

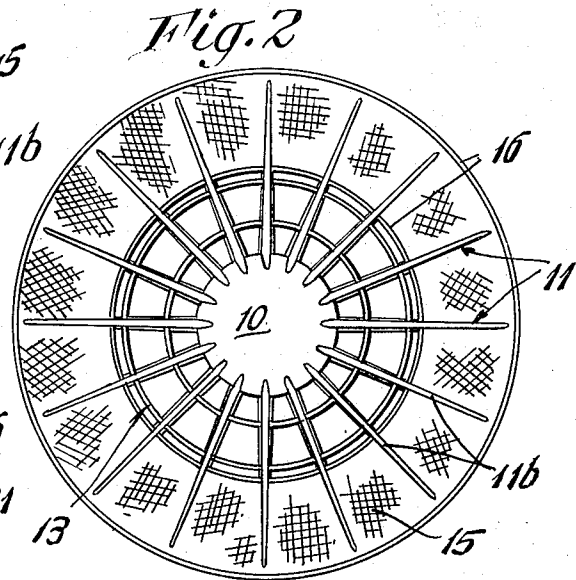
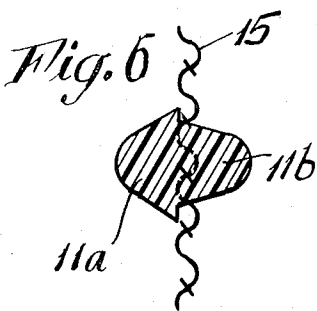
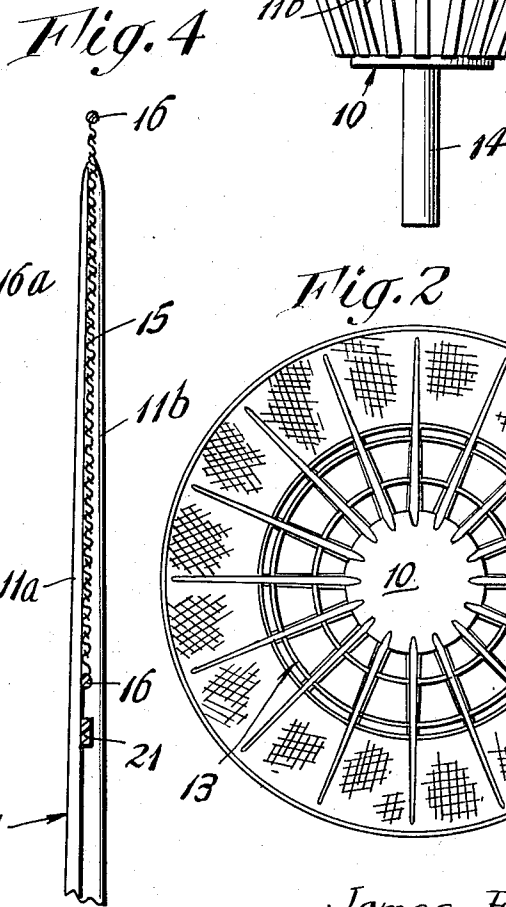
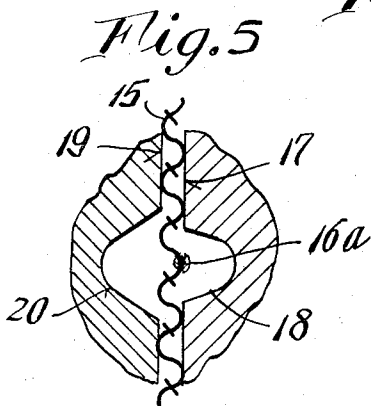
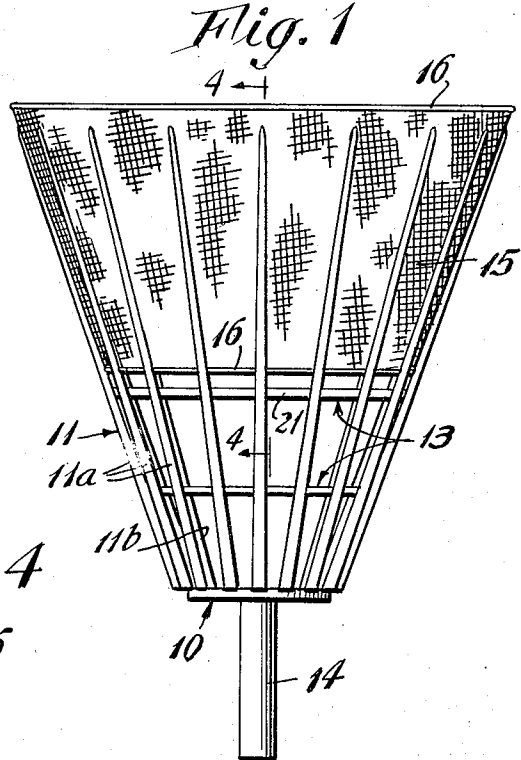
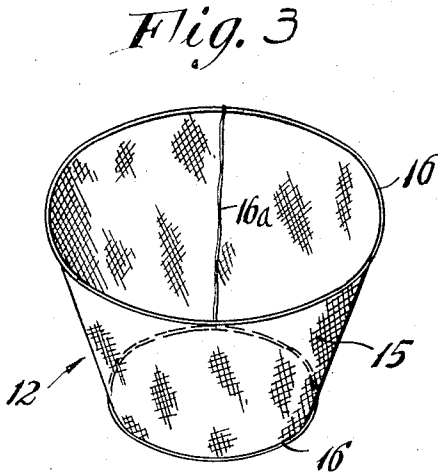
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VANE ELEMENT FOR SHUTTLECOCKS

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VANE ELEMENT FOR SHUTTLECOCKS

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ABSTRACT OF THE DISCLOSURE

The vane for connection to a shuttlecock includes a woven conical band and stems which extend upwardly and outwardly from a base and have parts located on the outside and inside of the band with portions of the stems extending through interstices in the band to interlock the stems therewith.

Heretofore, it has been proposed to mold the shuttlecock vane as a unitary structure, for example, as disclosed in Patent No. 2,667,662. This has required expensive molds and great care in the molding process to insure that the plastic material fills out all of the fine ribs connecting the stems which go to make up the vane for the shuttlecock.

The present invention overcomes the disadvantages of the prior methods of making the shuttlecock vane and provides a simplified novel vane element for use in shuttlecocks.

This is accomplished by forming the vane element by means of a performed band of thermoplastic material having interstices therein, preferably a band formed of fine mesh woven thermoplastic filaments, and by molding stems on a base on the element, with the stems interlocking with the mesh in the band to form a highly satisfactory structure which controls the shuttlecock in flight and is light in weight and yet sufficiently durable to withstand the battering that the vane portion encounters in a game of badminton. The novel method of making the vane element is simple and the molds required are inexpensive and the molding operation can be carried out expeditiously since it is unnecessary to insure that the plastic material flows through the fine passages which was heretofore necessary to make the ribs in the vanes.

Other features and advantages of the invention will be apparent from the specification and claims when considered in connection with the accompanying drawings in which:

FIG. 1 shows a side view of the vane member.

FIG. 2 shows a top view of the vane member.

FIG. 3 shows a view of the frusto conical band of the woven thermoplastic material.

FIG. 4 shows a longitudinal sectional view taken along lines 4-4 of FIG. 1.

FIG. 5 shows a fragmentary sectional view of the mold parts with the passages in registry.

FIG. 6 shows a fragmentary sectional view of the vane with the molded stem in position thereon.

As shown in the drawings, the vane element of the present invention comprises a base 10 having a plurality of stems 11 extending upwardly and outwardly therefrom and connected to a frusto conical band 12 at the upper end thereof, said stems having the same inclination to the base as the frusto conical band. If desired, the stems below the band can be connected by transverse extending ribs 13.

The vane can be connected to a suitable head (not shown) by any suitable means. In the illustrated form of the invention the base 10 has a mounting member 14

projecting from the end thereof upon which the head can be secured by any suitable means.

In forming the novel vane element of the present invention a strip 15 of material having interstices therein is provided and formed into a frusto conical band as shown in FIG. 3. In the preferred form of the invention the strip is cut or formed from a thin woven fabric of thermoplastic filaments, such as nylon or the like. Preferably, the weave is a fine mesh weave providing a plurality of small passages or interstices therethrough which function to provide a delicate control in the flight of the shuttlecock.

If the strip is cut from a sheet of woven fabric, it is preferred to bind the edges to prevent the filaments from raveling. In the illustrated form of the invention the preferred fabric is woven from nylon filament and the edges are heat sealed or beaded, as shown at 16 in FIGS. 3 and 4, to prevent raveling. The ends of the strip are joined together by suitable adhesives or by heat sealing or the like to form the frusto conical band member 12 having a seam 16a as shown in FIG. 3.

In making the novel vane element, a mold having a conical male part cooperating with a female mold part having a conical cavity similar to that shown in the patent noted above is employed. The frusto conical band is placed over the male mold part or core pin which has a smooth surface 17 provided with spaced longitudinally extending stem-forming grooves 18 in the surface thereof. The core pin is inserted into the conical mold cavity in the female mold part which also has a smooth surface 19 provided with spaced longitudinal grooves 20 in the surface. The longitudinal grooves in both mold parts, which are of a number to provide required stems in the vane member, are placed in registry as shown in FIG. 5 so as to form the stems 11. While the grooves 18 and 20 may be of the same size, it is at present preferred to make the groove 20 forming the outside portion 11a of the stem wider and deeper than the groove 18 forming the inside portion 11b of the stem and to shape them so as to provide a desirable angular side wall relation with the surface of the band as shown in the sectional view of FIG. 6.

If it is desired to reinforce the vane element below the band, annular strips 21 of similar thermoplastic material are placed on the core pin at the desired locations between the band 12 and the base forming portion of the mold. Preferably, the seam 16a is located within the grooves, as shown in FIG. 5, so that the stem, when formed, will reinforce the same.

With the elements of the vane in position in the mold, thermoplastic material having a melting point such that it will not damage the nylon in the band and transverse rib portions is injected into the mold cavity and is forced along the longitudinal passages so as to produce unitary stems having portions on the outside and inside of the band, with the plastic material passing through the interstices produced by the weave and interlocked to form a solid stem with the woven fabric embedded substantially midway of the thickness of the stem as shown in FIG. 6. With the band thus embedded in the stems separation therefrom in play, as might occur if the band were merely adhered to the stems, is avoided. Also the stems cooperate to hold the band in its desired frusto conical shape.

Thus it will be seen that a very secure connection is made between the stems and the band portion which will provide a rugged construction capable of withstanding the blow encountered in a badminton game. Further, since the cross channels used to make the ribs in the prior arrangements have been eliminated and passages of substantial cross-section are employed for making the stems,

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a simpler and less expensive mold construction may be used and an easier molding operation is obtained.

If desired, the stems 11 can extend all the way to the top edge of the vane section. However, in the present preferred form of the invention they stop just below the top of the band as shown in FIGS. 1, 2 and 4.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. A vane element adapted to be secured to a head to form a shuttlecock, comprising a frusto conical band of thermoplastic material having interstices therein, a base to be secured to the head and a plurality of plastic stems extending outwardly and upwardly from the base, said stems having portions disposed on each side of the band and having portions extending through and interlocking with the interstices in said band.

2. A vane element adapted to be secured to a head to form a shuttlecock, comprising a frusto conical band of woven thermoplastic material having interstices therein, a base to be secured to the head and a plurality of plastic stems extending outwardly and upwardly from the base and having the same angularity as said frusto conical band, said stems having portions on each side of the band extending through and interlocking with the interstices of the woven material.

3. A vane element adapted to be secured to a head to form a shuttlecock, comprising a frusto conical band of woven thermoplastic filaments, said band having interstices therein and having the edges thereof heat sealed to

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prevent raveling thereof, a base to be secured to the head and a plurality of plastic stems extending outwardly and upwardly from the base, said stems having portions disposed on each side of the band with the material of the stems extending through and interlocking with the interstices in the band.

4. A vane element adapted to be secured to a head to form a shuttlecock, comprising a frusto conical fine mesh woven band of woven thermoplastic filaments, a base to be secured to the head, a plurality of plastic stems extending outwardly and upwardly from the base, said stems having portions on each side of the band and passing through and interlocking with the band, the stem portion on the outer side of the band being wider than the stem portion on the inner side, and annular reinforcing ribs embedded in said stems between the base and band.

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