

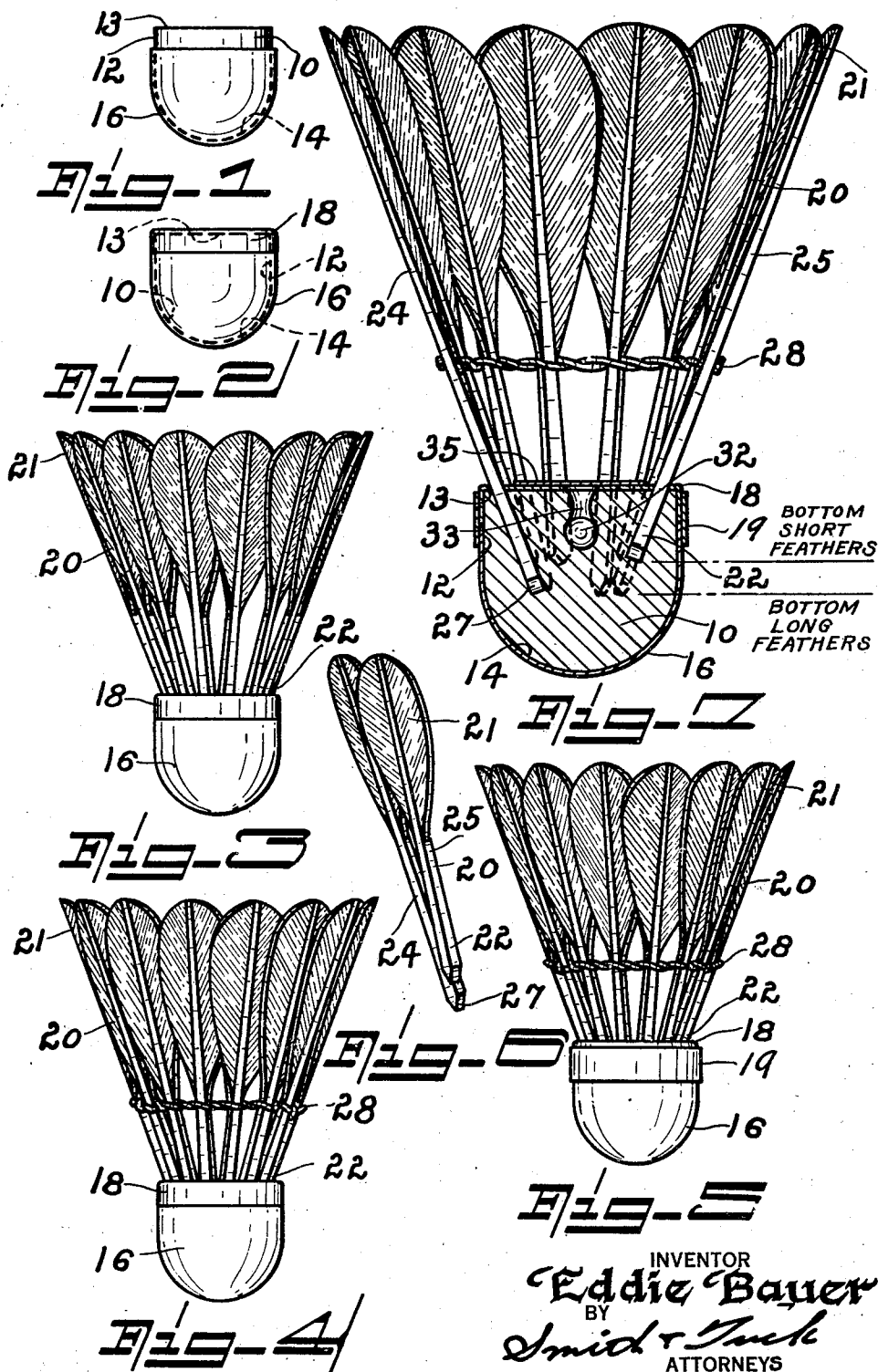
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E. BAUER

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SHUTTLE COCK

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SHUTTLE COCK

Eddie Bauer, Seattle, Wash.

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4 Claims. (Cl. 273-106)

My present invention relates to improvements in shuttlecocks or aerial missiles employed in games, such as badminton, in which the shuttlecock is tossed or passed back and forth by means of battledores in the hands of the players of the game. The primary objects of the invention are the quick production of articles of this character at comparatively low cost of manufacture, and in which the shuttlecocks are standardized as to size, shape and weight; to produce aerial missiles which possess the required liveliness which will insure activity on the part of the players of the game, together with the necessary symmetry and balance in the shuttlecock so that it will properly respond to the accuracy of the strokes of the expert player.

The invention consists in certain novel combinations and arrangements in the construction of the head of the shuttlecock and the feathers or quills forming the tail portion of the missile, as will be more fully set forth and claimed. In the accompanying drawing I have illustrated the steps employed in the manufacture of the shuttlecock, and one physical embodiment of the invention in which the parts are combined and arranged according to one mode I have devised for the practical application of the principles of my invention, but it will be understood that changes and alterations may be made in the exemplified structure and in the manner of constructing the device, within the scope of my claims, without departing from the principles of my invention.

Figures 1 through 5 show the procedure or steps employed in one mode for assembling the parts of the shuttlecock, but of course this procedure may be varied if desired. Figure 1 is a view showing the head of the shuttlecock with the lower portion or section of its cover in place. Figure 2 is a similar view with the head shown in dotted lines and entirely encased in its retaining and protective covering. Figure 3 is a view showing the head as in Figure 2 with the addition of the tail feathers or quills in place. Figure 4 shows the device of Figure 3 with the addition of the twisted retaining cord for the tail feathers. Figure 5 illustrates the completed shuttlecock. Figure 6 is a perspective view of two feathers or quills of different lengths, each feather being typical of a set of feathers or series of feathers mounted on the head. Figure 7 is an enlarged detail sectional view of the shuttlecock.

In the preferred form of my invention as illustrated in the drawing, I employ a solid head 10, of cork, which is fashioned with a cylindrical neck 12 that terminates in a flat circular top

face 13, and the lower part of the head is fashioned with a rounded or semispherical face 14. While I refer to the head as composed of cork, it will be understood that other suitable resilient, durable, and light material may be employed in the construction of the head 10, and the latter may be fashioned in any convenient and appropriate manner.

The entire exterior of the head is provided with a protective and retaining cover or coating of comparatively soft, but tough and resilient, flexible material, such as kid, which provides a smooth exterior surface for the shuttlecock. For convenience in applying the cover to the head and to insure the absence of wrinkles I employ a two-piece or sectional cover comprising the lower section 16, and the upper section 18, which are glued or otherwise firmly secured to the exterior surface of the head. The cover-section 16 is fashioned in shape to conform to the contour of the lower portion of the head by means of a female die, and the head 10 may be employed as the male die-member for co-action with the female die-member in shaping the cover, or other suitable die members may be used for this purpose. The upper section 18 of the cover is fashioned in similar manner, and both sections provide a taut or "glove-fitting" cover for the entire head. The two sections are glued to the head and smoothed down into close contact therewith to insure a smooth protective cover or retaining jacket that enhances the durability of the head as well as tending to preserve the correct shape of the head.

In Figure 2 it will be seen that the dividing line between the upper and the lower sections of the head-cover is located near the top, or the flat crown of the head, and in Figures 6 and 7 the flat, smooth, annular band 19 of suitable material, covers the dividing line, overlaps the adjoining edges of the two sections, and is glued to the adjoining portions of the two sections. This narrow band of suitable material seals the joint between the sections, and as it is located near the flat crown of the head, the major portion of the head, including the rounded face, is smooth and free of obstructions and presents a plane face to the battledore when struck by the latter.

The shafts 20 of the feathers or quills radiate from the head in such manner as to form an inverted, conical tail, with the tip ends 21 of the feathers terminating on an even circular line, the natural webs of the feathers being trimmed to a uniform size and shape.

The bare ends of the shafts, as indicated at 22, 55

are flared outwardly toward their extremities and the latter are embedded in the head, the length of all of the feathers, exterior of the head being uniform. The individual feathers are inclined
5 at uniform angles about the center of the head, and therefore the "tail" of the shuttlecock is symmetrical to insure accuracy in flight of the missile.

In order that the numerous feathers may be
10 compactly arranged and fastened in the head, I employ two series of feathers in the formation of the tail, the feathers in one series differing in their "over-all" length from the other series. Thus one series of feathers is designated as 23
15 and the other as 24, the feathers of the latter series having their shafts fore-shortened and terminating in the head at a point closer to the flat crown 13 of the head than the point of termination of the longer feathers 23. An even
20 number of feathers is employed in each series, the total number here used being sixteen, and the feathers of one series alternate with the feathers of the other series in order to preserve the equilibrium of the shuttlecock.

The ends of the shafts of all of the feathers
25 terminate in wedges 27 which are forced or otherwise inserted through the flat portion of the upper head-cover 18 and the flat face 13 of the head, into the head for a suitable distance to anchor the feathers. Due to the resiliency of the
30 material composing the head, the inserted ends of the shafts are grasped or clasped tenaciously by the material and the feathers are firmly held in place. The individual feathers are disposed
35 at uniform angles so that the tail of the shuttlecock will form an inverted, truncated, cone, the apex of which, if the shafts were extended, would be located at the peripheral center of the semi-spherical face 14 of the head. The feathers are
40 thus disposed tangentially with relation to the rounded portion of the head, and the tail of the shuttlecock flares outwardly a considerable distance beyond the periphery of the cylindrical head.

As indicated in Figure 7, where the legends
45 "bottom of short feathers" and "bottom long feathers" together with their respective lines designate the depth of penetration of the two series of feathers, the wedges 27 of each series
50 of feathers are spaced at regular intervals a considerable distance apart. The wedges of the two series are thus separated, and the wedges in each series are separated, from adjoining wedges, so that each wedge will be encased in the material of
55 the head and firmly held against displacement. This alternate arrangement of the wedges, in addition to insuring an adequate anchor for each wedge, also prevents breaking of the material that surrounds the wedge as it is being inserted in the
60 head, and after it has been set in place.

To hold the individual feathers against spreading, and to preserve the uniform and symmetrical shape of the tail of the shuttlecock, a cord 28
65 is twisted and intertwined about the adjoining feathers, and this cord, which is located just below the webs of the feathers, extends entirely around the tail, in contact with the shafts, to hold the feathered ends in their proper spaced relation.

To balance the shuttlecock, and to fix the center of gravity in order that the missile will at all
70 times seek its proper position in flight, a weight 32 of suitable material is pressed into a center hole or socket 33. The hole or socket passes
75 through the flat part of the cover-section 18 and

into the head, and after the weight is properly located, the opening is sealed and the weight is retained in place by means of a leather disk as
35. This circular flat disk is glued or otherwise fastened to the top surface of the top or flat portion of the cover-section 18, and it is located within, and concentric with, the circle formed by the feathers as they enter the head.

The two sections 16 and 18 of the cover, the annular joint-band 19 and the sealing disk 35, 10 are all permanently and firmly attached to form a cover for the head, and the cover is tight-fitting and taut to protect the head, and the head is firmly encased to preserve its shape.

The cord 28 may also be bonded, as by trans- 15 parent glue, to the shafts of the feathers about which the cord is twisted, and the cord is thus retained in its proper position with relation to the tail of the shuttlecock.

The weight 32 is preferably shaped in such 20 manner that the material surrounding it within the head will prevent its dislocation and hold it in fixed position. As here shown the weight has a head and a neck which are grasped by the resilient material of the head, and it will be ap- 25 parent that as the head is pressed or inserted into place it will have a tendency to spread the resilient material of the head into closer contact with the surrounding feather-shafts, thus more tightly embedding the shafts in their seats in 30 the head.

A single weight is here shown, but if desired more than one weight may be used, and generally fashioned of lead, and the location or depth of the weight in the head may be varied to vary the 35 center of gravity of the shuttlecock, within limits. By predetermining the size, shape and weight of the various parts of the shuttlecock, it will be apparent that a set of missiles similar in these respects may be fashioned for use, as in the game of 40 badminton.

While I have referred to the use of specific materials, it will be understood that other materials may be employed, such as light and resilient or 45 elastic wood, and the cover for the head may be fashioned of paper adapted for the purpose, or of other suitable material, to provide a firm but somewhat resilient covering for the head. The cover sections are first shaped and adapted to the head before they are applied, and as they are 50 applied they are pressed tightly and smoothly and held until the glue has set, thus avoiding subsequent stretching of the cover after it has been placed in position.

While I have illustrated and described a pre- 55 ferred form of my invention, it will be understood that the exemplified structure may be changed or altered within the scope of my appended claims without departing from the principles of the invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters 60 Patent is:—

1. In a shuttlecock, the combination with a head, of two series of feathers forming a conical 65 tail, each of said feathers having a wedge-shaped shaft-end seated in the head, the feathers of one series being alternated with the feathers of the other series, and the feathers of one series penetrating the head to a greater depth than the 70 feathers of the other series, and a weight located in the head within the bounds of the two series of feathers.

2. In a shuttlecock, the combination with a head of resilient material having a central recess there- 75

in, and a weight in said recess retained therein by frictional contact with the wall of the recess, of two series of feathers forming a conical tail and all of the feathers having their ends fixed in the head about the recess, and the feathers of one series penetrating the head to a less distance than the feathers of the other series.

3. In a shuttlecock, the combination with a head of resilient material having a central recess, and a weight in said recess retained therein by frictional contact with the wall of the recess, of two series of feathers forming a conical tail and all of said feathers having their ends flared out-

wardly toward their extremities and embedded in the resilient material, and the feathers of one series penetrating the head to a less distance than the feathers of the other series.

4. In a shuttlecock, the combination with a head, of two series of feathers forming a conical tail, each of said feathers having a wedge-shaped shaft-end seated in the head, the feathers of one series being alternated with the feathers of the other series, and the feathers of one series penetrating the head to a greater depth than the feathers of the other series.

EDDIE BAUER.