

Dec. 15, 1942.

C. J. CROWLEY
ATHLETIC GAME BALL
Filed Dec. 21, 1939

2,305,409

4 Sheets-Sheet 1

Fig. 1.

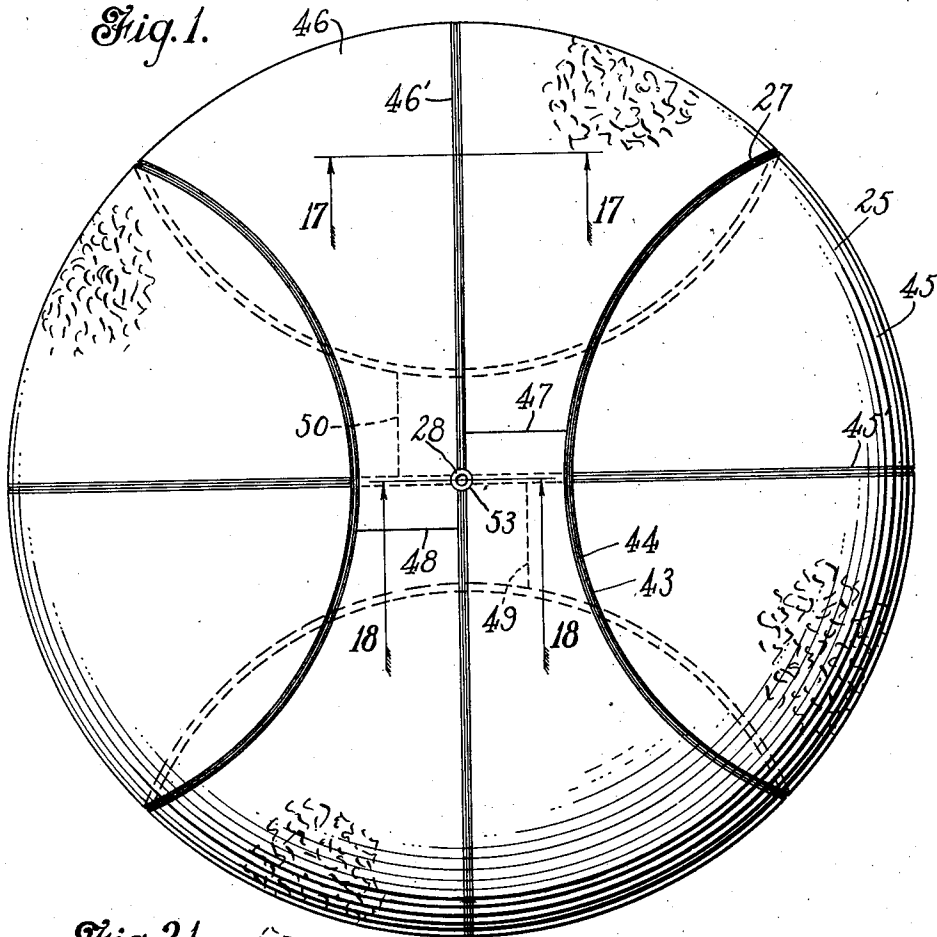
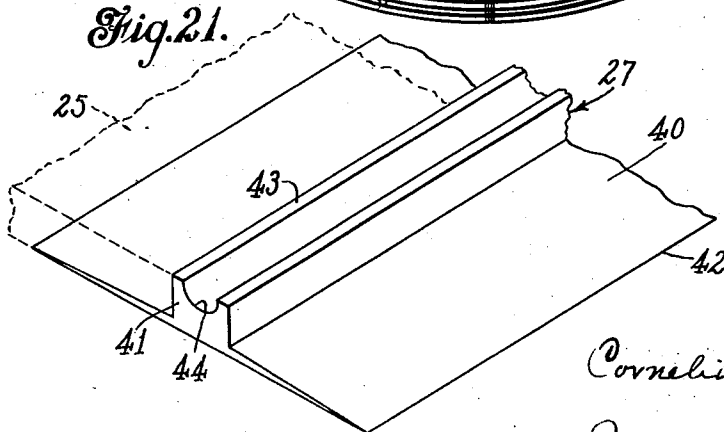


Fig. 21.



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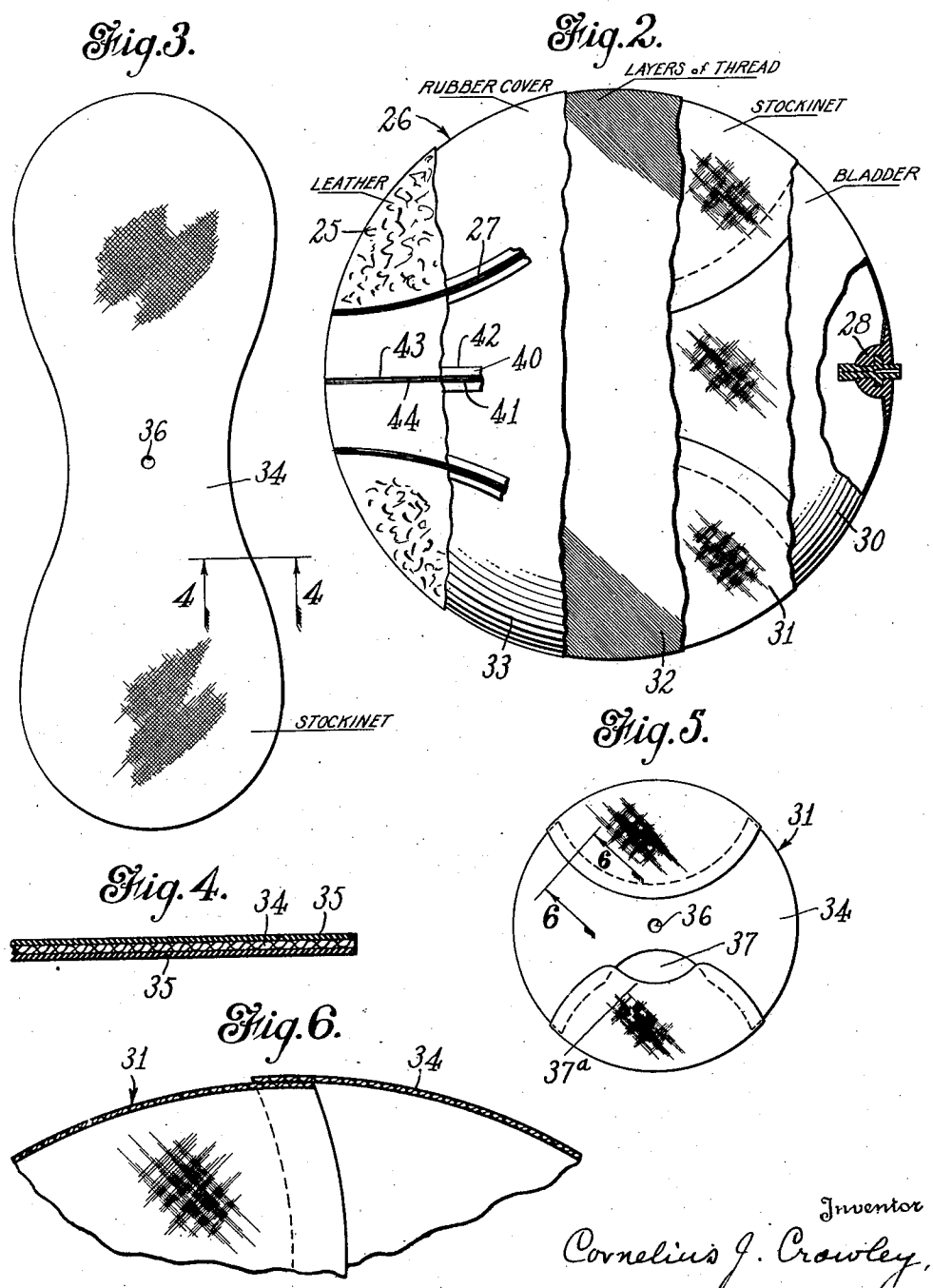
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4 Sheets-Sheet 2



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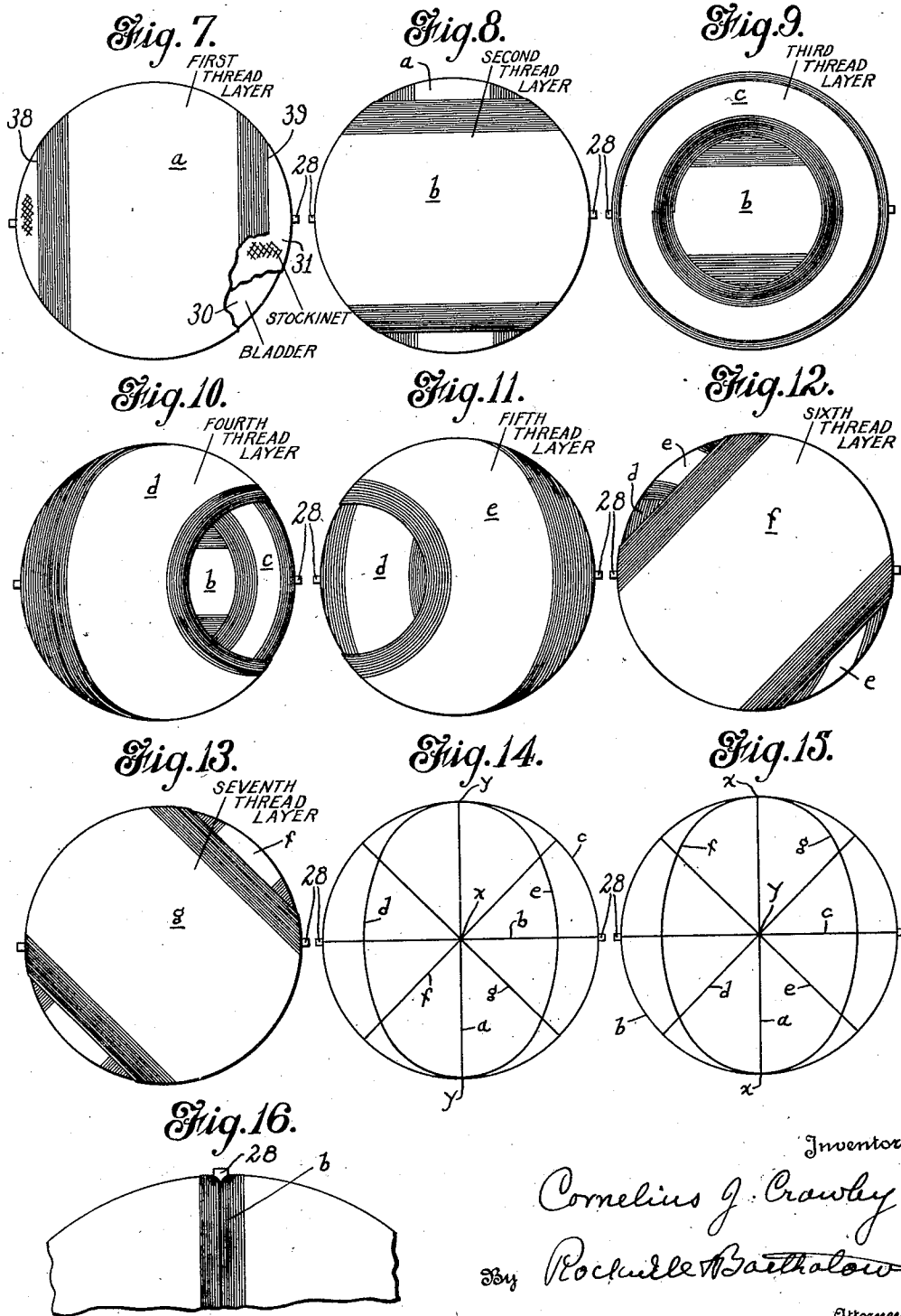
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ATHLETIC GAME BALL

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4 Sheets-Sheet 3



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ATHLETIC GAME BALL

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4 Sheets-Sheet 4

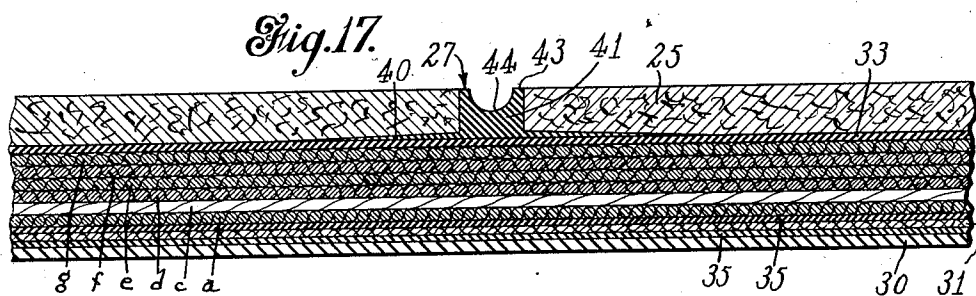
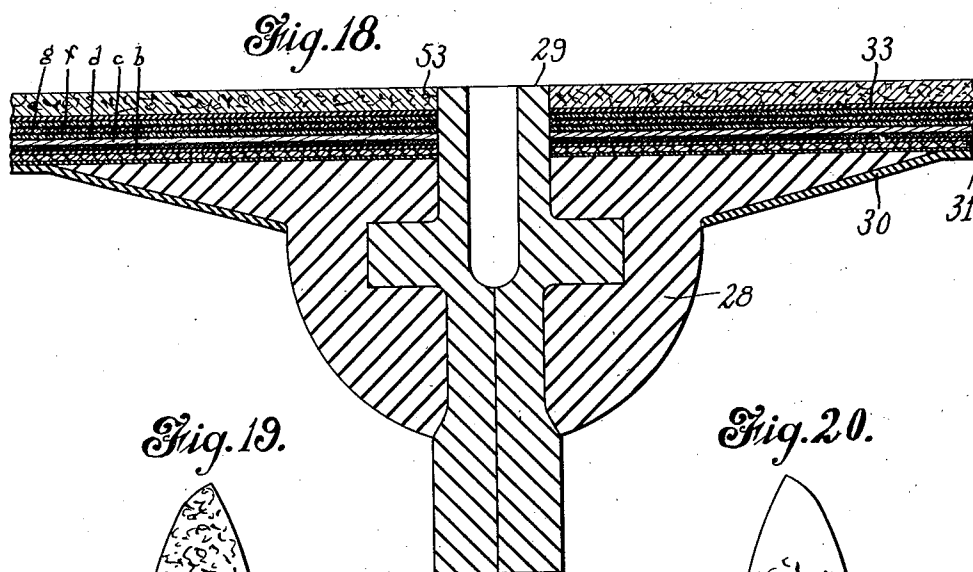


Fig. 19.

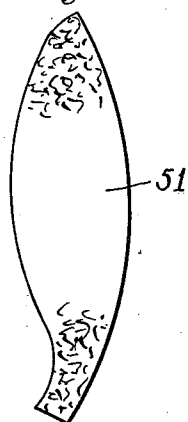
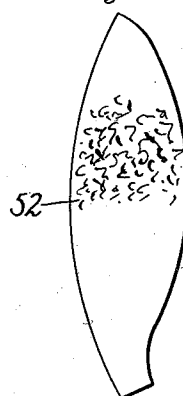


Fig. 20.



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UNITED STATES PATENT OFFICE

2,305,409

ATHLETIC GAME BALL

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Application December 21, 1939, Serial No. 310,394

15 Claims. (Cl. 273—65)

This invention relates to athletic game balls such as basket balls, volley balls, footballs, soccer balls, and the like.

The invention has particular application to balls of spherical form, and in some aspects of the invention the same is limited to a spherical form, but in other aspects the invention is applicable, for example, to a ball of ellipsoidal shape.

The invention relates primarily to that type of game ball in which a so-called carcass is employed, the same being a composite structure of rubber and textile fiber, and the carcass having applied thereto and carried thereby a facing of material such as leather, which facing replaces the so-called "cover" of the old type balls.

The invention has to do with the carcass and its method of formation, and it also has to do with the nature of the facing or external veneer, and the method of forming it.

Among the desirable features of the carcass are great strength and ruggedness, accuracy of shape, and fineness of balance, and especially uniformity of the resilient action at the different points in the surface of the ball. Other desirable features are increased facility of manufacture whereby extreme accuracy and uniformity of the product can be attained by process steps which do not require too high a degree of skill, and perhaps more important, too high a degree of care and perseverance on the part of the operator. In other words, it is desirable to have the method of construction sufficiently simple and non-tedious so that commercially it will be successful in accomplishing the intended purposes.

More particularly it is aimed to provide an athletic game ball of such nature that facile and convenient steps of manufacture, such as pertain to the fitting of a textile layer to a spherical surface, and to the application of cord or thread windings to a spherical surface, may be included in the operator's task.

Another object which I have in view is to furnish an improved arrangement of the leather or other facing, and improved means whereby the gripping of the ball in and by the hand of the player is facilitated.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is an elevation of an athletic game ball such as a basket ball embodying my improvements;

Fig. 2 is an elevation on a somewhat smaller

scale showing the wall of the ball broken away to disclose the principal layers of the composite structure;

Fig. 3 is a plan view of a panel of stockinet which may be employed in making the ball;

Fig. 4 is an enlarged section on line 4—4 of Fig. 3;

Fig. 5 shows two panels of stockinet joined to form a spherical structure, the same being shown before the bladder is introduced;

Fig. 6 is an enlarged cross-section on line 6—6 of Fig. 5;

Figs. 7 to 13, inclusive, show the steps of applying seven different layers of cord or thread to the stockinet-covered bladder;

Figs. 14 and 15 are diagrams hereinafter referred to, illustrating the manner of winding the thread layers;

Fig. 16 is a detail illustrating the winding of that part of the carcass which is adjacent one of the inflating valves;

Figs. 17 and 18 are, respectively, enlarged sections on lines 17—17 and 18—18 of Fig. 1, Fig. 18 being on a somewhat smaller scale than Fig. 17;

Figs. 19 and 20 are detail views showing in plan two of the leather facing pieces; and

Fig. 21 is a perspective view of a portion of a rubber attaching and spacing strip employed in the application of the facing to the carcass.

The ball shown in Fig. 1 is of spherical shape, and is of a kind used in playing basket ball. It has an outer veneer or facing of leather indicated at 25, which facing is made up of a plurality of separate panels, as hereinafter more particularly described. These panels or pieces are adhesively secured to a carcass 26 (Fig. 2) of composite construction, and between the pieces of leather are attaching and spacing strips 27, formed as hereinafter described. At one pole of the ball is a rubber inflating valve structure 28 preferably of the type shown in the DeLaney and Madsen Patent No. 2,065,121, having a small round resilient mouth portion 29 arranged substantially flush with the outer surface of the ball and adapted to be entered by an inflating needle of well-known type. At the opposite pole an identical valve may be employed so that in the event one valve becomes leaky it can be cemented up and the other valve then used for inflating purposes.

The carcass, which I have indicated by reference character 26, is an elastic composite inflatable member, the main parts of which are shown in Fig. 2 and include first the innermost member

or thin elastic bladder 30, in which the valves 23 are carried; second, the layer 31 of knit material or stockinet; third, the body 32 composed of a number of superimposed layers of cord or thread, and fourth, the rubber cover 33 which is applied to and merges into the thread-containing body or layer 32. A part of the completed ball along the line 17-17 of Fig. 1 is shown sectionally in Fig. 17 on a considerably enlarged scale for explanatory purposes, and in this view will be seen the bladder 30, the stockinet layer 31 which is rubberized on both faces, and a number of thread layers making up the main thread layer 32. In this view is also shown the rubber covering 33 to which the leather facing 25 is applied.

In the manufacture of a ball such as shown in the drawings, the first step is the provision of the bladder 30, which is preferably a molded bladder of the "Seamless" type having a thin wall of elastic rubber composition, this bladder being provided at the opposite poles with the rubber inflating valve structures 23, previously mentioned. This bladder, while in a collapsed condition, is introduced into a fabric cover 31. This fabric cover is made fairly accurately to spherical shape, and this is done by taking two figure-8 or Cassinian oval panels 34 of stockinet or like knitted material, and cementing them together in ball shape, as shown in Fig. 5. The stockinet which I prefer to employ is of a grade known as "heavy glove net" having a weight of 5.63 ounces per square yard, the thread count being 26, the "break" 44×40.5, and the gauge being .020. This material is calendered on opposite faces with thin layers of rubber which is not vulcanized, the layers at opposite faces of the sheet being indicated at 35 in Fig. 4. By the use of the rubber facing layers or otherwise the two figure-8 panels are cemented together in the manner shown in Figs. 5 and 6, the adjacent edges of the respective panels being lapped to provide lapped joints, and the overlap at the joints being quite substantial so that the joints will be quite strong. Owing to the figure-8 formation of the overlapping joints of the stockinet cover, there is nothing in the overlap itself to throw the ball out of perfect balance, and by using this method of making the textile cover for the bladder, an effective textile cover of spherical shape can be readily constructed.

Each of the stockinet panels 34 is provided with a central perforation 36 of a size to accommodate the stem or mouth portion of the corresponding rubber inflating valve. The bladder is introduced into the cover 31 before the cover is completely sealed up, and for the purpose of introducing the bladder it is convenient to leave an opening 37 in the cover, such as shown in Fig. 5, said opening being created by leaving unsealed, say for two or three inches, the edge portion of the outer panel, which edge portion is indicated at 37^a. When the bladder is introduced into this cover, the valve stems are projected through the two openings 36, and the bladder then partially inflated (using one of said valves), and the unsealed panel edge portion 37 is then completely sealed. When the valve stems are introduced through the holes 36, the bladder may be cemented to the stockinet over a small area adjacent the valve so that the valve will maintain its position in the hole.

At this stage the light pliable textile cover is held in the spherical shape by light inflation of the bladder, the latter being inflated to a pressure of say one-half pound per square inch.

In using stockinet for the textile cover there is one factor which needs to be taken into consideration, namely, the stretching properties of this material. The material is knit in tubular form, and then the tube is slit lengthwise to produce a flat sheet. This sheet in a direction longitudinally of the original tube has practically no stretch, whereas in a direction transverse to the original tube there is a very considerable amount of stretch. If the figure-8 panels 34 which I employ had unequal stretching properties in longitudinal and transverse directions, a satisfactory textile cover could not be produced by the process above described. I have found, however, that it is possible to obviate this condition by cutting the panels at an acute angle to the original tubular axis, and in this way the longitudinal axis of the panel will be directed diagonally or obliquely with respect to the wales of the fabric, as indicated in Fig. 3. In this manner there is produced a figure-8 panel in which the stretch in a direction longitudinally of the panel will be substantially or approximately the same as the stretch in a transverse direction.

The thread layer is placed on the stockinet cover by operations which are illustrated in Figs. 7 to 16, inclusive. First the stockinet-covered bladder, lightly inflated, is placed in a lathe for the winding of a thread layer *a*. The ball is placed in the lathe so as to revolve about an axis passing through the two polar inflation valves. At this stage the elastic stems of the valves project somewhat, but this does not interfere in any way with placing the ball in position for winding. Preferably a cotton thread is employed for winding, and this is laid in contiguous turns so that a single layer of thread, in which the adjacent turns are either in contact with each other or closely approached to each other, extends over the ball transversely in a zone of considerable width. Preferably I use a mercerized cotton thread made up of four strands. For forming a basket ball carcass a No. 24-4 thread is preferred, the diameter being about .011 inch. A basket ball carcass may have a diameter of 9 $\frac{3}{8}$ inches, and a point to be observed in connection with my new method of arranging the thread is that in winding each layer of thread a substantial area adjacent the poles is left uncovered, although on the other hand the zone on which thread is wound is of considerable width. For example, with a 9 $\frac{3}{8}$ inch carcass, a zone of say 8 $\frac{1}{2}$ inches will be laid on the stockinet layer. Practically, what determines the line where the winding begins and the line where it ends is the requirement that the thread should grip the spherical surface to such an extent that the thread will not slide off of the ball ends or polar portions. I prefer, while the carcass is being turned in a lathe, to wind on the first thread layer, and the subsequent layers, while the stockinet surface and the thread being laid thereon are subject to a spray of rubber cement, and of course under these conditions there is an increased tendency of the thread when laid on the spherical surface to resist sliding off of the same at the polar region of the ball. My experience leads me to advocate in the case of a 9 $\frac{3}{8}$ inch carcass a thread zone of from 8 to 8 $\frac{1}{2}$ inches, depending on the conditions. The thread is laid on with just sufficient tension to create a thread zone or band in which the turns of thread are neatly arranged substantially parallel to each other, and either in contact with each other or in approximate contact with each

other. While for purposes of simplicity I have not shown in Fig. 7, or in other views, all of the thread turns employed, it will be understood that, commencing at a transverse line indicated at 38 in Fig. 7, the laying on of the thread is commenced, working to the right, and as the carcass revolves the winding of thread is continued until the transverse line 39 is reached.

After the formation of thread band *a* the carcass is taken out of the lathe and turned laterally through an angle of 90°, and then replaced in the lathe, and then a thread layer *b* similar to layer *a* is laid on, as shown in Fig. 8. Here the axis on which the carcass is rotated will be at right angles to the line connecting the inflating valves. Next the carcass is taken out of the lathe, and a third layer of thread *c* laid on in a similar manner, as shown in Fig. 9, the layer *c* having an axis 90° removed from the axis of layer *b* as well as the axis of *a*. In laying on the layers *b* and *c*, the thread is laid on the regions where the valve stems project, but these projecting stems do not cause any difficulty because of the fact that the thread turns can be slightly curved so as to circle around the stems and lie flat in a single layer, while nevertheless in close proximity to the stems. This is shown in Fig. 16.

The arrangement of the thread layers *a*, *b* and *c* relatively to each other is shown in the diagram Fig. 14, where a single line is taken as representing the entire layer giving the direction of wind. It will be noted that the winding axis of each of *a*, *b* and *c* is either horizontal or vertical. The next operation is the laying on of layer *d*, and it will be noted from Figs. 14 and 15 that the layer *d* is laid 45° away from layer *a*, using points on the center line of winding *b* as a winding axis. The next layer *e* (Fig. 11) extends on a line 90° from the center of layer *d* and 45° on the other side of the center of layer *a*, as indicated in Fig. 15. Following this, layer *f* is laid on (Fig. 12) 45° away from layer *a*, but using points on the center line of layer *c* as a winding axis. The seventh and final layer *g* has its center line 90° from the center of layer *f* and 45° on the other side of the center of layer *a*, as indicated in Fig. 14. In other words, layer *d* is laid on, using the crossing center lines of *b* and *e* as a winding axis; layer *e* using crossing center lines *b* and *d* as a winding axis. Layer *f* is laid on, using crossing center lines *c* and *g* as a winding axis; and layer *g* using crossing center lines *c* and *f* as a winding axis.

The relation of the seven layers is shown in Figs. 14 and 15. These views illustrate a pair of poles *x-x* and another pair of poles *y-y*, said pairs of poles having axes at right angles to each other. As will be seen from Fig. 14, each pole *x* is crossed by four layers of thread, namely, *a*, *b*, *f* and *g*, whereas each pole *y* is crossed similarly by four layers of thread, the latter being *a*, *c*, *d* and *e*. It will also be noted from these views that the inflating valves 28 are alined on an axis which is at right angles to the axis of poles *x-x* and also at right angles to the axis of poles *y-y*. This produces an advantageous feature of my improved ball in that there is a concentration of thread layers at the poles *x-x* and *y-y* but not at the poles 28-28, but the lack of concentration at 28-28, which means decreased weight in the carcass walls at those poles, is compensated for by the provision of the rubber inflating valves, which by their slight additional weight at

the points where they are used bring the ball into balance.

After the final thread layer has been applied, the spraying of rubber cement (which usually accompanies the laying on of the thread) is continued to such an extent as to form a solid rubber layer of appreciable thickness over the layers of thread, forming the rubber cover 33 previously mentioned. This rubber cover in practice will be integral with the rubber surrounding and lying between the threads of the outermost thread layer.

The next step is to place the article thus formed in a mold and subject it to heat and pressure for the purpose of perfecting the outer surface and giving the carcass the proper external dimensions. Vulcanization is usually accomplished at the same time, the rubber containing the proper materials for this purpose so that upon being heated to the required degree the article will be vulcanized. In the operation of molding and vulcanizing, one of the valves 28 is made use of (usually before the stem or valve proper has been inserted), air being led to the valve body from the exterior of the mold so that the bladder is inflated to a high pressure, say 90 pounds to the square inch, for the purpose of pressing the structure with great force against the mold walls in order to accomplish the intended purposes. In this operation the stockinet and other parts of the carcass structure will be stretched to a considerable degree, the amount of stretch being nicely regulated so as to produce the optimum result from the standpoint of carcass strength, resiliency, etc. The entire wall from the outer face of the stockinet to and including the rubber layer on top of the thread windings will be highly condensed, the rubber being forced through the spaces between the threads, and the outer rubber layer becoming firmly bonded with the rubber in the spaces between the threads, and all the layers, in fact, being very thoroughly bonded and vulcanized together.

After being removed from the mold the carcass has the leather facing applied to it, and in this procedure the spacing and securing elements or strips 27, previously mentioned, are made use of. These strips are preferably made from an elastic rubber compound, and they are quite flexible so that they can be readily bent or curved in all directions. The strip comprises a body 40 which is quite thin (and in comparison rather wide), and is provided intermediate its side edges with an upstanding integral rib or body 41. Preferably the bottom of the strip is initially straight and flat, and at the sides of the rib the strip is tapered so as to have feather edges 42 at the sides, the upper surface of the strip being beveled or chamfered to achieve this result. Preferably also the upper surface of the rib, which is indicated at 43, will be flush with the outer surface of the leather at either side of the rib, as shown in Fig. 17, and for facilitating the gripping of the ball in the hands, the upper surface of the rib is provided with a longitudinal groove 44, the groove being of curved formation. While I do not limit myself to any particular dimension, the rib 41 may have a width of say .0625 inch, and the groove 44, which is formed on an arc, may have a width of .040 inch.

The procedure in applying a securing strip such as above described may differ, but in the case such as herein illustrated, pieces of the strip material are employed in securing to the exterior

rubber surface of the carcass a number of thin leather pieces, which when applied to the carcass present in conjunction two composite figure-8 panels. For the sake of clearness it is convenient to designate one of the figure-8 panels of Fig. 1, 45, and the other figure-8 panel 46. Each of these panels is divided by one of the securing strips in a longitudinal direction throughout its length, so that there is in panel 45 a longitudinal division line 45', and in panel 46 there is a longitudinal division line 46'. Furthermore, each of these figure-8 panels is divided transversely, panel 46 having the short transverse division lines 47 and 48, respectively, adjacent its narrowest portion or waist, and panel 45 having similar division lines 49 and 50. These transverse division lines of a given panel are laterally offset from each other and laterally offset from the adjacent pole of the ball, as shown in Fig. 1, so that, as shown in Fig. 1, panel 46 has the division line 47 slightly above and to the right of the adjacent pole, while the division line 48 is at the left and below the pole. Thus these division lines such as 47 and 48 are removed from and out of the way of the inflating valves 28 which are provided at the poles, and in this manner the structure is made stronger and more durable.

It will be understood from what has been said above that each of the figure-8 panels of leather is divided into two parts by a longitudinal division line, and that the two side portions thus created are in turn divided (in a transverse direction) so that each panel is made up of four pieces in all, the entire leather facing comprising in all eight pieces. It will also be understood that owing to the provision of the offset transverse division lines each panel has two longer side pieces and two shorter side pieces. This is illustrated in Figs. 19 and 20, one of the longer pieces being shown in Fig. 19 and indicated by numeral 51, while Fig. 20 shows one of the shorter pieces indicated by numeral 52.

At the transverse division lines 47, 48, 49 and 50, which are relatively short, the leather pieces are cemented to the carcass and abutted against each other to form butt joints, but along the longitudinal division lines of the panels securing strips 27 are provided. These follow straight lines, although of course conforming to the curvature of the ball. Strips 27 are also used along the curved edges of the figure-8 panels of leather, the rib 41 of the strip being interposed between the curved edge of one panel and the curved edge of the other panel. The flexibility or the elastic securing strips enables them to be bent or curved laterally so that they can conform fully to the adjacent portions of the panels and to the exterior surface of the carcass. The leather pieces are cemented to the upper face portions of the strip at opposite sides of the rib, as well as to the exterior surface of the carcass between the strips.

In doing some of the work of applying the leather facing, a leather piece may be adhesively secured at its edge portion to a piece of securing strip material before the latter is applied to the carcass surface. In other words, the leather piece may be cemented to the securing strip at one side of the latter, as indicated by the dotted lines in Fig. 21, whereby the leather piece is provided with an attached rubber strip extending along its edge. Thereafter the rubber strip can be adhesively secured to the exterior surface of the carcass in any desired position. In some cases, as will be understood, the positioning of the strip

material need not be as shown in the drawings, which are illustrative only. After the leather piece with its attached strip has been secured to the carcass, the adjacent leather piece may be placed in position and secured in a manner which will be obvious. I may, for example, build up an entire figure-8 panel, with its longitudinal dividing rubber strip and the strip running along the curved side edges, and apply such a panel to the carcass as an entity, and thereafter apply the other figure-8 panel as an entity, but various changes can be made in the details of the procedure, and one of the advantages provided by my invention consists in the latitude which is given the operator in applying the facing material and in using the novel rubber strip material, which can be adhesively applied on the one hand to the ball carcass and on the other hand to the leather facing material in a sequence which is most convenient.

Owing to the thinness of the body of the securing strip and the beveling or chamfering of the same, and owing also to the provision of a relatively wide strip, of which each side flange portion is preferably noticeably wider than the rib, the strip takes up very little space in a radial direction. If desired, the leather may be slightly beveled or scarfed adjacent the strip to accommodate itself thereto, but in most cases this is unnecessary. In any case that portion of the strip radially inward of the leather occupies little space, and moreover the provision of the strip has no effect in respect to the balancing of the ball owing to the symmetrical arrangement of the strip material which can be employed, as shown, for example, in Fig. 1.

Another advantage of the improved structure arises from the fact that in applying the leather facing the first leather panel or piece can be applied successfully at any lateral angle to one of the valve-equipped poles of the carcass. The panel is provided with a central perforation 53 (Fig. 1) which is adapted to fit over the projecting stem of the adjacent valve 28. The carcass being otherwise bare, the first panel, when its perforation 53 is fitted over the stem of the valve, can lie at any lateral angle, and it is of advantage that this is so because of the increased facility of operation.

After the application of the leather facing in the manner described, the ball can be placed in a mold having the size of the finished article and subjected again to inflation at a high pressure (using one of the valve structures), the mold being heated, for the purpose of perfecting the surface contour of the ball and bringing it accurately to size. Of course in such an operation there may be also vulcanization of a vulcanizable cement used in adhesively securing the rubber securing strips and the leather pieces to the carcass and to each other. In fact, I prefer to employ for the purpose indicated a latex cement which will cure at a relatively low temperature, and the curing can be effected by placing the ball in the finishing mold, slightly heated by steam, in quite a short interval, say about two minutes, the ball meanwhile being subjected to high internal pressure, as above stated. The result will be not only to perfect the surface contour of the ball, but to eliminate any occluded air between the facing and the carcass, and iron out any places in the ball wall which are not sufficiently dense and coherent.

The longitudinal grooving of the external face of the rib is of great advantage in enabling the

ball to be firmly gripped in the hands of the player.

It will be seen from the foregoing that by my invention a carcass can be provided having a resilient wall of great strength, and which is very accurately shaped and finely balanced, there being great uniformity in the resilient action at different points in the surface of the ball. The provision of a properly fitting stockinet cover for the bladder can be readily brought about by simple operations, and a uniform winding of the stockinet cover can also be effected by simple operations. In laying on the different layers of thread it is unnecessary to wind to and over the poles, and on the other hand it is unnecessary to provide special covers for the polar portions, which covers, if provided, would add materially to the difficulty and expense of the process. The thread bands or layers, laid on as herein described, thoroughly cover the stockinet material and bladder, and owing to the various angles at which the threads are arranged, the carcass is given remarkable strength. The novel veneer cover as herein described also provides an improved facing for such a ball, as well as an improved and simplified procedure in applying the facing.

Another great advantage arises from the fact that it is unnecessary to build the carcass on a form. By my invention it is possible to construct a satisfactory carcass for high grade balls by a process in which, during the winding operations, the inflated bladder provides support for the turns of thread or cord as they are laid in place.

It will be understood that in those aspects of the invention which concern, for example, the winding on of the threads or cords in different layers as described, the invention is particularly applicable to spherical balls such as basket balls, but it will also be manifest that in other aspects, such, for example, as the employment of the novel strips for securing the leather or other facing to the carcass, the same advantages as herein described, or like advantages, will be brought about in balls which are of non-spherical shape.

While I have shown herein a preferred form of athletic game ball and a preferred procedure in making the same, it will be understood that many modifications and changes can be made without departure from the principles of the invention and the scope of the claims.

What I claim is:

1. In an inflatable athletic game ball, a hollow carcass of spherical shape intended for inflation comprising a layer of knitted fabric formed in two figure-8 panels with cemented lapped edges.
2. In an inflatable athletic game ball, a carcass of spherical shape comprising a layer of knitted fabric formed in two figure-8 panels with cemented lapped edges, said figure-8 panels having their transverse stretch approximately equal to the longitudinal stretch.
3. An inflatable athletic game ball comprising a bladder cover formed of figure-8 panels of knit material, the longitudinal axis of each panel being directed obliquely to the wales of the fabric so that the transverse stretching characteristic of the panel is approximately equal to the longitudinal stretching characteristic.
4. An inflatable athletic game ball comprising a bladder cover formed of figure-8 panels of knit material, the longitudinal axis of each panel being directed obliquely to the wales of the fabric so that the transverse stretching characteristic

of the panel is approximately equal to the longitudinal stretching characteristic, said panels being secured to each other by lapped cemented edge portions.

5. In an inflatable athletic game ball, a bladder cover of stockinet rubberized on both faces and composed of two figure-8 panels interconnected by lapped cemented edges.

6. In an inflatable athletic game ball, a spherical carcass comprising a spherical bladder and wide bands of wound thread each extending over the periphery but leaving an uncovered area at the poles, said bands being of considerably greater width than the bladder radius and sufficient in number and arranged at such angles to each other as of themselves to close in completely and cover the periphery of the structure.

7. In an inflatable athletic game ball, a spherical carcass comprising a spherical bladder and wide bands of wound thread each extending over the periphery but leaving an uncovered area at the poles, said bands being of considerably greater width than the bladder radius and sufficient in number and arranged at such angles to each other as of themselves to close in completely and cover the periphery of the structure, said bands including three primary bands laid at right angles to each other, and at least two obliquely arranged bands.

8. In an inflatable athletic game ball, a spherical carcass comprising a spherical bladder and wide bands of wound thread each extending over the periphery but leaving an uncovered area at the poles, said bands being of considerably greater width than the bladder radius and sufficient in number and arranged at such angles to each other as of themselves to close in completely and cover the periphery of the structure, said bands including three primary bands laid at right angles to each other, and at least three obliquely arranged bands.

9. In an inflatable athletic game ball, a spherical carcass comprising a spherical bladder and wide bands of wound thread each extending over the periphery but leaving an uncovered area at the poles, said bands being of considerably greater width than the bladder radius and sufficient in number and arranged at such angles to each other as of themselves to close in completely and cover the periphery of the structure, said bands including three primary bands laid at right angles to each other, and at least four obliquely arranged bands.

10. In an inflatable athletic game ball, the combination of a spherical bladder having inflating valves at opposite poles, a cover for the bladder comprising wide bands of wound thread in at least five layers, the first band being wound on the axis of the valves, the second band being at right angles to the first, the third band being at right angles to the first two, and the last two bands of the five being obliquely disposed.

11. In an inflatable athletic game ball, the combination of a spherical bladder and a cover for the bladder comprising wide bands of wound thread in at least seven windings, the first three bands being at right angles to each other, the next two bands being placed obliquely to one of the first three, and the last two bands being arranged at 90° angles to each other and obliquely to another of the first three bands.

12. In an inflatable athletic game ball, the combination of a spherical bladder and a cover for the bladder comprising wide bands of wound thread in at least seven windings, the first three

bands being at right angles to each other, the next two bands being placed obliquely to one of the first three, and the last two bands being arranged at 90° angles to each other and obliquely to another of the first three bands, said bands in the aggregate crossing each other at not more than two pairs of poles.

13. In an inflatable athletic game ball, a carcass of spherical form, and a finishing or external layer applied to said carcass and formed of Cassinian oval panels of material adhesively secured to the exterior surface of the carcass, each of said panels being divided transversely, the transverse lines of division being located in the waist portions of the panels and being offset from each other and lying at opposite sides respectively of an adjacent pole, and the ball being provided with a substantially flush inflating valve stem at the pole at some distance from said lines.

14. In an inflatable athletic game ball, a carcass of spherical form and a finishing or external layer applied to said carcass and formed of Cassinian oval panels of material adhesively secured to the exterior surface of the carcass, each of said panels being divided longitudinally and

also transversely, each panel having two transverse lines of division in the waist portion thereof at opposite sides respectively of the longitudinal dividing line, said transverse lines being offset from each other, and said ball having at the pole an inflating valve from which said lines are offset on opposite sides.

15. An inflatable athletic game ball comprising a spherical bladder, a spherical cover over the bladder, wide overlapping bands of wound thread laid over the cover, each of said bands being of considerably greater width than the bladder radius and said bands being arranged as three primary bands crossing each other at right angles and four additional diagonally arranged bands overlying the primary bands such that the bands in and of themselves completely close in and cover the periphery, said bands in the aggregate crossing each other at two pairs only of poles, and said ball being provided at other diametrical poles respectively with inflating valves of predetermined weight which produce a substantial balance of weight with respect to the first-mentioned pairs of poles.

CORNELIUS J. CROWLEY.

CERTIFICATE OF CORRECTION.

Patent No. 2,305,409.

December 15, 1942.

CORNELIUS J. CROWLEY.

It is hereby certified that the above numbered patent was erroneously issued to The Seamless Rubber Company Inc., of New Haven, Connecticut, a corporation of Massachusetts, whereas said patent should have issued to The Seamless Rubber Company, of New Haven, Connecticut, a corporation of Connecticut, as assignee by mesne assignments of the entire interest therein; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of February, A. D. 1943.

(Seal)

Henry Van Arsedale,
Acting Commissioner of Patents.