

Aug. 27, 1957

R. J. NASH
SHUTTLECOCK CAP

2,804,305

Filed Jan. 25, 1956

2 Sheets-Sheet 1

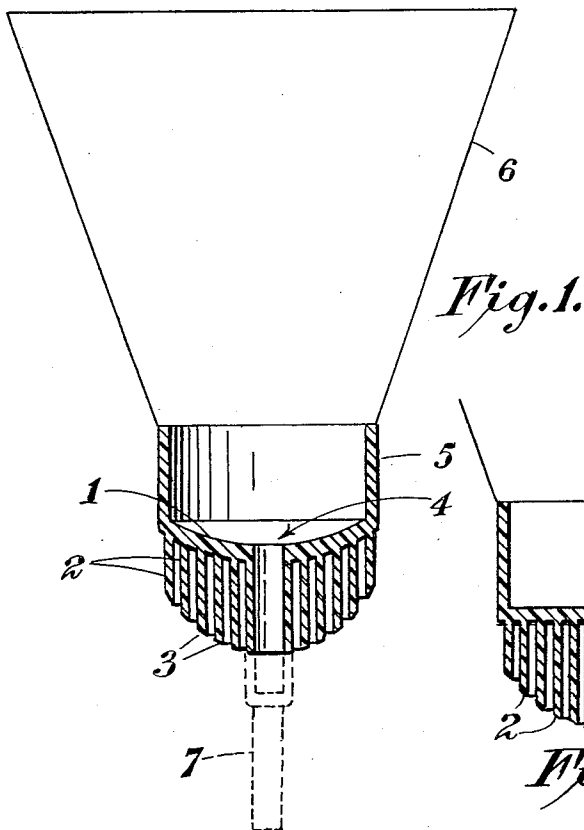


Fig. 1.

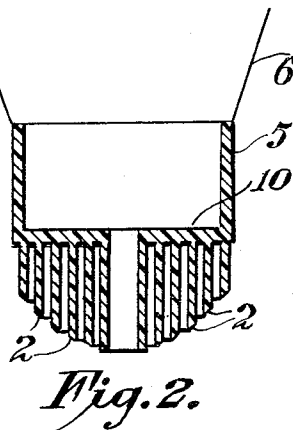


Fig. 2.

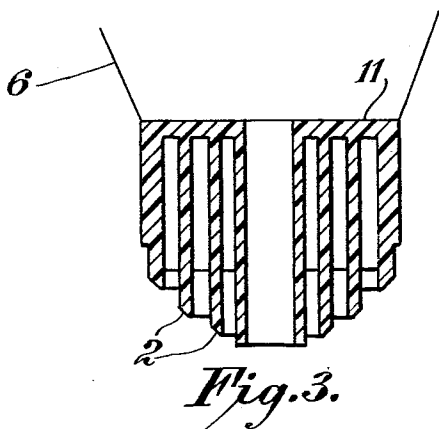


Fig. 3.

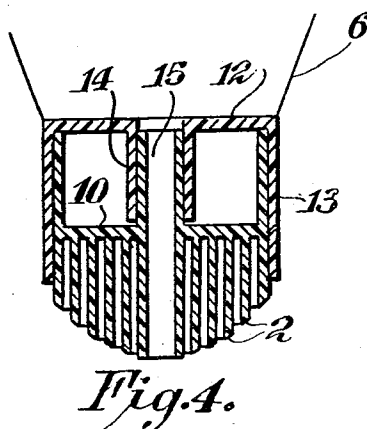


Fig. 4.

Inventor:
Robert John Nash
By his attorneys:
Baldwin & Wright

Aug. 27, 1957

R. J. NASH
SHUTTLECOCK CAP

2,804,305

Filed Jan. 25, 1956

2 Sheets-Sheet 2

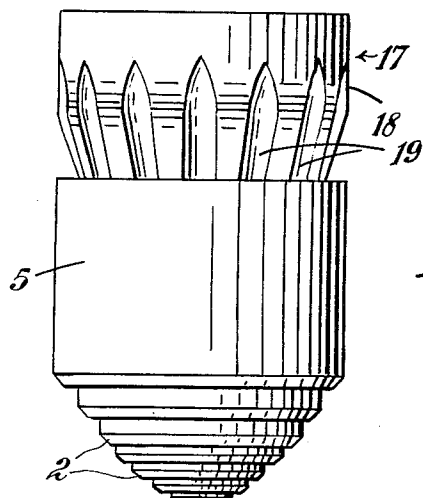


Fig. 5.

Fig. 6.

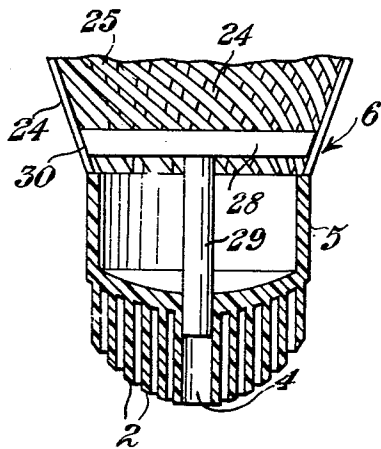
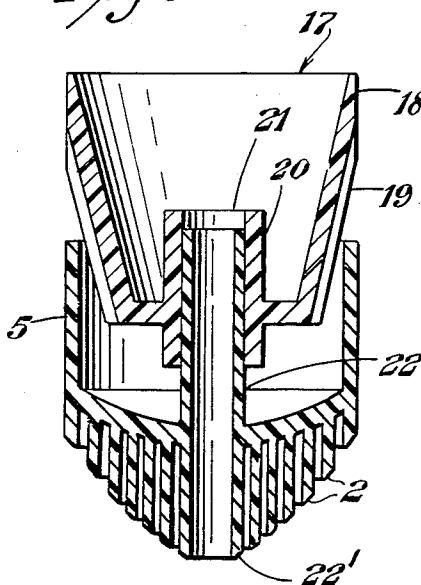


Fig. 7.

Inventor:
Robert John Nash
By his attorneys:
Baldwin & Wright

1

2,804,305

SHUTTLECOCK CAP

Robert John Nash, Alvechurch, England

Application January 25, 1956, Serial No. 561,201

Claims priority, application Great Britain
February 2, 1955

8 Claims. (Cl. 273-106)

This invention relates to caps for shuttlecocks, in particular to caps made of thermoplastic material.

Shuttlecocks consist of two main parts, the skirt or flight portion and the cap or nose portion which is struck by the racquet.

Usually the cap is made of cork covered with a layer of thin leather, to provide a striking surface. Plastic shuttlecocks are also known in which the cap is made of thermoplastic material moulded in the shape of a hollow dome and covered with a layer of rubber-like material to provide a striking surface.

In general half the weight of a shuttlecock is in its cap, and consequently, if this is made of a thermoplastic material, which must conform to the dimensions associated with a solid cork cap usually used for this purpose, it follows that the much greater density of the lightest thermoplastic in relation to cork necessitates a nonsolid structure. It is desirable that the centre of gravity of the shuttlecock shall be as far forward as possible, and therefore in hollow dome-shaped plastic caps the maximum thickness of plastic material has been provided at the extremity of the moulded cap or nose.

This relatively thick layer of material creates a problem in manufacture, as it must be cooled before extraction from the mould and the slow rate of cooling of the thick layer increases the time cycle of production, even when special cooling means are employed. A further disadvantage of this construction is that the shuttlecock is lacking in response when struck with a badminton racquet owing to the rigidity and hardness of the thick nose layer.

To overcome these difficulties it is proposed in the present invention to construct a shuttlecock cap of thermoplastic material in which the playing surface is provided by the free edges of a series of spaced co-axial cylindrical projections extending from one face of a diaphragm, the depth of the separate projections being such that the free edges in combination simulate a conventional domed striking surface.

Preferably the free edges of the projections are chamfered on the outer face to avoid presenting a sharp edge to the racquet.

The invention is illustrated in the accompanying drawings, in which Figure 1 is a sectional view of one form of cap in accordance with the invention,

Figure 2 is a section showing another form of cap and

Figure 3 is a sectional view of a shuttlecock having an integral cap.

Figure 4 is a sectional view of a shuttlecock skirt member having a membrane at the base or narrow end of the skirt and combined with a cap member in accordance with a further embodiment of the invention.

Figures 5 and 6 are respectively an elevation and vertical section of the skirted shuttlecock cap according to this invention used in combination with a socket piece fitting for a feathered skirt.

Figure 7 is an elevation partly in section showing a

2

shuttlecock comprising a one piece skirt and cap, provided with an internal reinforcement at the narrow end of the skirt.

Referring to the drawing, the cap of this invention comprises a shell or ring 5 by means of which the cap can be attached to the skirt member or portion of the shuttlecock, the skirt being indicated in dot and dash lines at 6. The shell 5 comprises a diaphragm 1 from which extend a series of spaced co-axial cylindrical projections extending generally in the line of flight 2.

In the embodiment shown in Figure 1 the diaphragm 1 is dishd so that the face from which the projections 2 extend is convex and further the depth of the projections decreases from the innermost to the outermost so that their free edges simulate in combination the conventional dome-shaped cap of a shuttlecock. The dome-shaped appearance is improved by chamfering the free edges of the projections 2 on their outer faces as at 3. In the centre of the diaphragm is a hole 4 which provides an air-spill through the innermost projection.

Referring now to Figure 2 there is shown a preferred form of cap having a diaphragm 10 which is flat, the projections 2 projecting from the diaphragm in a manner similar to that shown in Figure 1 so that they decrease in length from the centremost to the outermost to provide a dome faced striking surface.

One of the difficulties which presents itself to the manufacturer of shuttlecocks from thermoplastic material is to produce a skirt of the correct balance as regards weight so that in flight it will resemble the characteristics of the conventional feather shuttlecock. This has led to the development of a skirt having main stems interconnected by ribs. The stems and ribs may be made to a number of designs and in one arrangement (as for example shown in Figure 7) the skirt comprises stems 24 which spring from the collar or shell 5 of the cap and spiral in one direction around the skirt. The stems 24 are interconnected by closely spaced circular ribs 25 of lighter construction than the main stems to form a lattice. These ribs which lie transversely and at angles to the air flow or direction of flight of the shuttlecock provide the main aerofoil effect of the skirt.

In the arrangement shown the lead of the main stems 24 is very coarse and the stems spiral approximately one ninth of the way round the cone. On the other hand the pitch of the ribs is very fine, the ribs spiralling approximately two and a quarter times round the cone. It will be seen that the main stems and the ribs are given a twist in relation to the central axis of the shuttlecock, the purpose of which is to reduce the tendency of the skirt to turn inside out as a result of the sudden reversal of movement of the shuttlecock at the moment of the impact with the racquet. Notwithstanding this construction, it is difficult in certain designs to prevent lateral collapsing of the skirt in the vicinity of the cap, i. e. at its narrow end, especially where, as shown in Figure 1, the hollow or open end of the cap member faces the skirt.

I found that in accordance with this invention this tendency to collapse can be minimized by forming a membrane 11 across the narrow end of the skirt 6 as shown in Figure 3. Similarly, a membrane 12 may be formed across the narrow end of the skirt 6 as shown in Figure 4, which membrane 12 is integral with a collar or annulus 13. This is open in the direction of the cap and serves as a means of attaching the skirt to the cap.

It will be found that the provision of the membrane 12 appreciably strengthens the skirt 6 at its base end and has the advantage that not only does it prevent any tendency of the skirt to collapse laterally but it achieves this result without appreciable increase in weight.

It has also been found that combining the skirt construction of Fig. 4 with a cap member as shown in Figure

2 materially improves the touch on the racquet of the player, i. e. when striking a shuttlecock the feel is one of resiliency and lightness and similar to that of a feathered shuttlecock with a cork cap. As shown in Figure 4 this improved effect is obtained by interconnecting the diaphragm 10 of the cap to the membrane or diaphragm 12 of the skirt portion so that the blow is transmitted from the cap to the membrane 12 by a connecting spigot piece. In the arrangement shown in Figure 4 the membrane 12 is formed with a tubular spigot or sleeve 14 into which fits a similar spigot piece or sleeve 15 on the diaphragm 10 of the cap member.

Referring now to Figures 5 and 6, there is shown an arrangement for use in making up a feathered shuttlecock wherein the cap is combined with a socket element indicated generally at 17. The socket is constructed in the form of a tapered sleeve 18, the tapered end of which is of a size to fit within the ring 5 of the cap, the sleeve being provided around its periphery with slots 19 to receive the stems of the feathers or slights forming the skirt of the shuttlecock. As shown in Figure 6, the base of the cone 18 is formed with a spigot portion or sleeve 20 having a central bore 21 of a diameter to receive an upstanding and similar hollow spigot part or extension sleeve 22 moulded integrally with the cap and which conveniently forms an extension of one of the projections indicated at 22' of the cap.

Referring now to Figure 7, which shows a shuttlecock having stems 24 and interconnecting circular ribs 25 and wherein the skirt 6 is moulded in one piece with a cap formed with cylindrical projections, it is possible to increase the resistance to collapse of the skirt at the narrow end of the cone by use of a disc element 28. This disc is integral with a central pip or stud 29 by which it is secured to the cap, the pip being a tight fit in the central hole 4 of the cap. By forming a tapered edge 30 to the disc the latter can be forced downwardly into a position where it locks against the inside faces of the ribs connecting the stems.

I claim:

1. A shuttlecock cap member formed of plastic material and comprising a diaphragm and a plurality of spaced co-axial cylindrical projections extending from one face of the diaphragm and generally in the direction of the line of flight, the depths of the individual projections being such that their free edges in combination provide a domed striking surface.

2. A shuttlecock cap member as claimed in claim 1 in which the free edges of the projections are chamfered.

3. In a shuttlecock formed of plastic material, the combination with a cap member comprising a diaphragm, from one face of which project a plurality of spaced co-axial cylindrical projections, the free edges of said projections providing the striking and playing surface, of a skirt member co-axial with said projections, each of said members being formed with a sleeve fitting one within the other and by which they are united.

4. A shuttlecock cap member formed of plastic material and comprising a diaphragm having projecting from one face thereof a plurality of spaced co-axial cylindrical projections, the depths of the individual projections being such that their free edges in combination provide a domed striking and playing surface, and a collar projecting from the other face of the diaphragm to receive a skirt member.

5. The combination with a shuttlecock cap member formed of plastic material and comprising a diaphragm having projecting from one face thereof a plurality of spaced co-axial cylindrical projections, the depths of the individual projections being such that their free edges in combination provide a domed striking and playing surface, and a collar projecting from the other face of the diaphragm; of a socket element including a conical portion fitting within the collar of the cap member, and provided around its periphery with grooves to receive the stems of feathers adapted to form a skirt, and means connecting said socket member to the cap.

6. A shuttlecock as claimed in claim 5 wherein said means comprises a socket element formed with a hollow spigot slidingly engaging an extension provided on the cap member.

7. A shuttlecock comprising a skirt portion and a cap portion formed integrally with said skirt portion, said cap portion comprising a diaphragm and a plurality of spaced co-axial cylindrical projections extending from one face of the diaphragm and generally in the direction of the line of flight, the depths of the individual projections being such that their free edges in combination provide a domed striking surface.

8. A shuttlecock as claimed in claim 7 having an internal reinforcement including a disc fitting within the skirt at its narrow end and a stud joined to the cap member.

References Cited in the file of this patent

UNITED STATES PATENTS

2,116,304 Crespin May 3, 1938