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J. W. MILLER

2,666,643

SHUTTLECOCK AND METHOD OF MANUFACTURE

Filed Oct. 24, 1947

2 Sheets-Sheet 1

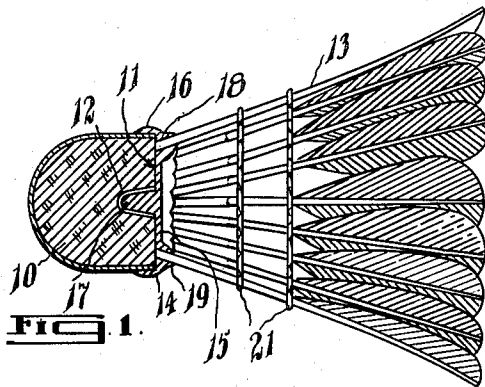


FIG. 1.

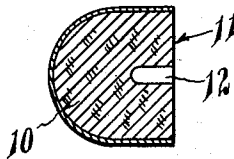


FIG. 2.

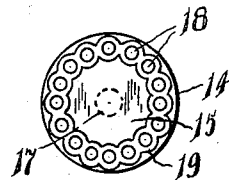


FIG. 3.

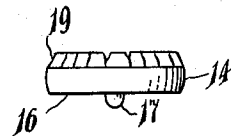


FIG. 4.

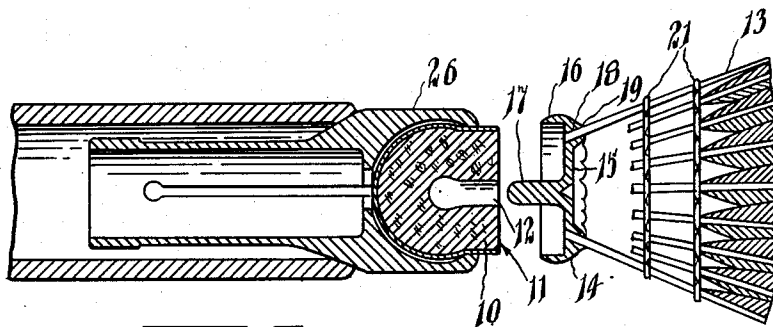
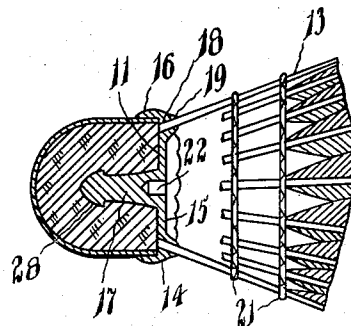


FIG. 5.

FIG. 5A

FIG. 6



Inventor

John W. Miller
By Frederick C. Bromley
Attorney

Jan. 19, 1954

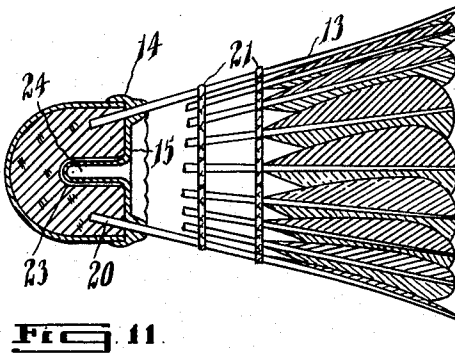
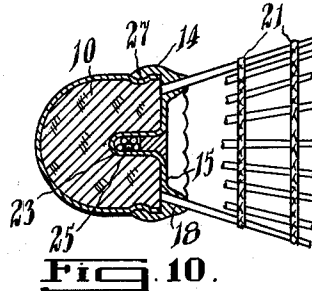
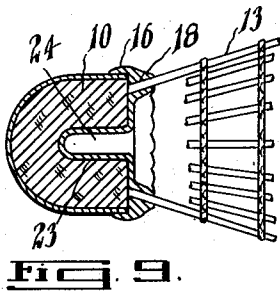
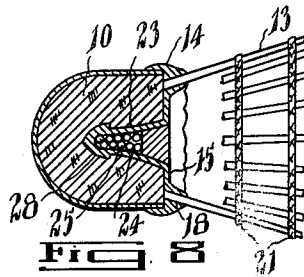
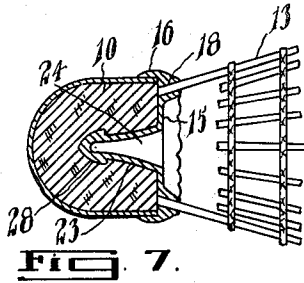
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SHUTTLECOCK AND METHOD OF MANUFACTURE

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2 Sheets-Sheet 2



Inventor

John W. Miller

By

Frederick C. Bromley

Attorney

UNITED STATES PATENT OFFICE

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SHUTTLECOCK AND METHOD OF
MANUFACTURE

John William Miller, Toronto, Ontario, Canada

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6 Claims. (Cl. 273-106)

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My invention relates in particular to badminton shuttlecocks, and has as a general object to provide an improved shuttlecock possessed of desirable playing qualities, and to facilitate and to reduce the cost of manufacturing shuttlecocks.

The manufacture of the conventional shuttlecock is recognized by those skilled in the art to be a costly and difficult process, which involves the use of special cork and fine kid leather for the head and selected feathers for the vane or tail. These components must be accurately assembled and weighted with care in order to avoid undesirable variations in the playing characteristics of the shuttlecock.

It is the practice to weight the shuttlecock by enclosing balancing pellets in an axial bore drilled in the cork. This practice leaves much to be desired because the cork is usually of a cavity nature and it frequently happens that in boring the material voids are intercepted into which the loosely confined shot will find its way and thereby throw the unit out of balance. Aside from this disadvantageous feature there is a decided tendency for the loose balancing pellets to be driven into the cork material when the shuttlecock is subjected to the impacts of a racquet. When this happens the shuttlecock is thrown out of balance and the desirable playing characteristics are lost. I am aware that it has been proposed in the prior art to place a capsule in the axial bore in order to confine the balancing pellets but this expedient leaves much to be desired in entirely overcoming the above noted objections and moreover produces a difficult and expensive assembly.

A paramount object of my invention is to provide an improved mode of weighting a shuttlecock and preserving the balance thereof in use of the same by the instrumentalities of a weight device integrated with a novel mounting by which the feathers are attached to the head or cork. The novel mounting is a mouldable and formable member of a suitable plastic material which for convenience is termed a "crown" and which is secured on the rear or butt end of the cork head. The crown is preferably a preformed member, that is to say it is mouldably formed before assembly with the cork and is apertured to receive the shafts or quills of the feathers which are anchored therein.

Another paramount object of my invention is to establish and maintain concentricity between the three basic elements of a shuttlecock, namely, the head, the weight and the flight control device, to a degree not previously attained. The

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benefits of this improved concentricity are that greater lateral stability (elimination of wobbling) and a truer rifling rotation are imparted to the shuttlecock in flight.

Two important features of the crown are that it provides secure anchorage for the feathers and reinforces the cork. Additionally it carries the weight device so that stress of the weighting means due to impact of a racquet is not imparted to the cork but is taken by the crown. Therefore, in the use of the shuttlecock the weighting means cannot be driven into the cork material nor otherwise displaced. Consequently the shuttlecock cannot be thrown out of balance. The crown is formed with a central intruding element of a solid form or in the nature of a container. In either form it projects into an axial bore in the cork. In the solid form it provides a weight mass designed to definitely render the shuttlecock overweight so that in assembly of the components the proper weight and balance can be secured by trimming. The trimming can be conveniently performed after assembly by drilling into the intruding weight so as to cut away a sufficient amount of the material therefrom to reduce the shuttlecock to the regulation standard weight. In forming the intruding element or weightpiece as a container it provides an axial chamber closed at its inner end and open at its outer end for introduction of balancing pellets which are inserted therein and sealed against movement by means of a suitable sealing medium which may be a self-hardening plastic, for example.

In another aspect of the invention the crown provides a novel mounting of plastic material for the feathers combining a weight-carrying disc or ring to which the feathers are affixed and an integral marginal flange or band which engages over the butt end of the cork and is attached as by adhesive to the cork and/or kid shroud. The invention provides a shuttlecock in which the feathers can be solely attached to the disc or ring portion of the crown, in which case the usual holes in the cork for the shafts or quills thereof are eliminated. By leaving the cork devoid of feather holes it is obviously improved structurally and also the playing qualities are enhanced by retaining the maximum muscular qualities or action of the cork. Alternately, the cork may be supplied with feather holes in order to supplement anchorage of the feathers.

In another aspect the invention comprehends a novel method of assembly comprising the steps of mounting the feathers on the crown, then

stitching, lacquering and weighing this unit and adding it to the cork head. In the use of the solid weighting element, this method has the advantage that excess weight may be readily trimmed by drilling into the weighting element from the outer face of the crown or removing material from the distal end of the weighting element. Alternately, in the use of the chambered weighting element the advantage accrues that weighting pellets may be added as required to bring the shuttlecock to the standard weight.

In a still further aspect of the invention it comprises a highly serviceable mode of assembling the feathers and crown unit to the cork head by making the head of a somewhat larger diameter than the internal diameter of the crown flange or band portion and compressing the head to sleeve the crown thereon. The interfitting connection may be effected by a bonding material such as a suitable adhesive. The compression of the head may be achieved as by a collet. The crown flange may be supplied with an internal bead in order to develop a tight fit with the head, if so desired. Also, the intruding weight device on the crown may have a diametrical increase at its free end in the form of a barb for engaging the wall portion of the axial bore of the cork with a view to enhancing the interfitting connection between the crown and the head.

The invention presents a shuttlecock in which uniformity and equalization of the spacing of the feathers is assured and it eliminates the customary ribbon fixing, and moreover saves considerable labor in the manufacture.

Having recounted the major objects and advantages of the present invention, other advantageous features will appear from the ensuing specification and the accompanying drawings.

In the drawings, Fig. 1 is a longitudinal section of a shuttlecock constructed in accordance with the present invention.

Fig. 2 is a view in longitudinal section of the head.

Fig. 3 is a view of the crown looking at it from its outer face.

Fig. 4 is an edge view of the crown.

Fig. 5 shows the cork head compressed in a collet for assembly of the tail unit or flight control device depicted in Fig. 5A.

Fig. 6 is a similar view to Fig. 1 but shows the solid type of weight device drilled to bring the shuttlecock to standard weight. This view also depicts the variant form in which the weight device is formed with a barb for engaging the cork head.

Fig. 7 is a similar view to Fig. 6 but shows the chambered type of weight device receptive to balancing pellets.

Fig. 8 is a similar view but shows the pellets in the weight device.

Fig. 9 is a sectional view similar to Fig. 7 but illustrating a differently shaped weight element on the crown for pellets.

Fig. 10 is a further sectional view of the shuttlecock depicting a modified form of crown in which the attachment flange or band portion is formed with a bead.

Fig. 11 is a still further view of the shuttlecock delineating the shafts of the feathers projecting through the crown and into the cork head.

Referring at first to Figs. 1 to 5A of the drawings, the head of the shuttlecock is made up of a regular cork 10 and a leather covering of kid or the like affixed thereto as by cement. Said covering or shrouding is shown as terminating flush

with the rear or butt face 11. The rear or butt face 11 is axially bored, as at 12, receptive to the weighting device.

The mounting for the feathers 13, which is novel, comprises the crown 14 which is a mouldable and formable member of a suitable plastic composition such as cellulose acetate butyrate, for example. It is desirably preformed by an appropriate mould before the feathers are applied and it comprises the disc or ring portion 15 and the annular marginal flange or band portion 16, in addition to which there is integrated a weighting device 17 for balancing the shuttlecock. The disc or ring portion 15 is formed with a circular series of apertures 18 for anchorage of the feathers 13. The shafts or quills of the feathers may be secured in the apertures in approved manner as by an adhesive or otherwise according to the dictates of the manufacturer. The apertured portions of the disc or ring are preferably built up as by individual bosses or fillets 19 to provide a secure anchorage without unduly increasing the total weight of the crown. Said bosses or fillets outwardly taper so that a good bending movement is established for the shaft or quill junctures which accommodates playing stresses.

An advantageous feature of the construction is that the shafts or quills need not extend into the cork. Therefore the cork is not structurally weakened as it would be by the conventional feather holes. The crown alone is adequate to mount the feathers on the head and therefore the shafts or quills thereof are made short so that they do not project into the cork. On the other hand, the shafts or quills may be of regular length to project into the cork without departing from the invention, as indicated at 20 in Fig. 11.

Due to the secure anchorage afforded by the crown the usual lower stitching may be dispensed with. The feathers may be fastened together by one or two stitchings. In the drawing two lines of sewing are illustrated as at 21.

It will be noted that the weighting device 17 shown in Figs. 1, 5A and 6 is a solid intruding member which forms with the crown and feathers a unit for attachment to the head by means of the flange or band portion 16 which is sleeved on the head and united as by a suitable adhesive. In this form of the weighting device it presents a weight mass in the nature of a cylindrical member centrally located and adapted to be loosely received in the axial bore 12 of the head and its proportions render the unit definitely overweight. The assembled unit is weighed and trimmed to standard weight by drilling a hole 22 in the weightpiece 17 from the outer face of the crown. The depth of the hole, of course, depends on the amount of material required to be removed. The bulk of the material of the weightpiece remains at the distal end disposed in the foremost part of the head and thus achieves most desirable positioning of centre of gravity.

In the variant form of the weighting device denoted at 23 in Figs. 7 to 11, it is made as a container whose receptacle 24 is adapted to contain balancing pellets, 25, added to bring the unit up to required weight as will be readily understood. To bring the weight of shuttlecocks to a uniform standard a measured quantity of lead pellets or other weighting material is inserted in the container 23 thereof and the same is sealed as by a sealing solution of a known kind such as a self-hardening substance. Ob-

viously other means could be employed to seal the balancing pellets in the container. Since the container is open at the outer face of the crown, pellets can be introduced even when the flight control unit is applied to the head.

It will be evident that the invention presents a flight control unit comprising feathers, a mounting in the form of a moulded crown for attaching the feathers to the head, and a unitary weighting device for establishing uniform weight.

A practical method of assembling the flight control unit comprises the steps of mounting the feathers on the crown, then stitching, lacquering and weighting this unit, and adding it to the head. In the use of the solid weighting member this method has the advantage that excess weight can be relieved by drilling into the weighting member 17 from the outer face of the crown. Alternately in the use of the chambered weighting member 23 the advantage accrues that pellets or the like may be inserted to bring the shuttlecock up to the standard weight.

The cup-shaped crown can be readily sleeved on the head and secured by means of an adhesive. Desirably, however, the head is made of a somewhat larger diameter than the diameter of the encompassing band or flange 16 and in the assembly the cork is compressed as by a collet to enable it to be inserted in the flange or band of the crown which thereby makes a good tight fit. This method of assembly is illustrated in Figs. 5, 5A, in which the head is represented as held in a collet, denoted at 26, of a known type.

The annular flange or band portion of the crown may be supplied with an internal bead 27 for aiding in securing the interfitted connection between the crown and the head, as shown in Fig. 10. It is also proposed that the weighting member may be fashioned with a diametrical enlargement 28 at its inner or distal end for gripping engagement with the wall of the axial bore of the cork. The enlargement is shown as a barb in Figs. 6, 7 and 8, which aids in securing the crown to the head.

The advantages and utility of the invention will be appreciated from the preceding disclosure and it will be understood that various modifications and changes may be resorted to such as come within the scope of the appended claims.

From the preceding disclosure it will be manifest that my invention provides a novel mounting or crown for attachment of the feathers to the head and also provides a unitary weighting device, whereby an improved shuttlecock is produced of a highly advantageous nature irrespective of whether the crown is employed as the sole anchorage for the feathers or whether it is used in conjunction with a conventionally drilled cork in which the ordinary arrangement of feathers are inserted in the drilled holes thereof. Further, the invention provides a novel method of assembly of the flight control unit including the weighting device.

It may be here pointed out that the moulded crown of my invention obviates the employment of the usual sticker or label bearing identifying reading. Such reading matter, which may be or may include identifying characters, can be mouldably formed on the crown, or impressed thereon.

What I claim is:

1. In a shuttlecock having a cork head and feathers, a crown forming a mounting unit for the feathers, said crown having a perforated disc portion in which the shafts of the feathers are inserted and having an annular flange portion sleeved on the cork head, and a weighting device carried by said disc portion and projecting into the cork head, said weighting device being rigidly supported by said head portion independently of said cork head.

2. In a shuttlecock, a cork, a crown attached to the butt end thereof, and weighting means carried by said crown for projecting into said cork, said weighting means comprising a receptacle integral with said crown for containing weighting material.

3. A method of making a shuttlecock having a cork and provided with a crown for anchoring the flight control device to the cork, which consists in forming a cavity in the butt of the cork, forming a crown with an integral weight container, affixing the crown to the butt of the cork with the container projecting into said cavity and having an introductory opening at the outer side of said crown, and introducing weighting material into said container to bring the shuttlecock up to a predetermined weight.

4. A method of making a shuttlecock having a cork provided with a crown for anchoring the flight control device to the cork, which consists in forming an axial cavity in the butt of the cork, forming a receptacle on the crown to project into said cavity to receive weighting material, attaching the crown to the cork, inserting the weighting material into the receptacle, and retaining it therein.

5. In a shuttlecock, a crown for attachment to the butt end of a head, said crown including a disc-like element for fitting against said butt end and having a circular series of openings therein receptive to the shafts of feathers, said disc-like element also having a central projection integrated with its inner side in the form of a container for holding weighting material, there being an introductory opening in the outer side of said disc-like element which leads into said container.

6. The combination in a shuttlecock, of a cork having a recessed rear face, a flight control device mounted on said cork and including a crown at said rear face; and weighting means solely carried by said crown and including a container projecting into said recess and containing a weight mass in comminuted form.

JOHN W. MILLER.

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