PATENT SPECIFICATION

DRAWINGS ATTACHED

Inventor: WILLIAM CHARLES CARLTON

907,700

Date of filing Complete Specification March 24, 1961.

Application Date Feb. 1, 1961. No. 3798/61.

Complete Specification Published Oct. 10, 1962.

Index at acceptance: —Class 132(3), S28.

International Classification: —A63h.

ERRATA

SPECIFICATION NO. 907,700

Page 1, line 36, *after* "perimeter" *insert* "and"

Page 3, line 21, *for* "last" *read* "least"

THE PATENT OFFICE.
26th April 1963

DS 73075/1(7)/R.109 200 4/63 PL

facture to obtain the true flight in the smash associated with spin and at the same time obtain true flight in the high lob. The trouble is that the spin necessary for the smash causes deviation at the top of the arc in the high lob, and other shots.

It is the object of this invention to overcome this difficulty.

In this specification the cap is the forward one third of the shuttlecock, at least part of which is especially adapted to be struck by the racket, the outer skirt is the one third of the shuttlecock remote from the cap and the inner skirt is the one third of the shuttlecock between the cap and the outer skirt. Stems are longitudinal stiffening members which connect the outer skirt to the cap and form at least part of the inner skirt.

This invention is that in a shuttlecock having a cap and a one-piece inner and outer skirt the cross section of both skirts being enclosed within a circular perimeter, the inner and outer skirts being made as a moulding of artificial material, and the inner skirt incorporating blade-like stems having a wide surface set at an angle of between 10° and 30° to the diameter of the inner skirt touching the inner edge of the said surface and the outer skirt incorporating a number of flutes like stems in the [illegible] arresting power of the flutes in the outer skirt, but at low forward speeds of the shuttlecock the arresting power of the flutes in the outer skirt reduces spin so that the untrue flight associated with high spin at low speeds is reduced.

The invention is achieved by forming within the inner skirt of the shuttlecock a number of stems (usually between 12 and 16) which are flared outwards from the proximity of the cap, and are at the same time set so that their greatest width forms a series of blades radiating outwards from the axis of the shuttlecock but at a small angle to any diameter of the inner skirt which passes through the axis of the shuttlecock. This angle of the effective face is of the order of 14° and is between 10° and 30°. In the outer skirt there are formed a number of flutes which form a series of waves in the outer skirt of the shuttlecock and these waves have in a shuttlecock of a maximum diameter of $2^{5}/_{8}$" a distance between trough and crest of between $^{3}/_{32}$" (2.38 mm) and $^{5}/_{16}$" (7.94 mm).

These figures are by way of indication.

In the model so far produced the trough is at its deepest at that part of the outer skirt

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COMPLETE SPECIFICATION

An Improved Shuttlecock

We, THE CARLTON TYRE SAVING COMPANY LIMITED, of Parkstone Works, Wingletye Lane, Hornchurch, Essex, a British company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This specification relates to shuttlecocks, and in particular to a combination within a shuttlecock of two features which appear to be contradictory but which in combination produce an unexpected but improved result.

It has been a problem in shuttlecock manufacture to obtain the true flight in the smash associated with spin and at the same time obtain true flight in the high lob. The trouble is that the spin necessary for the smash causes deviation at the top of the arc in the high lob, and other shots.

It is the object of this invention to overcome this difficulty.

In this specification the cap is the forward one third of the shuttlecock, at least part of which is especially adapted to be struck by the racket, the outer skirt is the one third of the shuttlecock remote from the cap and the inner skirt is the one third of the shuttlecock between the cap and the outer skirt. Stems are longitudinal stiffening members which connect the outer skirt to the cap and form at least part of the inner skirt.

This invention is that in a shuttlecock having a cap and a one-piece inner and outer skirt the cross section of both skirts being enclosed within a circular perimeter, the inner and outer skirts being made as a moulding of artificial material, and the inner skirt incorporating blade-like stems having a wide surface set at an angle of between 10° and 30° to the diameter of the inner skirt touching the inner edge of the said surface and the outer skirt incorporating a number of flutes and the cap of the shuttlecock being the forward one third of the total length of the shuttlecock, and the outer skirt being the one third of the total length of the shuttle cock remote from the cap, and the inner skirt being the one third of the total length of the shuttlecock between the cap and the outer skirt, the shuttlecock being characterised in that the blade-like stems are combined with the flutes, the combination of the blade-like stems and flutes being such that at the high forward speeds of the shuttlecock associated with the smash the spin imparted by the action of the air on the blade-like stems in the inner skirt overcomes the arresting power of the flutes in the outer skirt, but at low forward speeds of the shuttlecock the arresting power of the flutes in the outer skirt reduces spin so that the untrue flight associated with high spin at low speeds is reduced.

The invention is achieved by forming within the inner skirt of the shuttlecock a number of stems (usually between 12 and 16) which are flared outwards from the proximity of the cap, and are at the same time set so that their greatest width forms a series of blades radiating outwards from the axis of the shuttlecock but at a small angle to any diameter of the inner skirt which passes through the axis of the shuttlecock. This angle of the effective face is of the order of 14° and is between 10° and 30°. In the outer skirt there are formed a number of flutes which form a series of waves in the outer skirt of the shuttlecock and these waves have in a shuttlecock of a maximum diameter of $2^{5}/_{8}$" a distance between trough and crest of between $^{3}/_{32}$" (2.38 mm) and $^{5}/_{16}$" (7.94 mm).

These figures are by way of indication.

In the model so far produced the trough is at its deepest at that part of the outer skirt

most remote from the cap and reduces as the outer skirt approaches the boundary of the inner skirt.

When the shuttlecock is in slow forward flight but having high spin the flutes create considerable resistance to rotation and slow the rate of spin down.

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

Fig. 1 represents a perspective view from above of a shuttlecock embodying the invention.

Fig. 2 represents a side elevation of a shuttlecock embodying the invention.

Fig. 3 represents a plan view of a shuttlecock embodying the invention.

Fig. 4 represents a plan view through the section IV—IV in Fig. 1.

Fig. 5 represents a sectional view through the cap and part of the inner skirt of the shuttlecock shown in side elevation in Fig. 2.

Referring now to Figures 1, 2, 3, 4 & 5 the shuttlecock for the purposes of this invention, is divided into three parts as shown by the brackets 1^1, 2^1, and 3^1 in Fig. 2. The part of the shuttlecock indicated by the bracket 1^1 is the forward one-third of the shuttlecock, and this part is referred to as the cap 1 even though it may include a part of what might appear to be the inner skirt. The part of the shuttlecock indicated by the bracket 3^1 is the one-third of the overall length of the shuttlecock remote from the cap, and this part is referred to as the outer skirt 3.

The part of the shuttlecock indicated by the bracket 2^1 is the one-third of the total length of the shuttlecock between the cap and the outer skirt, and this part is referred to as the inner skirt 2.

For the purposes of this invention the essential features of the inner and outer skirts 2, 3, are the blade-like stems 4, having a wide surface 5 inclined outwards and these are combined with the flutes 6 in the outer skirt.

For the sake of convenience in manufacture the flutes 6 are shown as being radiused at trough and crest and these radii could be made much smaller than those shown if required.

Additionally, the flutes 6 are shown as being most pronounced at the end of the shuttlecock most remote from the cap, and least pronounced as they approach the inner skirt, but from the point of view of this invention the important thing is that there should be a number of flutes in the outer skirt, the object of these flutes being to retard the rate of spin when the shuttlecock is spinning, and it is not critical whether the flutes are of constant depth. In practice the depth of the flutes at their deepest part is between 2.38 mm and 7.94 mm.

Although it is not essential that there should be the same number of flutes as stems, in practice it is convenient to make them so. In the example shown in the drawings there are sixteen stems and sixteen flutes. It should also be noted that the flutes are, in the example, formed inwards from the line of the stems, and this is so that the stems give some protection to the flutes but from the point of view of the invention the flutes could be formed outwards of the stems.

As can be seen in Figs. 3 and 4 the stems 4 are blades which are arranged with a wide surface 5 inclined at an angle of about 14° to any diameter X of the inner skirt passing through the axis of the shuttlecock and touching the inner edge of the surface 5. When the shuttlecock is travelling forwards the air acts against the wide surface 5 to cause the shuttlecock to spin. The angle made between the surface 5 and the diagonal X must be between 10° and 30°.

WHAT WE CLAIM IS:—

A shuttlecock having a cap and a one-piece inner and outer skirt, the cross section of both skirts being enclosed within a circular perimeter and the inner and outer skirts being made as a moulding of artificial material, and the inner skirt incorporating blade-like stems having a wide surface set at an angle of between 10° and 30° to the diameter of the inner skirt touching the inner edge of the said surface and the outer skirt incorporating a number of flutes and the cap of the shuttlecock being the forward one third of the total length of the shuttlecock, and the outer skirt being the one third of the total length of the shuttlecock remote from the cap, and the inner skirt being the one third of the total length of the shuttlecock between the cap and the outer skirt, the shuttlecock being characterised in that the blade-like stems are combined with the flutes, the combination of blade-like stems and flutes being such that at the high forward speeds of the shuttlecock associated with the smash the spin imparted by the action of the air on the blade-like stems in the inner skirt overcomes the arresting power of the flutes in the outer skirt, but at low forward speeds of the shuttlecock the arresting power of the flutes in the outer skirt reduces spin so that the untrue flight associated with high spin at low speeds is reduced.

For and on behalf of:
THE CARLTON TYRE SAVING COMPANY LTD.,
W. C. CARLTON, Director.

PROVISIONAL SPECIFICATION

An Improved Shuttlecock

We, THE CARLTON TYRE SAVING COMPANY LIMITED, of Parkstone Works, Wingletye Lane, Hornchurch, Essex, a British company, do hereby declare this invention to be described in the following statement:—

This specification relates to shuttlecocks, and in particular to a combination within a shuttlecock of two features which appear to be contradictory but which in combination produce an unexpected but improved result.

It has been a problem in shuttlecock manufacture to obtain the true flight in the smash associated with spin and at the same time obtain true flight in the high lob. The trouble is that the spin necessary for the smash causes deviation at the top of the arc in the high lob, and other shots.

It is the object of this invention to overcome this difficulty.

In this specification the cap is the forward one third of the shuttlecock, at last part of which is especially adapted to be struck by the racket, the outer skirt is the one third of the shuttlecock remote from the cap and the inner skirt is the one third of the shuttlecock between the cap and the outer skirt. Stems are longitudinal stiffening members which connect the outer skirt to the cap and form at least part of the inner skirt.

This invention is that in a shuttlecock having a cap and a one piece inner and outer skirt, the inner and outer skirt being made as a moulding of artificial material, and the cap of the shuttlecock being the forward one third of the shuttlecock, the outer skirt being the one third of the shuttlecock remote from the cap and the inner skirt of the shuttlecock being the one third of the shuttlecock between the outer skirt and the cap, and both the inner skirt and the outer skirt incorporating stems, the invention is characterised in that at least in the inner skirt the stems are in themselves blades which act on the air to cause the shuttlecock to spin and these stems are combined with a series of flutes in the outer skirt which flutes are devices which act on the air to arrest the speed of the spin of the shuttlecock, the combination of stems and flutes being such that at the high forward speeds of the shuttlecock associated with the smash the spin imparted by the stems in the inner skirt overcomes the arresting power of the flutes in the outer skirt, but at low forward speeds of the shuttlecock the arresting power of the flutes in the outer skirt reduces the spin so that the untrue flight associated with high spin at low speeds is less pronounced.

The invention is achieved by forming within the inner skirt of the shuttlecock a number of stems (usually between 12 and 16) which are flared outwards from the proximity of the cap, and are at the same time set so that their greatest width forms a series of blades radiating outwards from the axis of the shuttlecock but at a small angle to any diameter which passes through the axis of the shuttlecock. This angle on the effective face is of the order of about 14° and is between 10° and 30°. In the outer skirt there are formed a number of flutes which form a series of waves in the outer skirt of the shuttlecock and these waves have in a shuttlecock of a maximum diameter of $2^5/_8$" a distance between trough and crest of between $^3/_{32}$" and $^5/_{16}$". These figures are by way of indication.

In the model so far produced the trough is at its deepest at that part of the outer skirt most remote from the cap and reduces as the outer skirt approaches the boundary of the inner skirt.

When the shuttlecock is in slow forward flight but having high spin the flutes formed by the waves create considerable resistance to rotation and slow the rate of spin down.

For and on behalf of:
THE CARLTON TYRE SAVING COMPANY, LTD.,
W. C. CARLTON, Director.

Leamington Spa: Printed for Her Majesty's Stationery Office by the Courier Press.—1962.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

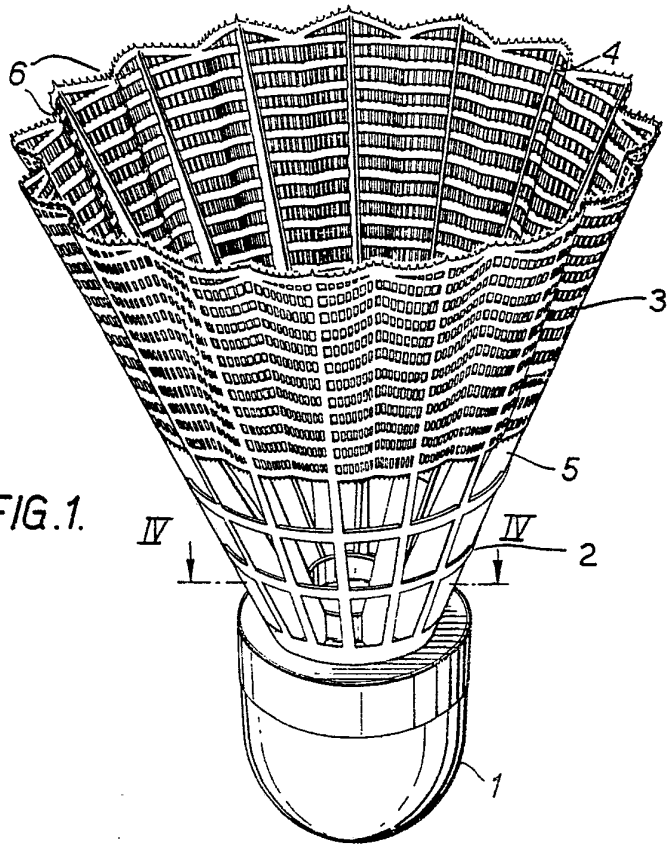


FIG.1.

FIG.4.

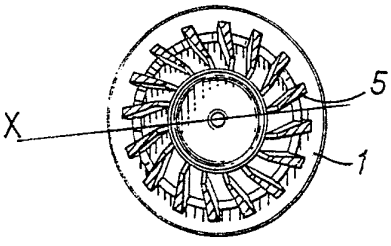
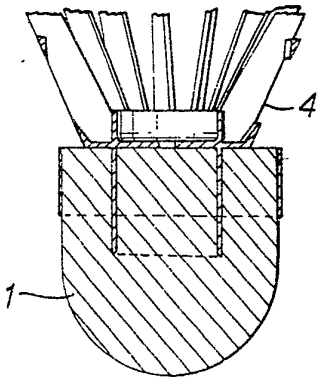


FIG.5.



907,700 COMPLETE SPECIFICATION

2 SHEETS

This drawing is a reproduction of the Original on a reduced scale.

SHEETS 1 & 2

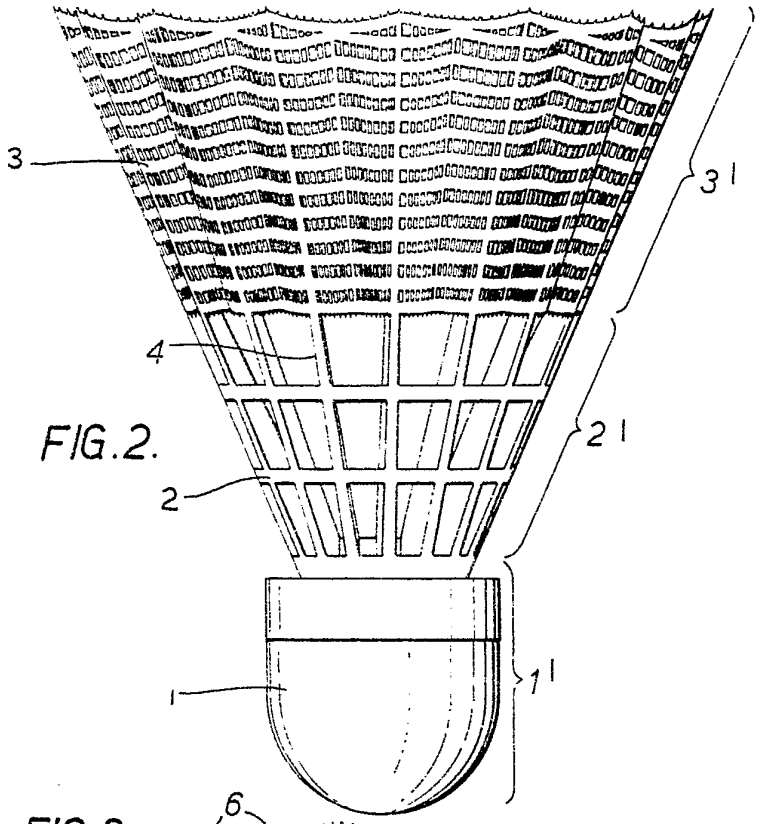
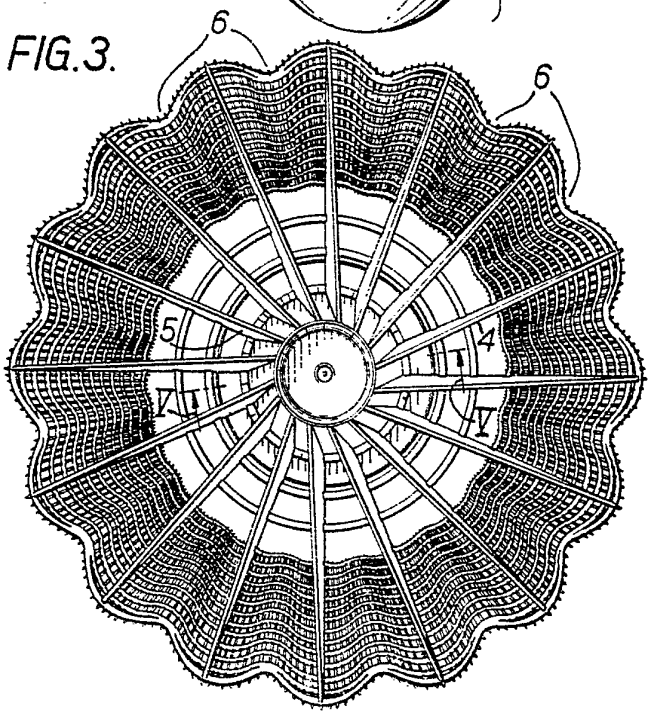


FIG.2.

FIG.3.



907,700 COMPLETE SPECIFICATION
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SHEETS 1 & 2

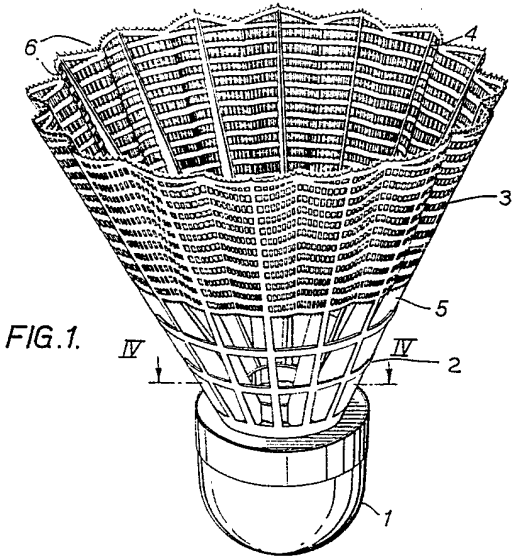

FIG.1.

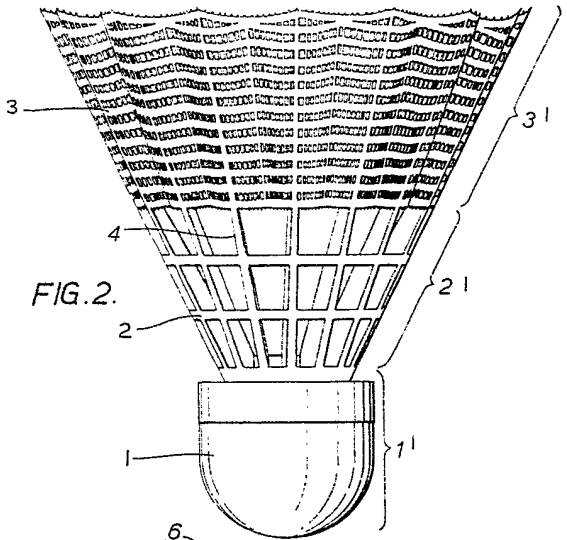

FIG.2.

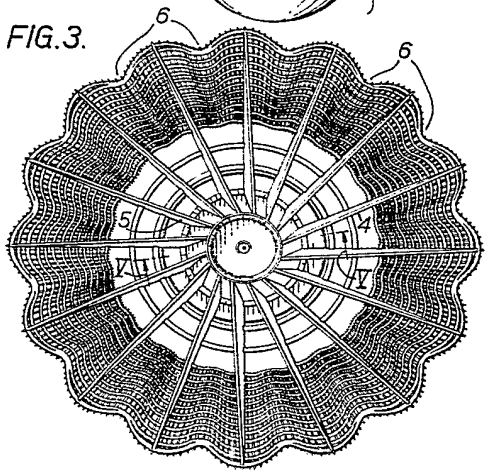

FIG.3.

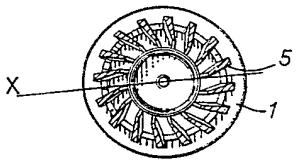

FIG.4.

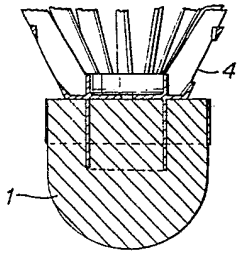

FIG.5.