April 11, 1967 W. C. CARLTON 3,313,543

SHUTTLECOCK WITH BLADE-LIKE STEMS

Filed May 21, 1964 3 Sheets-Sheet 1

FIG. 1.

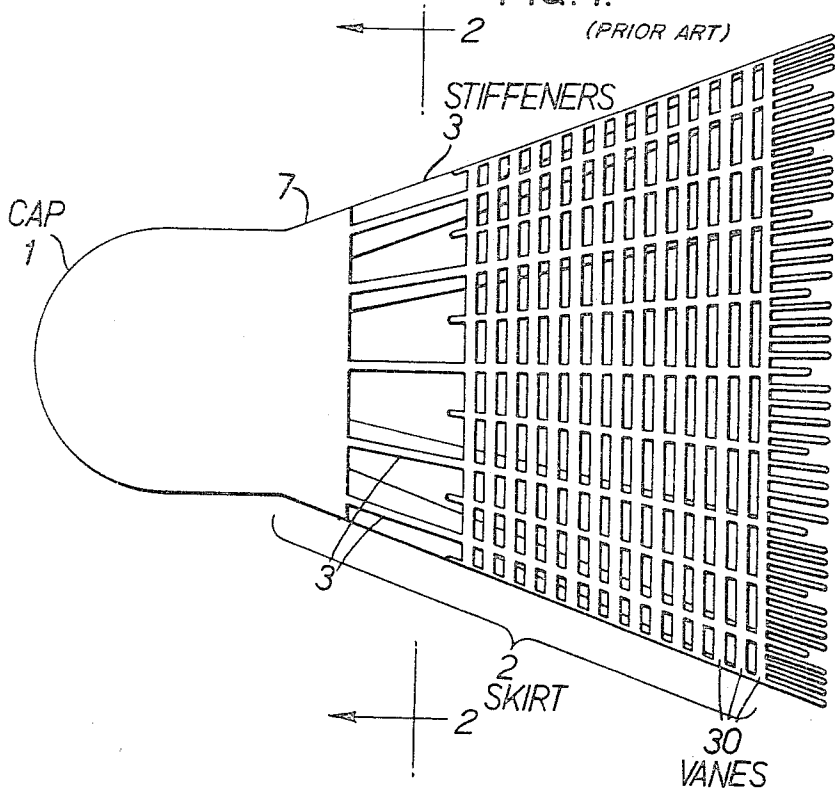
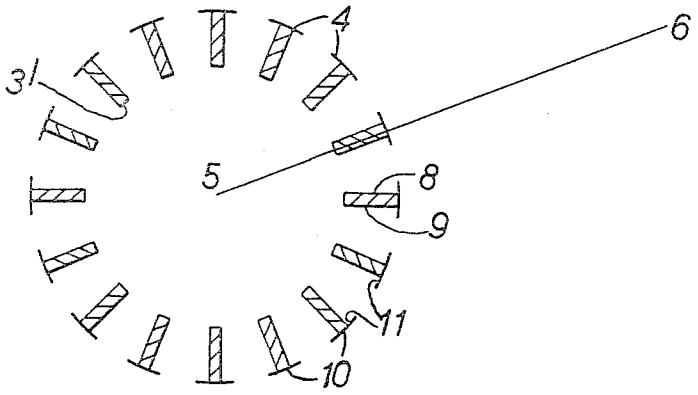


FIG. 2.



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SHUTTLECOCK WITH BLADE-LIKE STEMS

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FIG. 3.

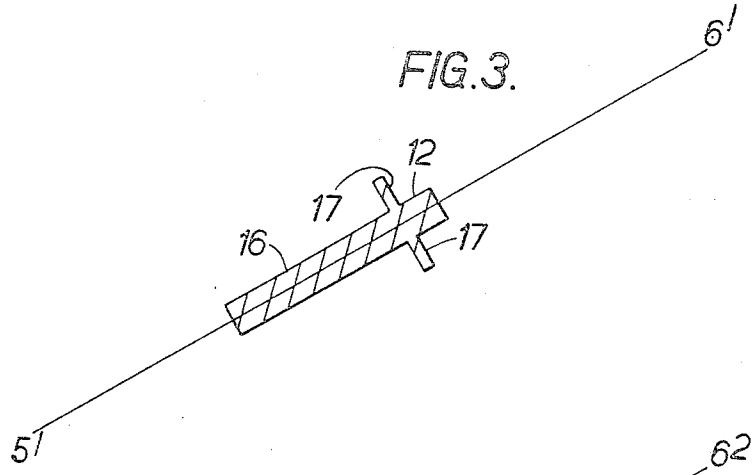


FIG. 4.

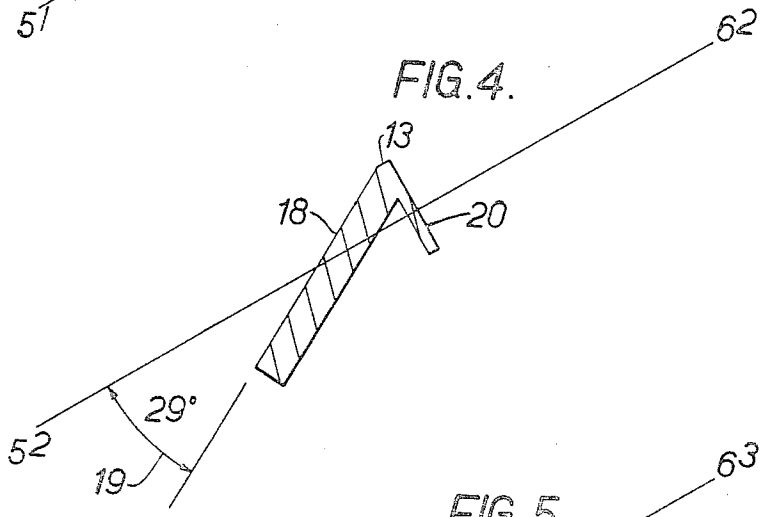
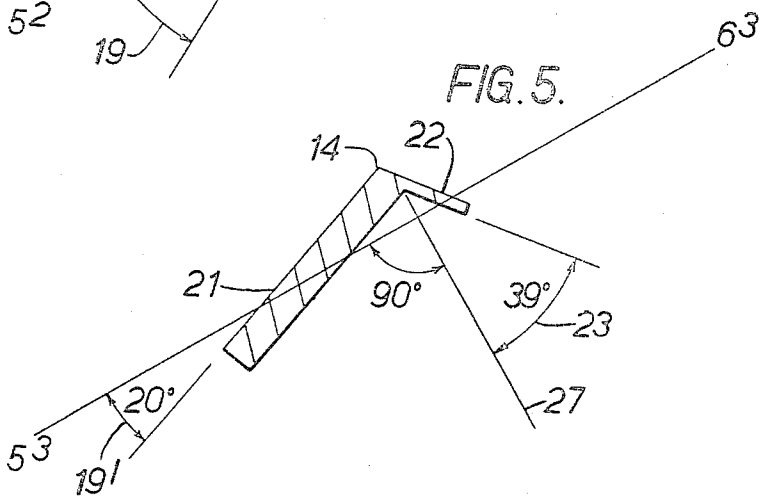


FIG. 5.



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SHUTTLECOCK WITH BLADE-LIKE STEMS

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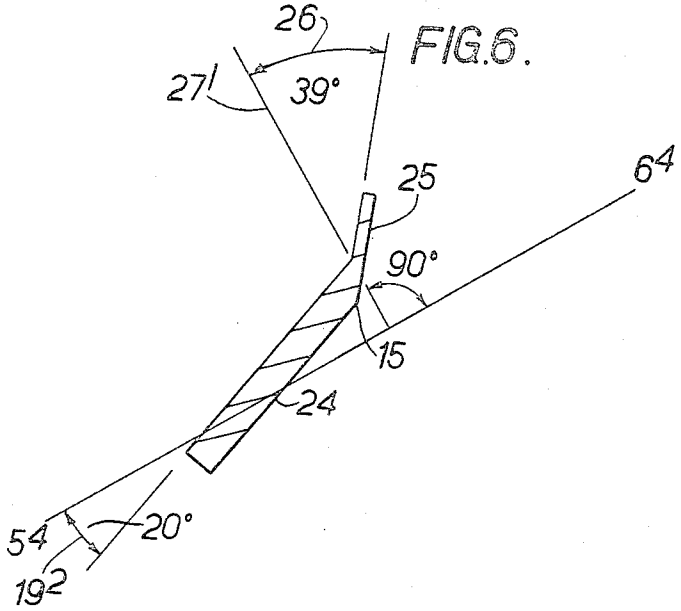

FIG. 6.

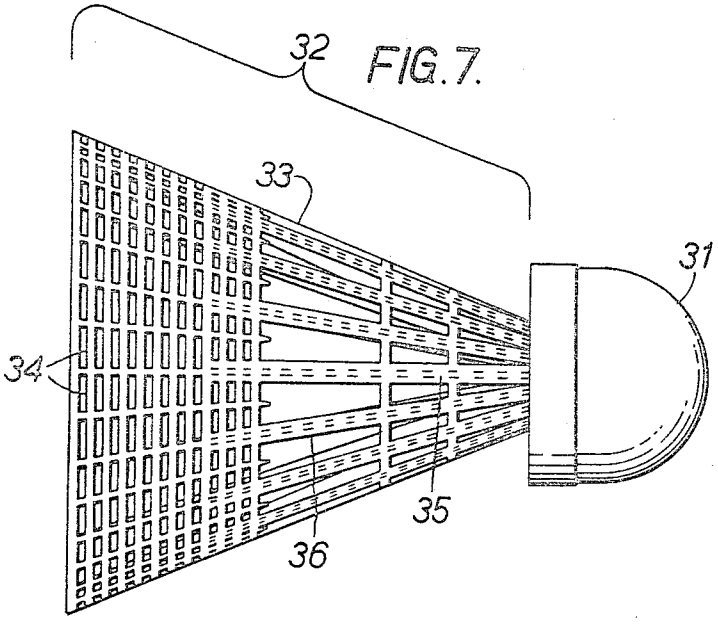

FIG. 7.

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3,313,543

SHUTTLECOCK WITH BLADE-LIKE STEMS

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Claims priority, application Great Britain, June 25, 1963, 25,135/63
1 Claim. (Cl. 273—106)

This invention relates to shuttlecocks having skirts made of suitable synthetic materials such as some types of polyethylenes and some types of polyamides.

Shuttlecocks having skirts made of synthetic materials and acceptable to large numbers of badminton players have been in production since 1950 and some of these shuttlecocks have a performance comparable to some types of feather shuttlecocks.

The performance of any type of shuttlecock can be continually improved but there are a number of conflicting requirements which make great attention to detail essential and some compromise between weight and strength inevitable.

In addition to performance there is a further quality which is also capable of continual improvement but subject to compromise with performance, and this quality is to some extent psychological and to some extent connected with "feel." When a badminton player "smashes" his satisfaction is increased if there is appreciable resistance and a certain noise made on impact between shuttlecock and racket. A new feather shuttlecock of tournament quality and made from goose feathers has this quality.

It is the broad object of this invention to improve the psychological attraction of shuttlecocks with particular regard to the "feel" and sound of shuttlecocks having skirts made of suitable synthetic materials, such as certain polyethylenes and polyamides.

The invention particularly aims to provide a shuttlecock capable of being made by injection moulding whose performance is eminently satisfactory to a skilled player of badminton. The shuttlecock of the invention flies properly, spins well, and emits the desired sound when struck.

In order that the invention may be readily understood and carried into effect reference is now made to the accompanying drawings in which:

FIGURE 1 is a side elevation of a typical shuttlecock of the prior art.

FIGURE 2 is a cross section on line 2—2 of FIGURE 1, but with wings 4 added to the blade-like stems, the showing of the wings being somewhat diagrammatic. This figure illustrates the invention.

FIGURE 3 shows an enlarged cross-sectional view of a single stem of a shuttlecock incorporating one form of the invention.

FIGURE 4 shows an enlarged cross-sectional view of a single stem of a shuttlecock incorporating another form of the invention.

FIGURE 5 shows an enlarged cross-sectional view of a single stem of a shuttlecock incorporating yet another form of the invention.

FIGURE 6 shows an enlarged cross-sectional view of a single stem of a shuttlecock incorporating still another form of the invention.

FIGURE 7 shows a side elevation of a shuttlecock incorporating the invention.

Referring first to FIGURE 1, a cap 1 is fixed to a skirt 2 which, it will be noted, joins the cap at the flared end 7. The cap 1 may be integral with the skirt 2 or may be attached to a collar (not shown) that is integral with the stems 3. The cap may also be provided with additional covering, not shown. The blade-like stems 3 form

part of the skirt and hold the vanes 30, which may be a series of ribs branching from each side of each stem in proper relationship to the cap. The vane area may extend the full length of the skirt but usually extends from the wide end of the skirt to between 70% and 30% of the total length of the skirt.

Now referring to FIGURE 2, the blade-like stems 3^1 are similar to stems 3 of FIGURE 1 except that wing-like portions 4 have been added to the outer surfaces of each stem. 5 is the longitudinal axis or center of the shuttlecock and the line 5–6 is a typical true radius, which passes through one of the stems 3^1. The broad faces of the stems are the faces 8, 9 and they fall within 30° of parallelism to this true radius 5–6. The wide faces of the wing-like portions 4 are the faces 10, 11, and they must fall within 40° of a line at 90° to the true radius 5–6. The term "thick" when applied to the blade-like stems 3^1 is the distance between the faces 8 and 9, and when applied to the wing-like portions 4 is the distance between the faces 10 and 11.

Referring to FIGURE 3, the blade-like portion 16 of stems 12 is in this instance parallel to the true radius 5^1–6^1, and the wing-like portion 17 is at right angles to the true radius 5^1–6^1 and on both sides of the blade-like portion but is intermediate the ends of the blade-like portion, though much nearer the outer end than the inner.

Referring now to FIGURE 4, the stem 13 has its blade-like portion 18 at an angle 19 which is at 29° to the true radius 5^2–6^2, and it will be noted that this angle is just within 30° which is the maximum scope it is desired to cover with this invention. The winglike portion 20 is at an angle of 90° to the true radius 5^2–6^2.

Referring now to FIGURE 5, the typical stem 14 has its blade-like portion 21 at an angle 19^1 which is at 20° to the typical true radius 5^3–6^3 and the wing-like portion 22 is at an angle 23 which is 39° to a typical line 27 at right angles to the true radius 5^3–6^3: this angle of 39° is just within the scope of this invention.

Referring to FIGURE 6 the typical stem 15 has its blade-like portion 24 at an angle 19^2 which is less than 30° to the true radius 5^4–6^4 and its wing-like portion 25 at an angle 26 which is at an angle 39° to a typical line 27^1 at 90° to the true radius but in this instance, to distinguish the embodiment from that shown at FIGURE 5 the line 27^1 is on the other side of the true radius 5^4–6^4.

The examples given are by way of indication and not limitation and any suitable combination of blade-like and wing-like portions may be used to give a total length of not less than 1 centimetre incorporated in from eight to twenty-four stiffeners arranged symmetrically around the axis of the shuttlecock.

In practice it is desirable that all the stems of the shuttlecock should incorporate the characterising features of the invention and the length of the characterising portion should extend from the cap to the vane area and even well into the vane area.

Referring now to FIGURE 7: the cap 31 is manufactured separately from the skirt 32 which has 16 stems 33 from which branch a number of vanes or ribs 34. The stems 33 incorporate a blade-like portion 35 from the cap outwards for a distance of 4 centimetres and the minimum breadth of the stems for this 4 centimetres is 2.5 millimetres and the thickness of the blade-like portion is 1 millimetre at the edge remote from the axis and .25 millimetre at the edge nearest the axis and tapered uniformly so that the mean thickness is more than .3 millimetre.

The wing-like portion previously referred to is designated 36.

What I claim is:

A shuttlecock, consisting of a cap and a flared skirt, the flared skirt incorporating not less than eight nor more

than twenty-four stems spaced symmetrically about the axis of the shuttlecock, said stems incorporating for at least 1 centimetre of their length a part having a cross section made up of a blade-like portion and a wing-like portion, the said blade-like portion having its broadest faces within 30° of parallel to a true radius from the axis of the shuttlecock which passes through the blade-like portion and the said wing-like portion having its widest faces within 40° of a line at 90° to the same true radius from the axis of the shuttlecock and the said blade-like portion having a mean thickness not less than .3 millimetre and not more than 1.5 millimetres and being not more than 7 millimetres and not less than 2 millimetres in total breadth and the said wing-like portion being not less than .075 millimetre thick, and the width of the said wing-like portion being not less than 1.5 millimetres.

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