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(71) Applicant(s)
William Charles Carlton
Villa Tas-Silg, Delimara Road, M'Xlokk, Malta

Sarah Gauci Carlton
Villa Tas-Silg, Delimara Road, M'Xlokk, Malta

(72) Inventor(s)
William Charles Carlton
Sarah Gauci Carlton

(74) Agent and/or Address for Service
S W Carlton
1 Juxon Close, Chichester, PO19 2HA,
United Kingdom

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None

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UK CL (Edition Q) **A6S**
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(54) Abstract Title
Shuttlecock

(57) A shuttlecock comprising at least a cap, a flared skirt having an inner and an outer part and an inflated device, for example a balloon incorporated in the space partially enclosed by the flared skirt, a plurality of stems form at least the main part of the inner skirt. The stems in the area of the inner skirt are substantially wider in a circumferential direction than the said stems are thick in a radial direction. The inflatable device is inflated to cause the flared skirt to swell so that a partially barrelled shape is formed in the inner skirt. A cirfcumferential member may be stretched to control the size of the barrelled portion.

FIG 1

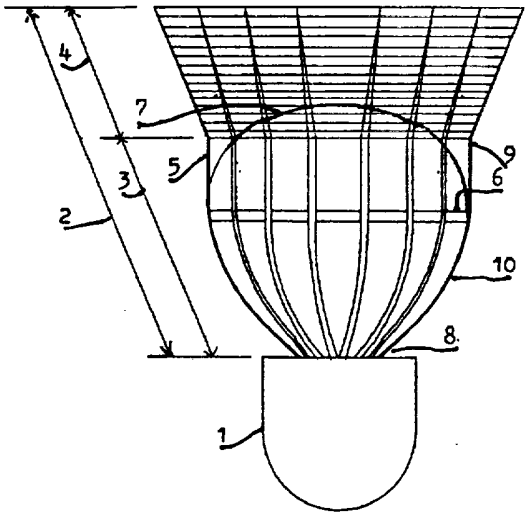

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FIG 1

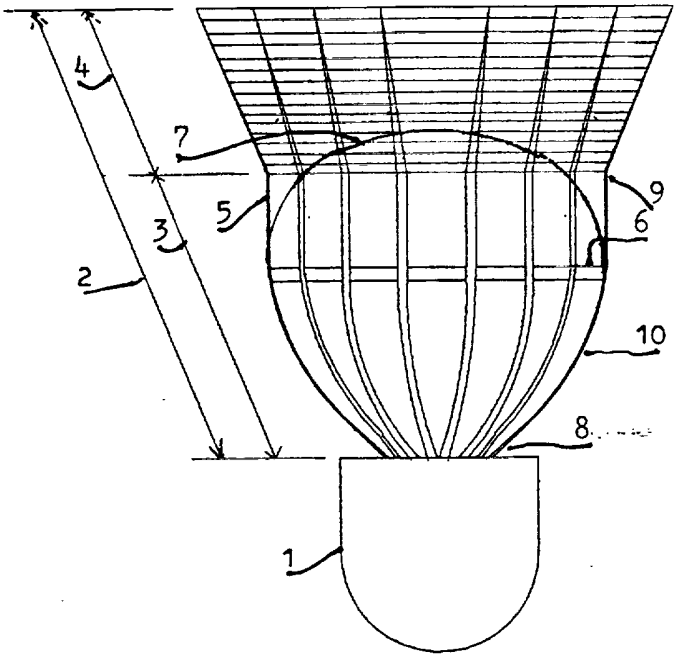


FIG 2

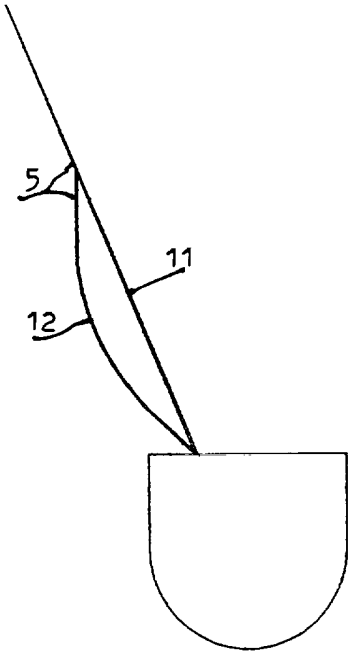


FIG 3

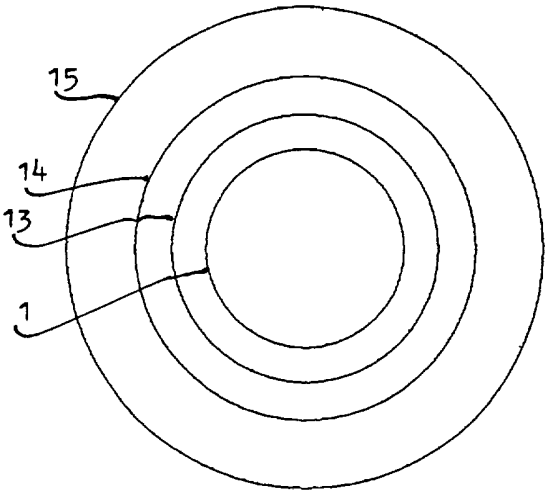
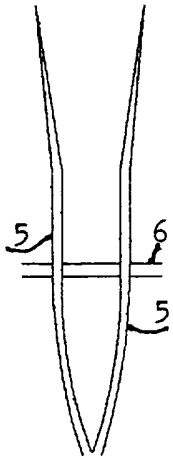


FIG 4



SHUTTLECOCK.

Technical field.

This invention is in the field of sports equipment aand relates to shuttlecocks which incorporate at least a cap, a flared skirt having an inner part and an outer part and an inflated device, for example a balloon, incorporated in the space partially enclosed by the flared skirt; a plurality of stems form at least the main part of the inner skirt.

Background Art.

The background art includes shuttlecocks which incorporate in the flared skirt either feathers, known for upwards of one hundred years, or plastic material as disclosed in specification GB 887172. The most relevant prior art is disclosed in specification PCT/GB97/00030. It has been a characteristic of all shuttlecock construction, that the stems in the inner skirt should be made as rigid as possible to prevent the collapse in the smash which collapse decreases the desireable decelleration in the smash. Typical stems in any section in the inner skirt are substantially less wide in a circumferential direction than they are thick in a radial direction; dimensions of such stems of popular make are 2mm. wide in a circumferential direction and 3mm. thick in a radial direction at the end of the stem adjacent the cap and 2mm thick at the position of entry into the part of the outer skirt nearest to the cap with a connecting member 0.60mm thick in the area of the inter skirt.

Technical problems to be overcome.

Two features required in a shuttlecock are that after being struck severely in the 'smash' the shuttlecock should decelerate rapidly and when struck lightly in net play the shuttlecock should, when forced to make a sharp change in course, do so with a minimum of tumbling in the air; this feature is, in this specification, referred to as turnover; the above two features conflict because reducing the deceleration in the smash requires more strength and improving the turnover requires less weight. It is the object of this invention to improve both these features in a shuttlecock

incorporating a balloon by a substantial change in the weight, the shape and the strength of the stems.

Disclosure of invention.

In accordance with the invention a shuttlecock comprising a cap, a flared skirt made up of an inner skirt and an outer skirt and partially enclosing an inflatable device such as a balloon, the said inner skirt comprising at least a plurality of stems and the said shuttlecock being characterised in that the said stems in the area of the inner skirt are substantially wider in a circumferential direction than they are thick in a radial direction; the arrangement being such that when the said inflatable device is inflated, the said inner part of the flared skirt is swollen to form, by the bending of the said stems, a partially barrelled shape.

The invention is developed in that no thickness in the stems in the area of the inner skirt in a radial direction is greater han 1.5mm.

The invention is developed in that there is, in the area of the inner skirt a plurality of stems connected by at least one circumferential member the said member being adapted to be permanently stretched to increase the diameter of the said inner skirt at the position of the said circumferential member, to the desired size of the said barrelled shape.

Advantageous Effects.

The decreased thickness of the stem allows the inflated device, for instance the balloon, to increase the effective head-on area of the balloon, this, at the same time decreases the air pressure on the outer part of the outer skirt, its weakest part; the effect is to increase the deceleration in the smash. At the same time the increased space available to the inflated device means that the weight of the outer part of the inflated device is moved towards the cap and away from the outer part of the skirt, hereby improving the turnover.

In this specification the area of the said inner skirt is that part of the flared skirt which extends from the cap to at least half of the distance between the cap and the outer edge of the outer skirt.

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 general drawing of a shuttlecock incorporating an inflated balloon with deliberatly weakened stems.

Figure 2 is a side elevation of a stem distorted by the inflation of a balloon..

Figure 3 is an end-on view of a shuttlecock.

Figure 4 is a view of part of figure 1 with a stretched connecting part.

Referring now to figures 1, 2, a shuttlecock comprising at least a cap 1, a flared skirt 2 made up of an inner part 3, and an outer part 4; the area of the inner part 3 covers at least half the distance (but not half the area because the perimiteris smaller)between the cap 1 and the outer edge of the outer skirt 15. The inner skirt, including the stems 5, is swollen by the inflated balloon 7, to a partially barrelled shape, the swelling being caused by the stems 5 being deliberately reduced in thickness from the part of the stem 5 adjacent the cap 8 to the position of entry 9 into the part of the outer skirt nearest to the cap. The reduction in thickness allows the stems 5 to bend, thus allowing the inner skirt 3 to swell into a partially barrelled shape which encloses more space. The swollen inner skirt 3 takes the main pressure of the air in the smash and is the strongest part of the flared skirt 2 because the stems are supported by the balloon; in this area the stems are lighter and weaker in bending, therefore improving turnover

Referring now to figure 2, a stem 5 made according to the invention is shown in side elevation. The straight line shows the shape of the stem before the inflation of the balloon. No part of of any of the stems 5 are greater in thickness than 1.5mm. in practice, the maximum thickness is 1mm. When subjected to the pressure exerted by an inflated balloon the stem 5 will bend readily as shown at 12.

Referring now to figure 3, the end-on view shows the head-on area of the cap 1, the head-on area 13 at the position of the circumferential member 6 in the inner skirt before inflation of

the balloon, the head-on area 14 at the position of the circumferential member 6 after inflation of the balloon and the head-on area 15 of the outer part of the outer skirt. This area 15 may be indented.

Referring to figure 4, two adjacent stems 5 are shown after inflation. Because the circumference of the inner skirt is increased by inflation the distance between the stems 5 is increased at the position of the circumferential member6. When moulded, the stems 5 are straight as shown at 11 in figure 2 and the length of the circumferential member 6 is short; after moulding, the circumference of the skirt at the position of the circumferential member 6 is increased by stretching the said circumferential member 6 and the distance between the stems 5 is increased to the limit permitted by the said stretched circumferential member 6.

Claims.

1. A shuttlecock comprising a cap, a flared skirt made up of an inner and an outer skirt, and partially enclosing an inflatable device such as a balloon, the said inner skirt comprising at least a plurality of stems and the said shuttlecock being characterised in that the said stems in the area of the inner skirt are substantially wider in a circumferential direction than the said stems are thick in a radial direction; the arrangement being such that when the said inflatable device is inflated the said inner part of the flared skirt is swollen to form, by the bending of the said stems, a partially barrelled shape.

2. A shuttlecock as in claim 1 characterised in that no thickness in the stems in the area of the inner skirt in a radial direction is greater than 1.5 millimetres.

3. A shuttlecock as in claim 1 having, in the area of the said inner skirt a plurality of stems connected by at least one circumferential member, the said member being characterised in that it is permanently stretched from its original moulded size to increase the diameter of the said inner skirt at the p;osition of the said circumferential member to the desired size of the said barrelled shape.

The Patent Office

INVESTOR IN PEOPLE

Application No:	GB 9823730.8	**Examiner:**	Roger Casling
Claims searched:	1-3	**Date of search:**	14 January 1999

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.Q): 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.