PATENT SPECIFICATION

DRAWINGS ATTACHED

Inventor: WILLIAM CHARLES CARLTON

861,649

Date of Application and filing Complete Specification April 11, 1957.

No. 11854/57.

Complete Specification Published Feb. 22, 1961.

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

International Classification: —A63h.

COMPLETE SPECIFICATION

An improved Shuttlecock

We, CARLTON GENERAL DISTRIBUTORS (SHUTTLECOCKS) 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 invention relates to shuttlecocks which incorporate skirts which are made of artificial materials.

In this specification the shuttlecocks described consist of a cap and a skirt which is attached to the cap and flared outwardly from it. The stiffeners referred to are longitudinal strengthening members which flare outwardly from the cap and form part of the skirt; other parts of the skirt are not concerned with this invention.

A difficulty in the manufacture of shuttlecocks made of artificial materials is to incorporate a control on the speed of spinning. Spinning may be caused by the action of a racket on the shuttlecock, or the action of air on the shuttlecock as it flies. If a shuttlecock spins too quickly it does not follow a true course when changing its direction of flight; if it does not spin at all, it behaves irregularly in the "smash" because of either damage or deformation when in contact with the racket and the recovery to its normal shape is not instantaneous. It is important therefore, in good quality shuttlecocks (although not required at this date by the rules of Badminton, a game in which shuttlecocks are used) that a control should be incorporated in the shuttlecock and this control should tend to reduce the speed of spinning when the shuttlecock is spinning too fast, and increase the speed when the shuttlecock is spinning too slowly.

A number of proposals have been made to make shuttlecocks spin, but in practice the resulting shuttlecocks either spin too quickly, or one shuttlecock does not spin at even approximately the same speed as others in the same batch, or the expense or time of manufacturing the shuttlecock is increased, or the cost of tooling has been increased.

It is the object of this invention to overcome these difficulties in a positive manner.

It has now been noted that sufficient air passes through the skirt of a shuttlecock via the large holes often left in that part of the shuttlecock skirt between the vane area and the cap, for the shuttlecock to be caused to spin if the stiffeners, between the cap and the vane area, are so shaped that the air acts on the stiffeners to turn the shuttlecock.

When it is stated in this specification and these claims that a stiffener is "offset" it is meant that the stiffener has a cross section which is both (a) asymmetrical in relation to a diameter drawn through the outermost point of the cross section and the axis of the shuttlecock for example as indicated by the diameter YY in Figure 2, and (b) has at least one surface on which the air passing from the outside of the shuttlecock to the inside of the shuttlecock skirt acts to cause a positive sideways force on the stiffener for example as indicated by the arrow D in Figure 2, it being understood that the action of the air against other surfaces of the stiffener may cause forces in other than the desired direction which must be cancelled out before the positive sideways force becomes effective.

In this specification and these claims the phrase " a stiffener of a cross section which is offset in relation to the mean direction of the air passing through the skirt of a shuttlecock" can be understood by referring to Figs. 2 and 3 of the drawings herewith. The arrows X X and X^1 X^1 indicate the mean direction of the air passing from the outside of the

[

shuttlecock skirt to the inside of the shuttlecock skirt when the shuttlecock is in normal forward flight. In practice the air flows towards the axis of the shuttlecock from the outside and passes through the large holes left between the stiffeners. The stiffeners are provided with an outside face E or E^1 upon which air passing in the direction of the arrows X X or X^1 X^1 will act to turn the shuttlecock.

It is emphasised that previously the air passing along the outside of the shuttlecock skirt has been harnessed to make the shuttlecock spin, but this invention relies on the passage of air through the shuttlecock skirt, as distinct from along it.

Previous efforts to make a shuttlecock spin have been directed to the airstream where the air is flowing along the surface of the shuttlecock skirt, or where the velocity of the air is so reduced in passing through the vane area of the shuttlecock skirt that some of the energy is lost. Alternately the stiffeners or feathers have been curved or angled from the cap, but removal from the manufacturing tool is then complicated.

According to this invention a shuttlecock, consisting of a cap and a balanced flared skirt, the skirt being made of artificial material and incorporating straight longitudinal stiffeners with air spaces between them is characterised in that at least two of the longitudinal stiffeners are of a cross section which is offset in relation to the mean direction of the air passing through the skirt of the shuttlecock, as described in the relevant part of the specification, the offset being such that the shuttlecock is caused to spin at the desired speed.

There are a number of advantages for achieving spin in this manner; the tool is easily made, the shuttlecocks withdraw from the forming or moulding tool without the necessity for twisting, the amount of spin required can be precisely arranged by increasing or decreasing the offset, and all the shuttlecocks produced from a particular die or mould will be substantially similar in performance. If the shuttlecock is made to spin too fast by the action of the racket, in either direction, the surfaces of the offset stiffeners will come into action to cause the shuttlecock to slow down to the correct rotational speed (if the shuttlecock is already spinning in the correct direction), or to stop the spinning and then to reverse the direction of spinning until the shuttlecock is spinning at the right speed and in the correct direction (if the shuttlecock was originally spinning in the wrong direction).

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 side elevation of a shuttlecock embodying the essential features of the invention when applied to a typical shuttlecock.

Fig. 2 represents a cross section about II—II on Fig. 1.

Fig. 3 represents a cross section of an alternative embodiment of the invention.

Fig. 4 represents a cross section of an alternative embodiment of the invention.

Referring now to Figures 1 and 2, the shuttlecock consists of cap A and skirt B and the skirt incorporates stiffeners C. These stiffeners are not, however, the usual symmetrical stiffeners, but stiffeners which are offset in relation to the mean direction of airflow passing from the outside of the shuttlecock skirt to the inside of the shuttlecock skirt as represented by the arrows XX. A cross sectional view of the offset stiffeners is shown at C^1 in Figure 2. It will be noted that the arrows XX have been described as representing the mean direction of airflow, but from the constructional point of view it is adequate to make the stiffeners "offset" in relation to any typical diameter YY, providing that the conditions for the creation of the rotational force D are maintained.

The passage of air in the direction XX impinges on the surface E and creates a force approximately in the direction of the arrow D, and this force causes the shuttlecock to tend to rotate.

In Figure 3 is shown another embodiment of the invention, in cross section. In this instance the stiffeners C^2 shown in cross section are offset in relation of the arrows X^1 X^1 and in relation to a typical diameter Y^1 Y^1, the surface E^1 being at a greater angle to X^1 X^1 than the surface F.

It is extremely important to note, however, that if the surface F were appreciably longer than the surface E^1 the forces created by the airflow on each face might become equal, in which case a rotational force would not result. It is essential that the forces created by the air on the stiffener should have a positive rotational effect.

In Figure 3, the force created by the air on the surface E^1 is greater than the force created by the air on the surface F with the result that a positive rotational force D^1 is created.

In Figure 4 is shown a flange G, part of an otherwise symmetrical stiffener C^3, this flange causes the offsetting.

There are many other suitable sections which will give a satisfactory result, and the examples shown in Figures 1, 2, and 3 are by way of indication and not limitation.

It is to be noted that although claim 1 refers to "at least two stiffeners" being offset, since two will give a balanced rotational force, in practice it is desirable that all the stiffeners in the shuttlecocks should be offset

and that it is customary to provide between 11—25 stiffeners.

WHAT WE CLAIM IS:—

1. A shuttlecock consisting of a cap and a balanced flared skirt, the skirt being made of artificial material and incoroporating straight longitudinal stiffeners with air spaces between them and the shuttlecock being characterised in that at least two of the longitudinal stiffeners are of a cross section which is offset in relation to the mean direction of the air passing through the skirt of the shuttlecock, as described in the relevant part of the specification, the offset being such that the shuttlecock is caused to spin at the desired speed.

2. A shuttlecock as in Claim 1, and characterised in that all the longitudinal stiffeners in the skirt are offset in relation to the mean direction of the air passing through the shuttlecock, as described in the relevant part of the specification.

3. A shuttlecock substantially as described in the specification and illustrated in the drawings herewith.

For and on behalf of:
CARLTON GENERAL DISTRIBUTORS (SHUTTLECOCKS) LTD.,
W. C. CARLTON,
Director.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.—1961
Published at the Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained

861649 COMPLETE SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

FIG. 1.

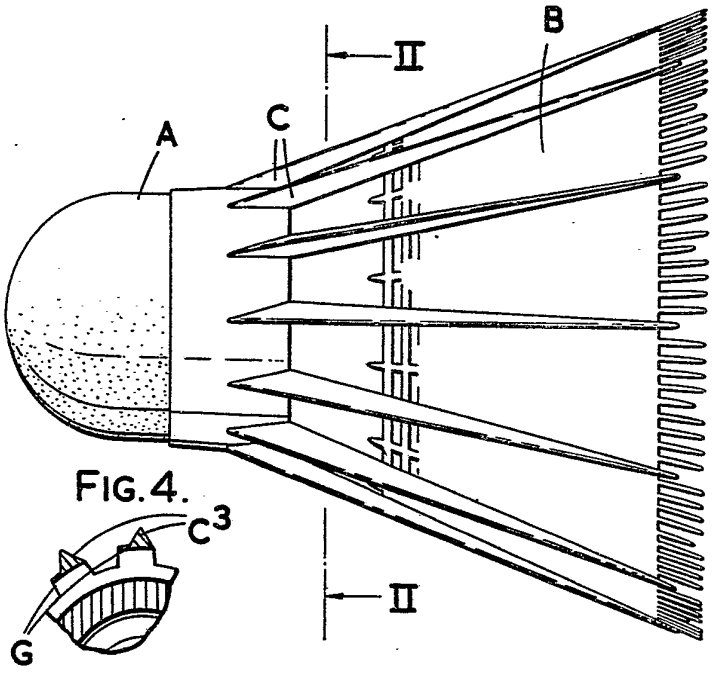

FIG. 4.

FIG. 2.

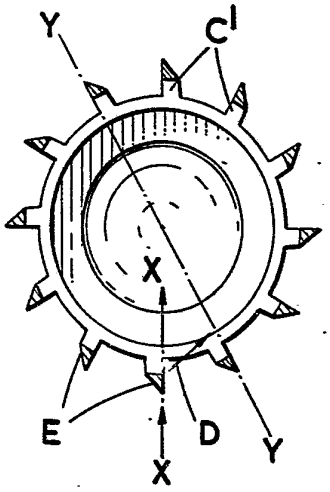

FIG. 3.