of the or each slot preferably being at least 1.2 times the width of the strip.
- 15 3. A takraw ball strip (10, 46) as defined in claim 1 or 2 in which the maximum width of the rattan-like sliver (42a, 42b, 42c, 42d) is less than half of the width of the takraw ball strip (10) minus half of the width of a said generally longitudinal slot (38a, 38b, 38c); or in which the thickness of the rattan-like sliver (76a, 76b) is greater than or equal to one third of its width, or is greater than or equal to one half of its width, or is
20 greater than its width or preferably is substantially equal to its width.
4. A takraw ball side strip (10) comprising a takraw ball strip as claimed in claim 1, 2 or 3 and having a plurality of said generally longitudinal slots (38).
5. A takraw ball side strip (10) as defined in claim 4, in which the maximum width of the rattan-like sliver (42a, 42b, 42c, 42d) is less than half of the width of the takraw
25 ball strip (10) minus half of the width of a said generally longitudinal slot (38a, 38b, 38c); and/or in which the length of the or each slot (38a, 38b, 38c) is substantially greater than the width of the strip.
6. A takraw ball side strip (10) as claimed in claim 4 or 5, wherein the plurality of generally longitudinal slots (38) extend along at least the majority of the length of

those regions (34) forming part of the strip outer face (30) that is exposed when the strip has been woven into a takraw ball (66).

7. A takraw ball side strip (10) as claimed in claim 6, wherein the outer faces (30) of the strip (10) are moulded with preferably intermittent, generally longitudinal grooves (36a,b,c), each groove having a said generally longitudinal slot (38a,b,c) opening from the groove bottom to the strip inner face (40).
8. A takraw ball side strip (10) as claimed in claim 6 or claim 7 and having one convex side edge (12) and the opposed side edge (14) of undulating profile with troughs (18) and generally arcuate peaks (16); wherein the regions (34) are each generally proximate to a trough (18) and extending beyond the next peak (16).
9. A takraw ball side strip (10) as claimed in any of claims 2-5 wherein the slots extend along the length of the strip from proximate one end (22) to proximate the other end (26) of the strip.
10. A takraw ball centre strip (46) comprising a takraw ball strip as claimed in claim 1.
11. A takraw ball centre strip (46) as defined in claim 9 in which the thickness of the rattan-like sliver (76a, 76b) is greater than or equal to one third of its width, or is greater than or equal to one half of its width, or is greater than its width or preferably is substantially equal to its width; and/or in which the length of the or each slot (74a, 74b, 74c, 74d, 74e) is substantially greater than the width of the strip.
12. A takraw ball centre strip (46) as claimed in claim 10 or 11 and having one or more longitudinal grooves (54) in an outer face (30) of the strip, the or each groove having a preferably intermittent said longitudinal slot (74) opening between the or each groove bottom and a lower face (56) the strip.
13. A takraw ball centre strip (46) as claimed in claim 10 or 11 and having a longitudinal groove (54) in an outer face (30) of the strip, the groove having a said longitudinal slot provided along the length of the strip from proximate one end (62) to proximate the other end (64) and opening between the groove bottom and the strip lower face (56).
14. A takraw ball (66) woven from strips as claimed in any of claims 1 to 3 or side strips (10) as claimed in any of claims 4 to 9.

15. A takraw ball (66) as claimed in claim 14 additionally woven from centre strips (46) as claimed in any of claims 10 to 13.

16. A takraw ball (66) as claimed in claim 14 or claim 15 and woven to have:-

i) side strip slotted regions (34);

5 or

ii) side strip slotted regions (34) and centre strip slotted regions (78)

exposed on the outer surface of the ball,

whereby the outer surface of the woven takraw ball mainly consists of rattan-like slivers (42a,b,c,d,76a,b).

10