Sept. 14, 1937. E. BAUER 2,093,301

METHOD OF WEIGHTING SHUTTLECOCKS

Filed Sept. 11, 1935

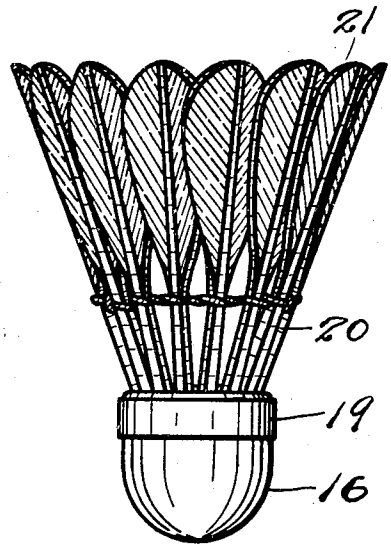

Fig. 1

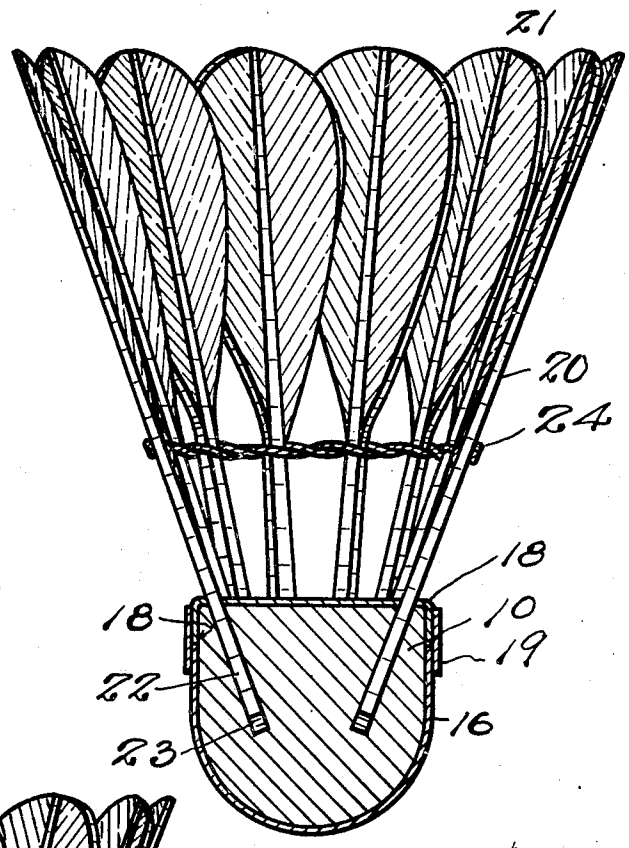

Fig. 2

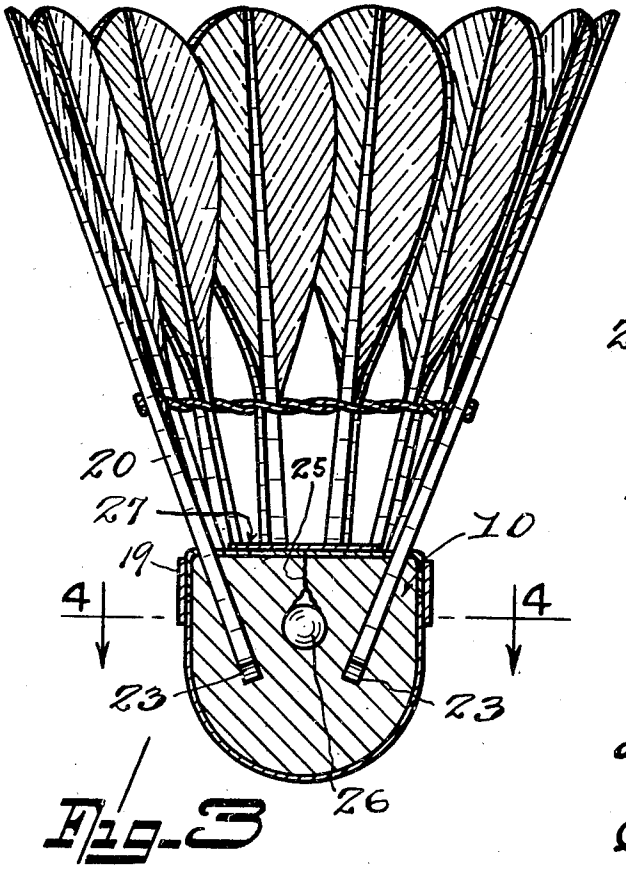

Fig. 3

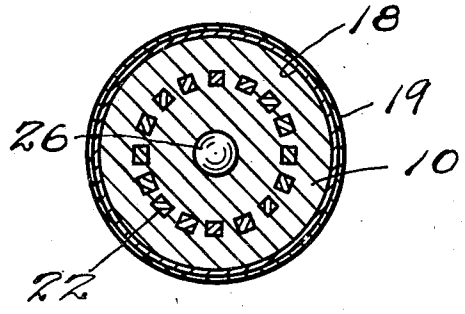

Fig. 4

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Patented Sept. 14, 1937 2,093,301

UNITED STATES PATENT OFFICE

2,093,301

METHOD OF WEIGHTING SHUTTLECOCKS

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Application September 11, 1935, Serial No. 40,182

5 Claims. (Cl. 273—106)

My present invention relates to an improved method of making shuttlecocks or aerial missiles employed in games, such as badminton, in which the shuttlecock is passed or tossed back and forth by means of battledores in the hands of the players of the game.

The primary object of my invention is the method of manufacturing shuttlecocks which will be of the exact same weight when sold to the consumer.

I prefer to use the shuttlecock described and claimed in my allowed application Ser. No. 705,096, filed January 3, 1934, on which this invention is an improvement, although it will be understood that my present invention may be applied to the manufacture of other types of shuttlecocks.

It is a well known fact that skilled badminton players require that the shuttlecocks employed in the game be of the exact same weight, and it is the purpose of my invention to provide an economical and quick method of weighting the shuttlecocks, and a method by which all of the shuttlecocks in a group purchased may be brought to a uniform standard of weight.

The old method of manufacturing shuttlecocks would permit the assumption that all corks made from the same materials would be of the same weight, however, the subsequent steps that follow in the completion of the shuttlecocks cause a variation in weight upwards to 10 or 15 grains, accounted for approximately as follows:—variations upwards to 5 or 6 grains in the leathers; 4 or 5 grains in the feathers; and 2 or 3 grains in the adhesive materials. In practical demonstrations it has been found that a variation of a grain more or less in the weight of a shuttlecock causes its flight to vary approximately one foot.

In the accompanying drawing I have illustrated the steps employed in my method, and one physical embodiment of the invention, in which the steps 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 method of making shuttlecocks within the scope of my claims without departing from the principles of my invention.

Figure 1 is an elevation of the completed and weighted shuttlecock made according to my improved method.

Figure 2 is a sectional view of the shuttlecock before the weight is added.

Figure 3 is a sectional view of the complete, weighted shuttlecock.

Figure 4 is a sectional view of Figure 3, taken along line 4—4.

In carrying out the steps in the method of my invention, as illustrated in the drawing, I employ a solid, cylindrical head 10, of cork, the lower part of which is fashioned with a semi-spherical face. While I refer herein to the head as composed of cork, it will be understood that any other suitable resilient, durable and light material may be employed, and the head 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 material, such as kid, which provides a smooth exterior surface for the shuttlecock.

For convenience in applying the cover to the head, and also 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 cover-sections are glued or otherwise securely fixed to the exterior surface of the head. The two sections are glued to the head and smoothed down into close contact therewith to insure a smooth cover, which enhances the durability of the head, as well as tending to preserve the correct shape of the head.

The dividing line between the two sections is covered by a flat, smooth, annular band 19, of suitable material. This band is located above the semi-spherical face of the shuttlecock, and therefore the major portion of the head, including the rounded face, is smooth and free of obstructions and presents the desired smooth striking surface for the battledore.

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

The ends of the shafts of all the feathers terminate in wedges 23 which are forced or otherwise inserted through the flat portion of the upper

cover-section 18, and into the head for a suitable distance to anchor the feathers. Due to the resiliency of the 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.

To hold the individual feathers against spreading, and to preserve the uniform and symmetrical shape of the tail of the shuttlecock, a cord 24 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 feathers in their proper spaced relation.

In the method of manufacture of my shuttlecock the steps are as follows:—The cork is first fashioned to form the head 10 of the shuttlecock and then the cover-sections 16 and 18 are glued or otherwise fastened to the head. The annular band 19 is then permanently attached covering the joint between the two cover-sections. The shafts 20 of the annular series of feathers are then inserted through the cover and into the head in the manner described and the shafts are secured in fixed relation by means of the twisted cord 24.

Due to the nature of the materials thus employed in the manufacture of the shuttlecocks, as shown in Figure 2, they may vary from 10 to 15 grains in weight and therefore the shuttlecocks cannot with precision be accurately standardized as to weight.

In the method of my invention, I now weigh each assembled shuttlecock and determine the variations in weight between them and a predetermined standard. We may assume in this instance that the predetermined standard is, say, 77 grs. Then the weight to be added must be equal to the difference between the weight of the completed birds, and the predetermined standard of weight. Assuming that the shuttlecocks have been completed, and all under the weight standard, weighing 68, 70, and 71 grs. respectively, then pellets or weights of 9, 7, and 6 grs. respectively must be added to bring the individual weights to exactly 77 grs.

A suitable tool is then inserted through the cover 13 and into the center of the head, and then withdrawn, to form a passage 25, to facilitate the insertion of a weight.

A weight such as a pellet of lead 26, equal to the difference in weight between the assembled shuttlecock and the predetermined standard as stated above is then inserted through the flat top of the cover 18 and into the passage 25. As shown in the drawing, Figure 3, the pellet is inserted in the head well below the cover 18, in order that the passage may be closed by the resiliency of the cork.

It will be apparent that the pellet or weight will be retained in the desired position through the rough usage of a game.

Obviously pellets of different weights are used in the respective shuttlecocks according to the variance of their weights.

The disk, as 27, is then glued or otherwise attached to the head entirely surrounding and covering the opening caused by the insertion of the pellet.

The shuttlecocks are now completed and all of them manufactured and assembled according to my method will be of the exact same weight thus insuring a perfect set of playing missiles which will respond identically to the player's stroke.

While I have shown and described the weight as being of spherical shape, it will be understood that a weight of any desirable and suitable shape may be employed.

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

1. The method of making a shuttlecock of a predetermined standard of weight which consists in assembling a sub-standard shuttlecock, weighing the shuttlecock, and inserting a weight equal to the difference between the shuttlecock and the standard of weight.

2. The method of making a shuttlecock of a predetermined standard of weight which consists in assembling and weighing the sub-standard missile, forming a weight-receiving passage in the missile, and inserting a weight in said passage equal to the difference between the shuttlecock and the standard of weight.

3. The method of making a shuttlecock of a predetermined standard of weight which consists in assembling and weighing the sub-standard shuttlecock, forming a weight-receiving passage in the shuttlecock, inserting a spherical weight in the passage equal to the difference between the shuttlecock and the standard, and covering the passage-adit to give the shuttlecock a normal appearance.

4. The steps in the method of making a shuttlecock of a predetermined standard of weight and having an elastic head, which said steps consist in assembling the sub-standard shuttlecock, weighing the same, creating a passage in the elastic head, and inserting a weight in the passage equal to the difference between the shuttlecock and the standard of weight.

5. The method of making a shuttlecock of a predetermined standard of weight which consists in assembling and weighing the sub-standard shuttlecock, forming a weight-receiving passage in the shuttlecock, inserting a weight in the passage equal to the difference between the shuttlecock and the standard of weight, and covering the passage-adit with a sealing disk to give the shuttlecock a normal appearance.

EDDIE BAUER.