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This invention relates to Badminton Shuttlecocks. The object of my invention is to simplify and make less costly the manufacture of shuttlecocks.

The manufacture of shuttlecocks is costly and difficult. Specially selected feathers must be used for the tail or vane. Special cork and fine kid leather are used for the heads, and the whole must be accurately assembled and weighted to avoid undesirable variations in the playing qualities of the shuttlecock.

It has been proposed to substitute fabric, papier mache, celluloid or similar materials for the feathers commonly used, but this does not overcome the necessity of carefully mounting the vane or tail on the head and weighting the bird to obtain correct playing characteristics.

I overcome these difficulties and attain the object of my invention by making the shuttlecock from a single piece of material that may be stamped out or molded to the desired shape. Darts having body and tail parts molded from rubber are known but these have not the characteristics of a badminton shuttlecock, nor do they involve the same considerations of accuracy of form and weight.

My invention is hereinafter more particularly described, and is illustrated in the annexed drawings in which

Fig. 1 is a horizontal section of the shuttlecock;

Fig. 2 a rear view, showing slots formed in the vane;

Fig. 3, a vertical section partly broken away showing a modified form of perforation of the vane;

Fig. 4, a fragmentary cross section through one side of the vane of a form of corrugation of the vane;

Fig. 5, a side elevation partly broken away showing a modification of the corrugation;

Fig. 6, a side elevation partly broken away showing another modified form of corrugation of the vane;

Fig. 7, a fragmentary side elevation of the vane;

Fig. 8, a perspective rear view of the vane showing strengthening ribs.

Fig. 9, a rear view of a shuttlecock showing elastic reinforcing cords;

Fig. 10, a rear view of the vane showing cellular reinforcing struts;

Fig. 10a, a longitudinal section of the construction shown in Fig. 10;

Fig. 11, a side elevation of the vane having slit outwardly curled ends;

Fig. 12, a longitudinal cross section of a vane having an inturned end; and

Fig. 13, a longitudinal cross section showing a modified form of resilient connection between the head and vane.

In the drawings like numerals of reference indicate corresponding parts in the different figures.

In its simplest form, the invention comprises a shuttlecock of hard resilient material having a head 1 integral with the tail or vane 2 as illustrated in Fig. 1.

In general the shape of the shuttlecock will conform to that of the ordinary shuttlecock. The vane portion is frusto-conical, and the head portion substantially semi-spherical or cylindrical with a substantially semi-spherical end. The tail portion is normally hollow and open at the end and the body portion will usually be hollow depending on the material used.

Preferably the material used will be celluloid or pyroxalin, but papier mache, stiffened fabric, hard rubber, phenolic condensation products, and even light metal, such as aluminum may be used.

The head and vane of the shuttlecock are integral and are formed by molding or stamping. The head will have thicker side walls than the vane (in fact it may be solid), for two reasons. First, it is desirable that the head should be heavier than the tail part and secondly, the tail should be sufficiently resilient to bend when hit by the racquet. The actual thickness of the walls will depend on the weight and nature of the specific material used, but preferably the wall of the vane should taper in thickness from the head to its outer end.

The size of the bird is preferably substantially the size of a standard bird, but it may be varied as desired depending upon the purpose for which it is to be used and the material of which it is made.

By forming the shuttlecock by molding or stamping, the total weight can be made practically invariable, thus making unnecessary the weighing of the finished article and adding weights until the desired weight is obtained. However if for any reason it is desired to increase the weight of the shuttlecock, the weights may be placed in the hollow centre of the head and a cork stopper or other closure inserted to retain the weights therein. In Fig. 1 a small recess 1a is shown formed in the wall of the head with weights comprising small lead pellets in the recess which is closed by a cork stopper 4.

As in the case of ordinary shuttlecocks the head may be covered with kid leather and decorated with a ribbon. The vane may be colored or otherwise marked or decorated.

Preferably the walls of the vane will be provided with V-shaped slots as shown in Figs. 1 and 2 or transverse round holes as shown in Fig. 3 to permit the passage of air therethrough to slow and steady the flight.

To increase the resilience of the vane portion, an annular groove may be formed in the wall at the junction between the head and vane portions of the shuttlecock, as shown in Figs. 1, 2 and 3.

For strength and also to modify or steady the flight of the shuttlecock the vane may be corrugated throughout its length as shown in Figs. 4, 5 and 6. These corrugations may be S-shaped or U-shaped, or semi-circular in cross section or of other suitable shapes such as

spaced inwardly extending V-shaped depressions as illustrated in Fig. 4. In Fig. 5 is shown an alternative construction in which annular corrugations extend around the periphery of the vane, and in Fig. 6 is shown a plurality of semi-circular projections or knobs on the vane for the same purpose.

As shown in Figs. 1 and 2 and in detail in Fig. 7, the piece cut out to form the opening in the vane may be connected to one edge of the opening and extend outwardly to form a flap resiliently attached to the vane. These flaps tend to break the force of the blow of a racquet or of any object struck by the shuttlecock.

It may be desirable to strengthen the vane by forming internal ribs which taper down at each end as shown in Fig. 8. These ribs may be also formed externally.

A sharp blow on the side of the vane will distort it and if the material is not sufficiently resilient it may not return to its normal position. To assist the vane to retain or regain its normal shape elastic cords may be provided extending between the walls of the vane as shown in Fig. 9.

To prevent undue distortion and to assist in returning the vane to its normal shape, the interior of the vane may be provided with struts or braces which may be arranged in cellular form as illustrated in Fig. 10. These struts are preferably resilient so that the side of the vane may yield to a blow.

The vane may be slit or slotted from its outer end as illustrated in Fig. 11 and the ends outwardly curled to form resilient parts to absorb the shock of the blows of a racquet or other object.

Alternatively the end of the vane may be turned in as illustrated in Fig. 12.

In Fig. 1 I have illustrated an annular groove in the wall at the junction between the head and the vane. In Fig. 13, I show a modification of this construction in which the shuttlecock is of substantially mushroom shape forming an external annular depression or groove which provides resilience between the vane and the head.

Other modifications may be resorted to without departing from the spirit of my invention.

Having regard to the foregoing disclosure, the patent of which this specification forms part confers, subject to the conditions prescribed in the Patent Act, 1935, the exclusive right, privilege and liberty of making, constructing, using and vending to others to be used, the invention as defined in claims submitted by the patentee as follows:

1. A shuttlecock comprising a head of hard light resilient material and a hollow vane integral with and flaring outwardly from the head.

2. A shuttlecock constructed as set forth in claim 1, in which the head and vane are formed by molding or stamping.

3. A shuttlecock comprising a head and an integral vane flaring outwardly from the head, said head and vane being molded or stamped from celluloid or the like material.

4. A shuttlecock constructed as set forth in claim 1, in which both the head and vane are hollow.

5. A shuttlecock constructed as set forth in claim 1, in which slots or apertures are provided in the walls of the vane.

6. A shuttlecock constructed as set forth in claim 5, in which the apertures are formed by partially cutting out part of the wall leaving outwardly extending resilient flaps.

7. A shuttlecock constructed as set forth in claim 1 in which an annular groove is formed in the walls of the shuttlecock adjacent the junction between the head and vane to permit the vane to bend relatively to the head.

8. A shuttlecock constructed as set forth in claim 1, in which stiffening means are provided for reenforcing the walls of the vane.

9. A shuttlecock constructed as set forth in claim 8, in which the walls of the vane are longitudinally corrugated.

10. A shuttlecock constructed as set forth in claim 8, in which the wall of the vane is provided with a plurality of outwardly expressed substantially semi-spherical projections.

11. A shuttlecock constructed as set forth in claim 8, in which the vane is provided with peripheral annular strengthening ribs.

12. A shuttlecock comprising a head and a hollow frusto-conical vane integral with the head, both being formed of a hard, light resilient material.

13. A shuttlecock constructed as set forth in claim 12, in which the nose of the head is of thicker material than the adjacent wall of the vane and in which the wall of the vane tapers in thickness from the head towards the outer end.

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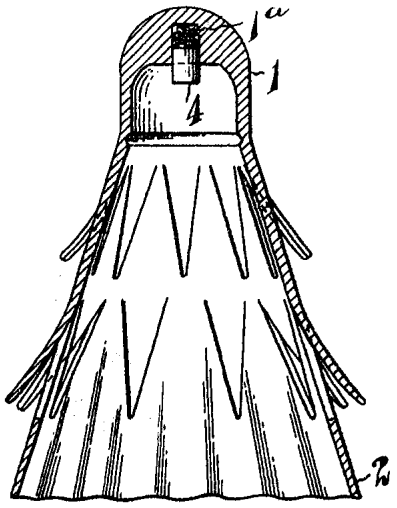


Fig. 1.

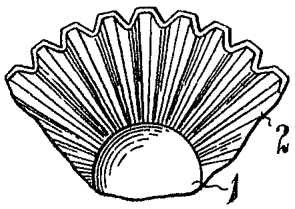


Fig. 4.

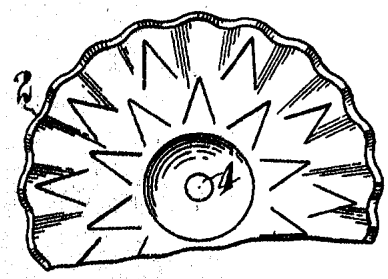
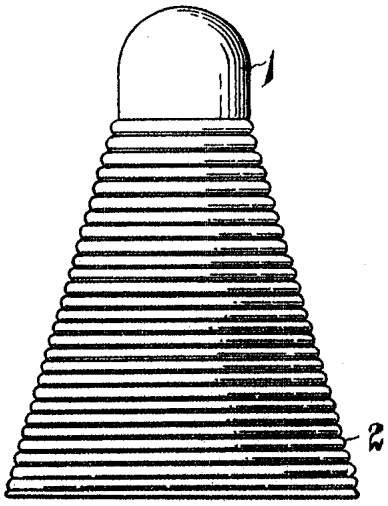


Fig. 2.



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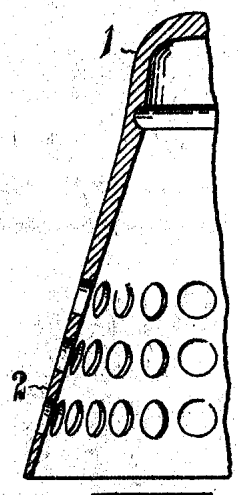
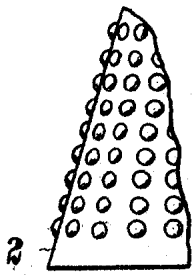


Fig. 3.



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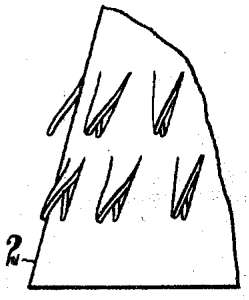

Fig. 7.

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Certified to be the drawing s referred to in the specification hereunto annexed.

Toronto, May 6th 1927

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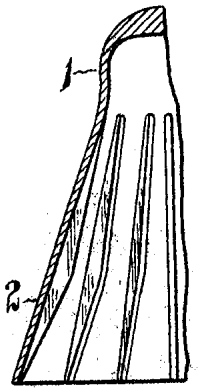
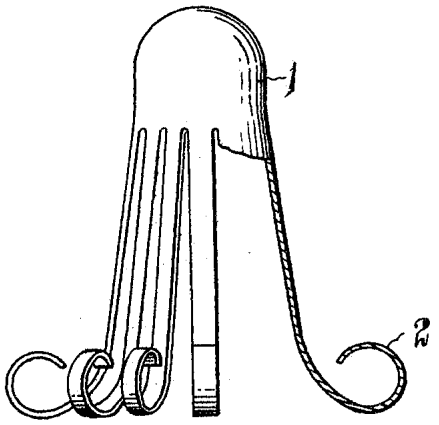


Fig. 8.



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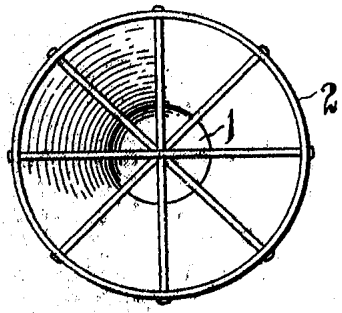

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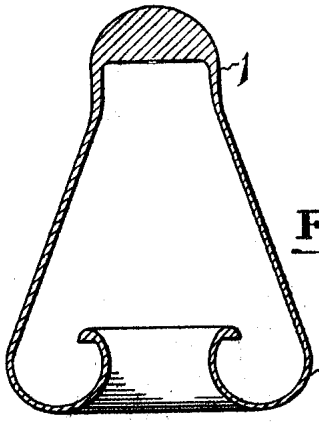

Fig. 12.

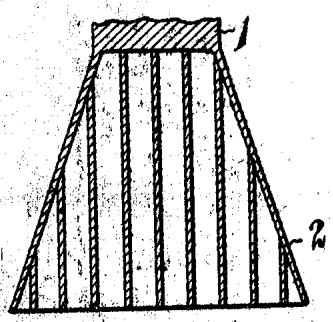

Fig. 10a

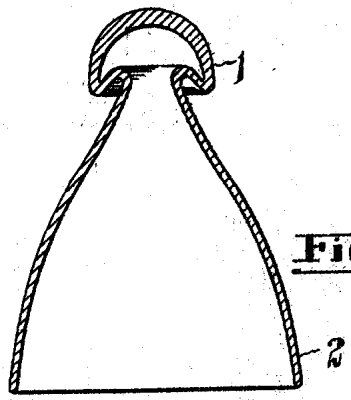

Fig. 13.

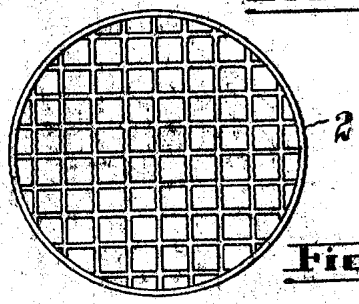

Fig. 10b

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Certified to be the drawing referred to in the specification hereunto annexed.

Toronto, May 6th 1937