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(51) INT CL:
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(56) Documents Cited:
GB 2458361 A **GB 2353482 A**
GB 0820179 A **GB 0753966 A**
WO 1996/031260 A1 **US 4509761 A**

(58) Field of Search:
INT CL **A63B**
Other: **Online: EPODOC, PAJ, WPI.**

(54) Title of the Invention: **An improved shuttle for badminton**
Abstract Title: **Shuttlecock**

(57) A plastic shuttle for badminton, comprises a cap of known design 2 and a flared skirt. The flared skirt comprises a tubular part 3, a vane part of very thin material, a plurality of stems 4 and a circumferential rib 8 at the trailing edge of the shuttlecock. Stiffener blades (9, Fig. 9) with tapered ends are provided on the stems. Triangular plates 5, 6, are provided between the stems 4 and the circumferential rib 8. Flaps 7 are also provided projecting from the trailing edge of the circumferential rib. The blades, flaps and triangular plates are all made of very thin material and are all sited substantially in line with the direction of flight so that when the shuttle is in slow flight, minimum resistance is created, and when struck in the smash, maximum resistance is created. The flared skirt preferably has only a single rib.

Fig.7

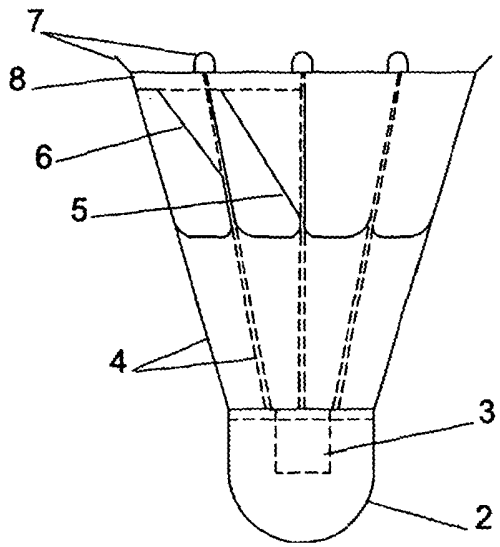

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FIG.1

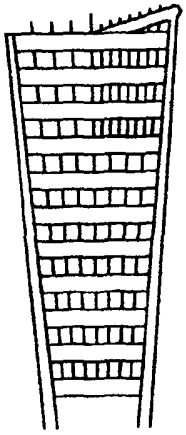


FIG.2

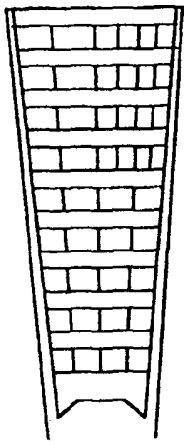


FIG.3

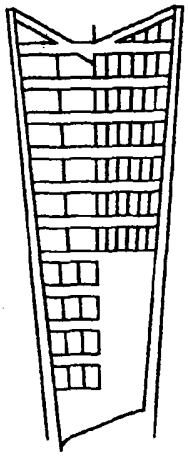


FIG.4

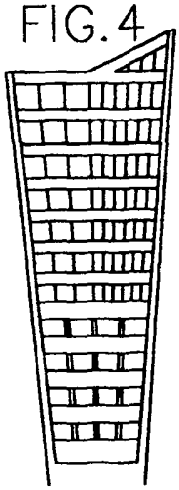


FIG.5

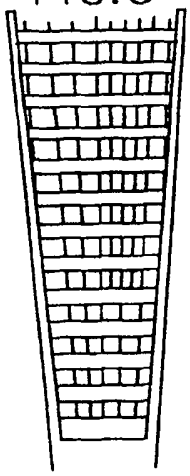


FIG.6

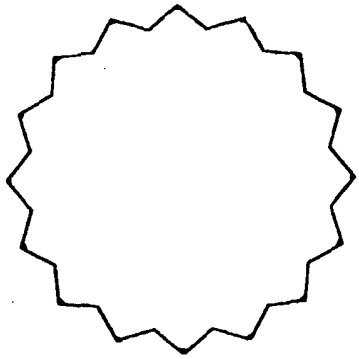


Fig.7

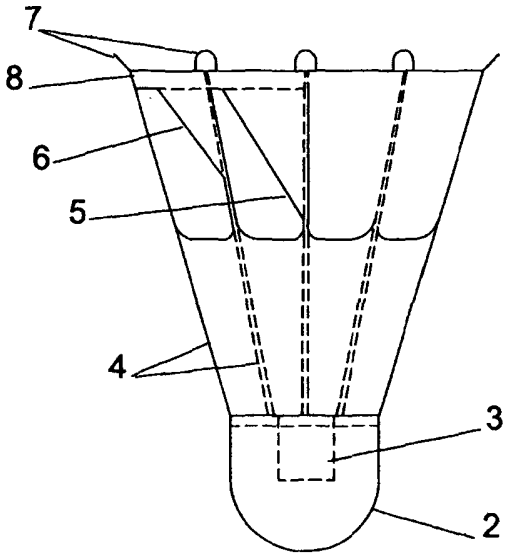
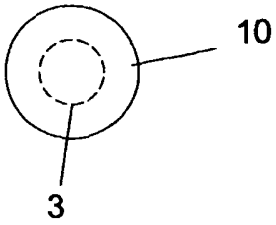


Fig.8



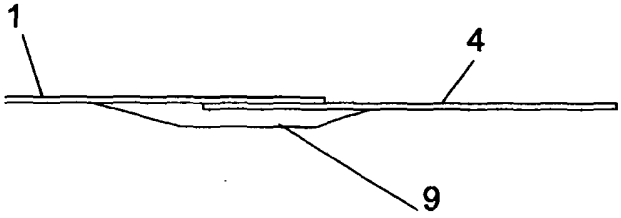


Fig.9

Application for patent.

Applicants: William Charles Carlton and Sarah J. Gauci Carlton.

Title: An improved Shuttle for Badminton.

The term 'shuttle' has been used because 'shuttle' is used in the Laws of Badminton , the term 'shuttle' will be used hereafter in this specification.

Technical Field.

This specification is in the field of sports equipment.

Background Art.

Shuttles for badminton have a cap and a flared skirt and are of two main types, those in which the flared skirt is made of natural feathers, usually goose feathers, and those in which the flared skirt is made of artificial materials such as polyethylene or polyamide (nylon), hereafter referred to as 'plastic'. Either type may have a cap made of natural cork, expanded PVC, or other suitable material. Badminton players have been delighting in the flight and lamenting the life of feather shuttles for many years. The feather shuttles used in badminton are clearly described in the Laws; plastic shuttles have also been addressed but the Laws on particular characteristics required are restricted to a broad statement about similarity to the flight of a feather. No plastic shuttle has ever been fully accepted by the better players who normally use feathers, especially for tournaments. The most widely accepted plastic shuttles, the patents now having expired, are made in many badminton playing countries. The invariable characteristic of this popular type is that the flared skirt incorporates many ribs, sometimes nine or ten, connecting the stems and these ribs are spread over more than fifty per cent of the flared skirt. Further, in both feather and plastic shuttles, spaces are left between the stems for the passage of air.

Figures 1 – 5 of this specification show variations of this rib design which have been on the market during the last fifty years. A variation with flutes between the stems, shown here in Figure 6, has also been popular; this variation, nevertheless, always includes ribs. As far as we know, no other design has achieved a comparable degree of acceptance. Ribs do, however, reduce the range.

Technical Problems to Be Overcome.

The basic problem is to make, with an artificial material, the flared skirt of a shuttle, which is as light and as strong and lasts longer in play than the preferred part of a goose feather; in practice this becomes a number of requirements, which when achieved, constitute advantages.

1. To have a stable flight, that is, resistance to tumbling cap over skirt. This is a pronounced characteristic of a natural feather shuttlecock; when struck it almost instantly aligns itself with the new direction of flight.

2. To climb easily in the short service and the 'clear' that is, during the high shot to the back of the court. A shuttle climbs instantly, as distinct from a ball which takes a flatter trajectory.

3. To decelerate reasonably quickly when 'smashed'.

4. To spin during flight.

5. To fall sharply in the 'drop' shot.

6. To have the correct 'feel' when struck by the racket.

7. The flared skirt must not collapse substantially during the smash.

8. To reach the range, that is, the distance that would result if the shuttle were to be 'tested for speed' as in Law 3 of the Laws of Badminton.

To achieve these requirements recourse has been made to aircraft technique. In the present invention the number of ribs has been reduced to one, the minimum that prevents tangling, i.e ribs twisting around each other. Triangular plates have been introduced to cause spin and increased surface area.

Disclosure of Invention.

A shuttle for Badminton comprising a cap of known design and a flared skirt, the said flared skirt consisting of a tubular part, a disc-like part, and a very thin vane part together acting as a monocoque which incorporates a stressed skin, in this case the stressed skin is a very thin vane part of plastic which can be injection moulded to form a unit and further, there are sixteen stems which contribute towards the shape of the said flared skirt, and each of the said stems are integral with, and flow into, a single rib which substantially encircles the trailing end of the shuttle and further, sixteen very thin triangular plates are securely fixed to the said stems and the said single rib again giving a monocoque effect, and further, sixteen very thin flaps project from the trailing edge of the said single rib the centre line of each of the said flaps being directly in line with the centre line of its stem and further, stiffener blades tapered at each end project from the stems along their effective length to extend the stiffness from the very thin vane part in the inner part of the flared skirt towards the outer skirt; further, the whole assembly is integral and moulded in one piece to form a unit so that when the shuttle is struck severely by the racket, the whole shuttle will move in the direction imparted by the racket and further, between each pair of stems is a clear space for the passage of air so that when the shuttle is in normal flight i.e. flight substantially in the direction of the length of the court, air will pass along the increasing diameter of the shuttle and through the clear spaces which are between the said very thin vane part, the said very thin triangular plates, the said encircling rib, the said stiffener blades and the said very thin flaps and these said features are all sited substantially in the direction of flight to provide minimum resistance to the shuttle when it is travelling comparatively slowly in the short service, in the high lob and in the drop shot, compared to the substantial angles and faster speed caused by the smash when resistance increases as the square of the speed; and further, attention is drawn to manufacturing the shuttle with very light, very strong material of high impact value; such material is referred to by manufacturers such as Dupont, as 'engineering material.'

Modes of Carrying out the Invention

A specific embodiment of the invention, will now be described solely by way of example with reference to the accompanying diagrammatic drawings in which:-

Figures 1 – 5 show panels of typical known shuttles embodying ribs.

Figure 6 shows a variation of the typical known rib design but also involving flutes and flaps.

Figure 7 shows some features of the present invention.

Figure 8 shows a simplified plan view of the tube-like part, and the disc-like part.

Figure 9 is a diagrammatic view of the very thin vane part in relation to a stem and a stiffener blade.

In order that the invention may be understood and carried into effect reference is now directed to figures 7, 8 and 9 showing the known cap 2 which fits snugly on to tubular part 3 which is integral with the disc-like part 10, the stems 4, the triangular plates 6, with their possible extension 5, the single rib 8, the flaps 7, and the vane 1. The outer end of the vane 1, where it joins the stems 4, is faired to prevent failure through fatigue as are all similar connections.
Referring now in particular to figure 9; this shows a typical assembly of the very thin vane part 1 (which is in the inner part of the skirt) to the stem 4, and the stiffener blade 9; together, this assembly extends the stiffened area to the outer part of the skirt.
The present shuttle is substantially a similar size to the known feather shuttle.
Further, the sixteen stems 4, are sited equidistantly around the disc-like part 10, the single rib 8, and the very thin vane part 1.
The very thin triangular plate 6 is securely fixed to the stem 4 and the rib 8, the very thin flaps 7 project from the trailing edge of the single rib 8 the centre line of the said very thin flaps 7 being directly in line with the centre line of their stems 4 for easier filling. the combination of the cap 2 the very thin vane 1, the stems 4, the very thin triangular plates 6 and the rib 8 all moulded in one piece makes a semi-rigid assembly which, when struck severely by a racket moves as a whole in the direction imparted by the racket.

Advantages.

The advantages of the invention are that it overcomes the technical problems indicated. This invention is of use in the manufacture of shuttlecocks.

Claims

1. A shuttle for Badminton comprising a cap of known design and a flared skirt, the said flared skirt consisting of a tubular part, a disc-like part, and a very thin vane part acting as a monocoque which incorporates a stressed skin, in this case the said stressed skin is a very thin vane part of plastic and further there are also sixteen stems which contribute towards the shape of the said flared skirt, and each of the said stems are integral with a single rib which substantially encircles the trailing end of the shuttle and further, sixteen very thin flaps project from the trailing edge of the said single rib and sixteen very thin triangular plates are securely fixed to the said stems and to the said single rib to again give a monocoque effect, and the centre line of each of the said flaps, being directly in line with the centre line of its stem and further, stiffener blades tapered at each end project from each stem along its effective length to extend the stiffness from the vane part in the inner part of the flared skirt towards the outer skirt; further, the whole assembly is integral and moulded in one piece to form a unit so that when the shuttle is struck severely by the racket, the whole shuttle will move in the direction imparted by the racket and further, between each pair of stems is a clear space for the passage of air so that when the shuttle is in normal flight i.e. flight substantially in the direction of the length of the court, air will pass along the increasing diameter of the shuttle and through the clear spaces which are between the said very thin vane part, the said very thin triangular plates, the said encircling rib, the said stiffener blades and the said very thin flaps and these said features are all sited substantially in the direction of flight to provide minimum resistance to the shuttle when it is travelling comparatively slowly in the short service, in the high lob and in the drop shot, compared to the substantial angles and faster speeds caused by the smash when resistance increases as the square of the speed.

2. A shuttle as in claim 1 and characterized in that the flared skirt has only a single rib.

3. A shuttle as in claim 1 and characterized in that the flared skirt includes stiffener blades attached to the said stems to improve the deceleration in the smash.

4. A shuttle as in claim 1 and characterized in that the triangular plates, the flaps and the vane are all made of very thin material.

5. A shuttle as in claim 1 and characterized in that, in the comparatively slow flight of the climb in the clear the surfaces of the very thin triangular plates the very thin vane part and the very thin flaps are sited substantially in line with the direction of flight.

6. A shuttle as in claim 1 and characterised in that the very thin triangular plates, and the very thin vane are sited so that when smashed they turn at a severe angle to the normal direction of flight to improve deceleration.

7. A shuttle as in claim 1 and characterized in that the cap of known design, the tubular part, the disc-like part, the vane part, the stems, the stiffeners, the triangular plates, and the single rib are all securely fixed into one unit to give a monocoque effect.

Application No:	GB1000697.1	**Examiner:**	Dr Matthew Jefferson
Claims searched:	1 to 7	**Date of search:**	27 May 2010

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
Y	1 to 5.	GB 2458361 A (WILLIS) See pages 5 to 7, & figures.
Y	1 to 5.	GB 753966 A (SPORTEX GMBH) See whole document.
Y	1 to 5	US 4509761 A (LIU) See whole document.
Y	1 to 5	GB 2353482 A (CARLTON ET AL) See abstract & figures.
Y	1 to 5.	GB 820179 A (AMM) See whole document.
A	1.	WO 96/31260 A1 (WILLIS) See abstract & figures.

Categories:

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.

Field of Search:

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Worldwide search of patent documents classified in the following areas of the IPC

A63B

The following online and other databases have been used in the preparation of this search report

Online: EPODOC, PAJ, WPI.

International Classification:

Subclass	Subgroup	Valid From
None		