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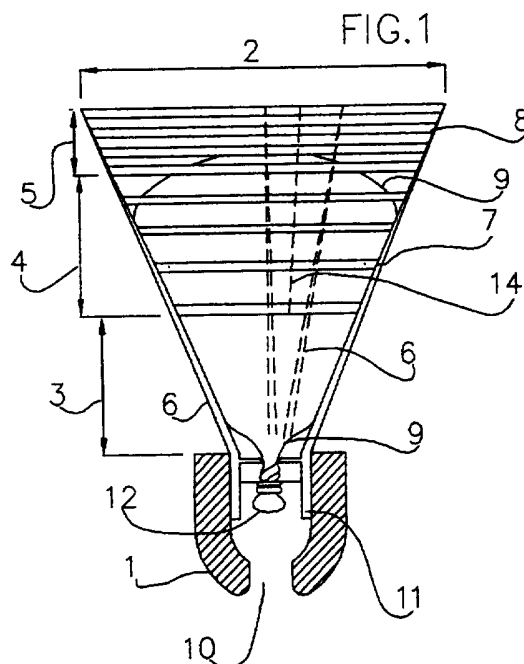
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None

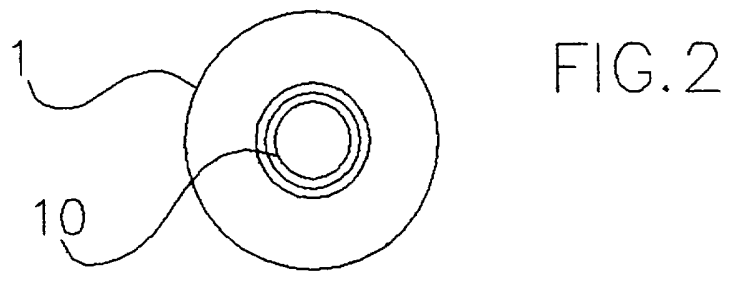
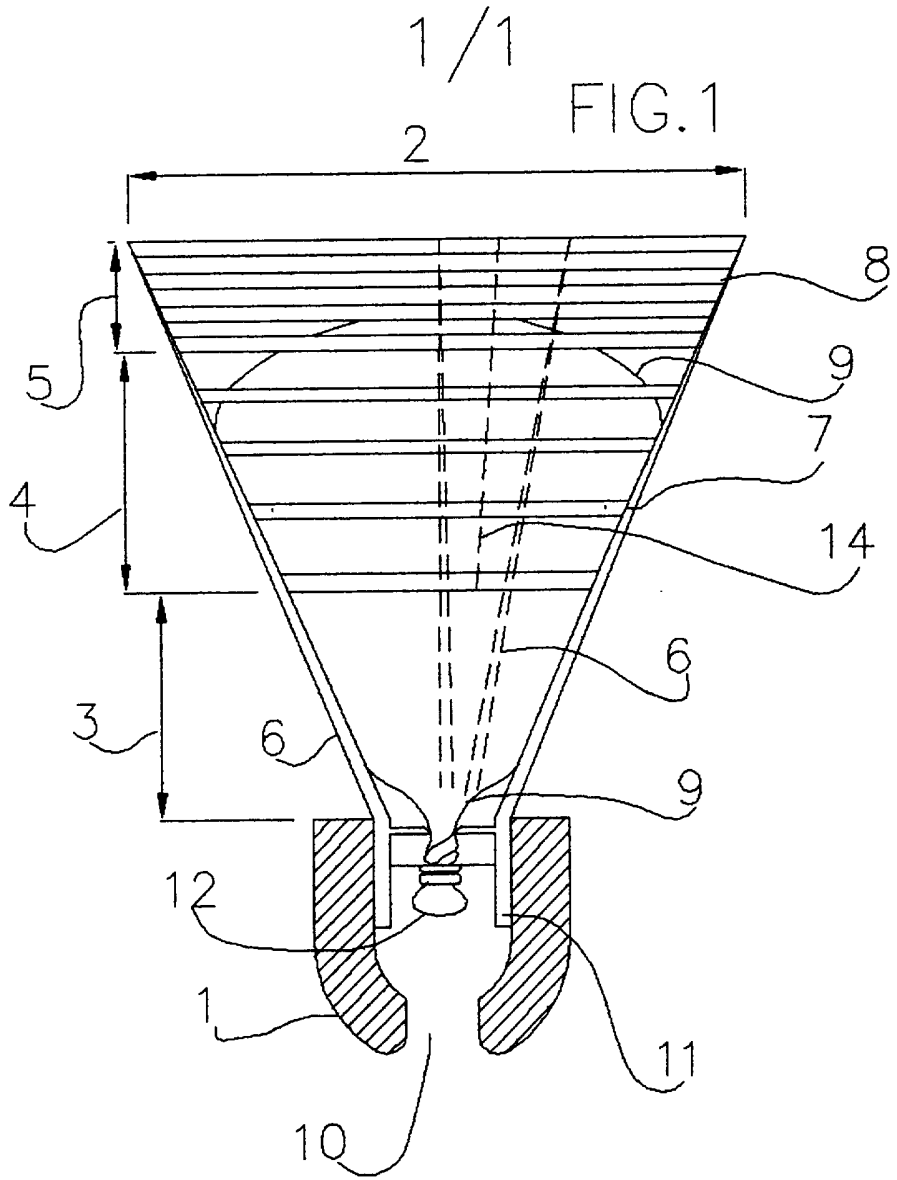
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UK CL (Edition O) **A6S**
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(54) Abstract Title
A shuttlecock

(57) A shuttlecock comprises a cap 1 with hole 10 not less than 6mm in diameter in its nose, a flared skirt 2 and a balloon 9, the flared skirt incorporating an inner part 3, a lattice part 4 and a vane part 5, stems 6 connecting the various parts of the flared skirt and being connected by lattice ribs 7 and vane ribs 8, the lattice ribs 7 being substantially further apart than the vane ribs 8 and the stems being less than 2mm thick in the inner part and having lattice ribs less than 0.35mm thick and spaced substantially farther apart than the ribs and the balloon being adapted to support the lattice ribs and the stems adjacent the said lattice ribs. Optionally a plastic foil is interposed between the skin of the balloon and the skirt.



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An improved shuttlecock.

Technical Field. This invention is in the field of shuttlecocks of the type referred to herein as type 3 and comprises a cap preferably made of expanded material, a flared skirt preferably made of nylon and a balloon preferably made of latex. A shuttlecock is a very light but heavier than air device often used as the missile in the game of badminton. Weight and resistance to deformation is critical if the shuttlecock is to be acceptable in first class play, therefore some dimensions and comparisons are given as, at least, desirable.

Background Art.

In this specification, a nylon skirted shuttlecock referred to as type 1 comprises a cap, and a flared skirt, the said skirt being divided into an inner part adjacent the cap and a vane part; about 16 stems connect the cap through the skirt connector to the inner part and the vane part. The stems are about 3mm deep adjacent the cap and tapering through the inner part to about 0.4mm. at the outer end of the vane part. Further, the said stems are connected in the vane part by a series of about 12 ribs either equidistantly apart or closer together nearer the inner part. Further, there may be, in the inner part, one or two substantial support ribs about 0.50mm thick. When a balloon is incorporated into type 1 the turnover i.e. the tendency to resume a straight path after the direction of flight has been changed, could be indifferent because the weight of the balloon plus the weight of the skirt is too great. Therefore, in co-pending applications GB9609734-0 and PCT/GB 97/0030, referred to as type 2, there are fewer ribs in the vane part, the support ribs are eliminated and the said balloon supports the stems. In type 1 the skirt collapses and the shuttlecock becomes unplayable when 'smashed' by a top class player, but in type 2 collapse is unlikely unless the balloon bursts and any distortion shows itself as a swelling or a deformation in the skirt.

Technical problem to be overcome.

The object of this invention is to increase the deceleration in the smash and improve the turnover of the type 2 shuttlecock, the improved shuttlecock being referred to as type 3. The technical
5 problem is to make the whole shuttlecock, especially the skirt, lighter but more resistant to distortion and to increase the life of the balloon.

Disclosure of invention.

In accordance with the invention, in a shuttlecock incorporating
10 a cap with a hole in its nose, a flared skirt and a balloon, the said flared skirt incorporating an inner part (adjacent the cap), a vane part, a lattice part between the inner part and the vane part and stems connecting the cap through the skirt connector to the inner part, the lattice part and the vane part;
15 the said stems being connected by a plurality of said lattice ribs in the lattice part and vane ribs in the vane part and the said ribs being preferably connected by minor stems and the invention being that there are a plurality of said lattice ribs less than 0.35mm thick and spaced substantially further apart (in
20 practice not less than 6mm) than the said vane ribs (in practice not more than 4mm apart) and the balloon being sited so that when inflated it is adapted to support at least the said lattice ribs and the said stems adjacent the said lattice ribs, thus reducing distortion.

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Further, the thickness of at least some of the said stems is 2mm or less in the inner part of the skirt.

Further, a plastic foil may be interposed between the skin of the balloon and the skirt.

30 Further, the diameter of the hole in the nose of the cap is not less than 6mm.

Advantageous Effects.

The advantageous effects are that by rearranging the ribs
35 advantage is taken of what might be referred to as the 'pneumatic tyre effect'. Widely spaced thin ribs in the lattice part which are supported by the balloon reduce distortion and increase the

bearing area on the balloon thus increasing its life. Further, the stems which were in bending can be reduced in thickness. Similarly, increasing the diameter of the hole in the nose of the cap reduces the weight remote from the centre of gravity of the shuttlecock thus improving the turnover but if the hole is too large the strength of the cap and the performance of the shuttlecock in delicate shots is affected; the combined effect is to reduce the overall weight of the shuttlecock which, with, the same resistance, improves the deceleration in the smash.

Further, if it is desired to modify the range. at the same time maintaining the deceleration and the same total weight the effective head-on area can be varied by increasing or decreasing the flare in the skirt.

Some of the above advantages may be shown in figures.

By way only of indication: A type 1 shuttlecock made by a good manufacturer has stems which are about 3mm thick adjacent the cap and 1.75mm thick half way along the stem; the skirt has one substantial support rib 0.55mm thick in the inner part and 13 vane ribs not more than 2mm apart; the weight of the skirt including the skirt connector is 2.7g. The total weight of the shuttlecock is 5.0g.

A type 2 shuttlecock has similar stems, but the support rib is eliminated as are six vane ribs (to leave 7 ribs in the vane part); there is a 5mm hole in the nose and a balloon is incorporated in the lattice part. The weight of the skirt is 2.7g including the balloon; the total weight including the cap is 4.8g. The deceleration and the turnover is acceptable.

A type 3 shuttlecock has stems with a maximum thickness of 2mm compared with 3mm in types 1 and 2. Lattice ribs not more than 0.35 mm thick and more than 6mm apart in the lattice part; five vane ribs not more than 2mm apart in the vane part; a 7mm hole in the nose and a balloon supporting the lattice part. The weight of the skirt is 2.6; the total weight is 4.6. The deceleration and the turnover is good.

Modes of carrying out the invention.

The invention will now be described by way of example and with reference to the accompanying drawings in which :-

Figure 1 is a diagrammatic partly sectional view showing features of the invention.

5 Figure 2 is an end view of the cap.

Referring to Figures 1 and 2. A flared skirt 2, tightly attached through skirt connector 11 to a cap 1, incorporates an inner part 3, adjacent the cap 1, a vane part 5 and, between the two, a lattice part 4. Sixteen stems 6, only four of which (two dashed) are shown, are equally spaced around the skirt 2. The said stems connect the cap 1, through the skirt connector 11 to the inner part 3, the lattice part 4 and the vane part 5. The stems 6 are connected to each other by the lattice ribs 7 and the vane ribs 8; the lattice ribs 7, preferably less than four in number are spaced substantially farther apart (in practice, not less than 15 6m) than the vane ribs 8 (in practice, not more than 4mm apart); the said ribs may be at an angle to the stems similar to a feather. The balloon 9 inflated through entry 12 is sited so that it supports the lattice ribs 7 and the stems 6 in at least 20 the lattice part 4. When combined with the lattice ribs 7, the arrangement reduces distortion and enables weight in the stems 6 to be reduced. Ribs 7 and 8 are preferably connected by minor stems 14.

There is an hole 10 not less than 7mm and not more than 12mm in diameter in the nose of the cap 1.

25 A piece of thin tubular conical plastic foil of substantially the same diameters as the inside of the lattice part of the said skirt may be interposed between the balloon and the skirt when the balloon is being inflated; this reduces damage to the 30 balloon.

Industrial Use.

The industrial use is in the manufacture of shuttlecocks.

Claims.

1. A shuttlecock incorporating a cap (1) with a hole (10) of 5mm or less in its nose, a flared skirt (2) and a balloon (9), the said flared skirt (2) incorporating an inner part (3) adjacent the cap, a vane part (5) and a lattice part (4) between the said
5 inner part (3) and the vane part (5) and stems (6) connecting the cap (1) through the skirt connector (11) to the inner part (3) the lattice part (4) and the vane part (5); the said stems (6) being connected by a plurality of lattice ribs (7) in the lattice part (4) and vane ribs (8) in the vane part (5) and the
10 said ribs (7), (8) being preferably connected by minor stems (14) and characterised in that there are a plurality of said lattice ribs (7) less than 0,35mm thick and spaced substantially farther apart, (in practice not less than 6mm) than the said vane ribs (8) (in practice not more than 4mm apart) and the said balloon
15 (9) being sited so that when inflated it is adapted to support at least the said lattice ribs (7) and the said stems (6) adjacent the said lattice ribs (7) thus reducing distortion..
2. A shuttlecock as in claim 1 characterised in that the thickness of at least some of the stems (6) is 2mm or less in the
20 inner part (3) of the said skirt.
3. A shuttlecock as in claims 1 or 2 characterised in that the hole in the nose of the cap is not less than 6mm in diameter.
4. A shuttlecock as in claims 1,2 or 3 and characterised in that
25 a plastic foil is interposed between the skin of the balloon and the skirt..



Application No: GB 9710368.3
Claims searched: 1 - 4

Examiner: Roger Casling
Date of search: 28 July 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK Cl (Ed.O): A6S
Int Cl (Ed.6): A63B
Other: Online:WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
	None	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.