March 8, 1938. I. I. TUBBS 2,110,183

INFLATABLE BALL

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Fig. 1.

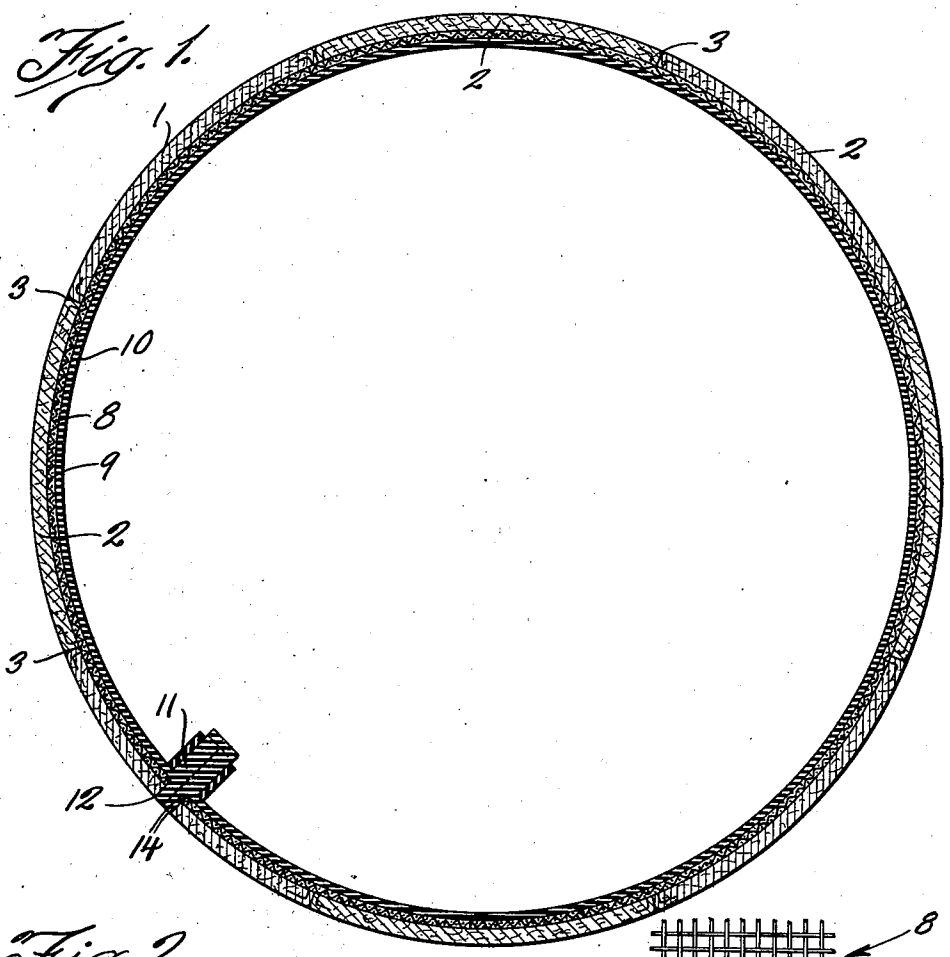


Fig. 2.

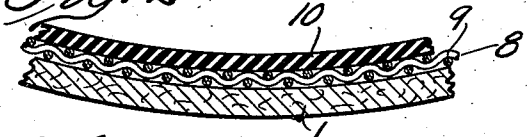


Fig. 3.

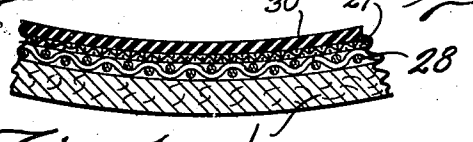


Fig. 4

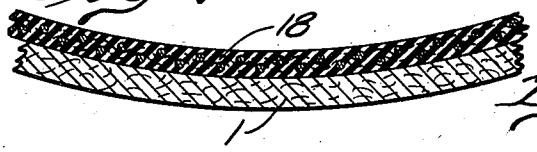
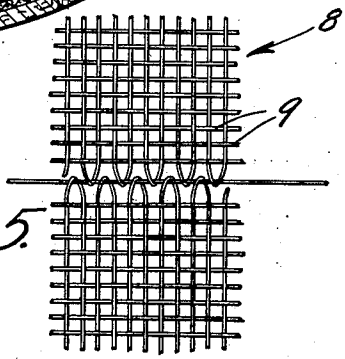


Fig. 5.



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Fig. 9.

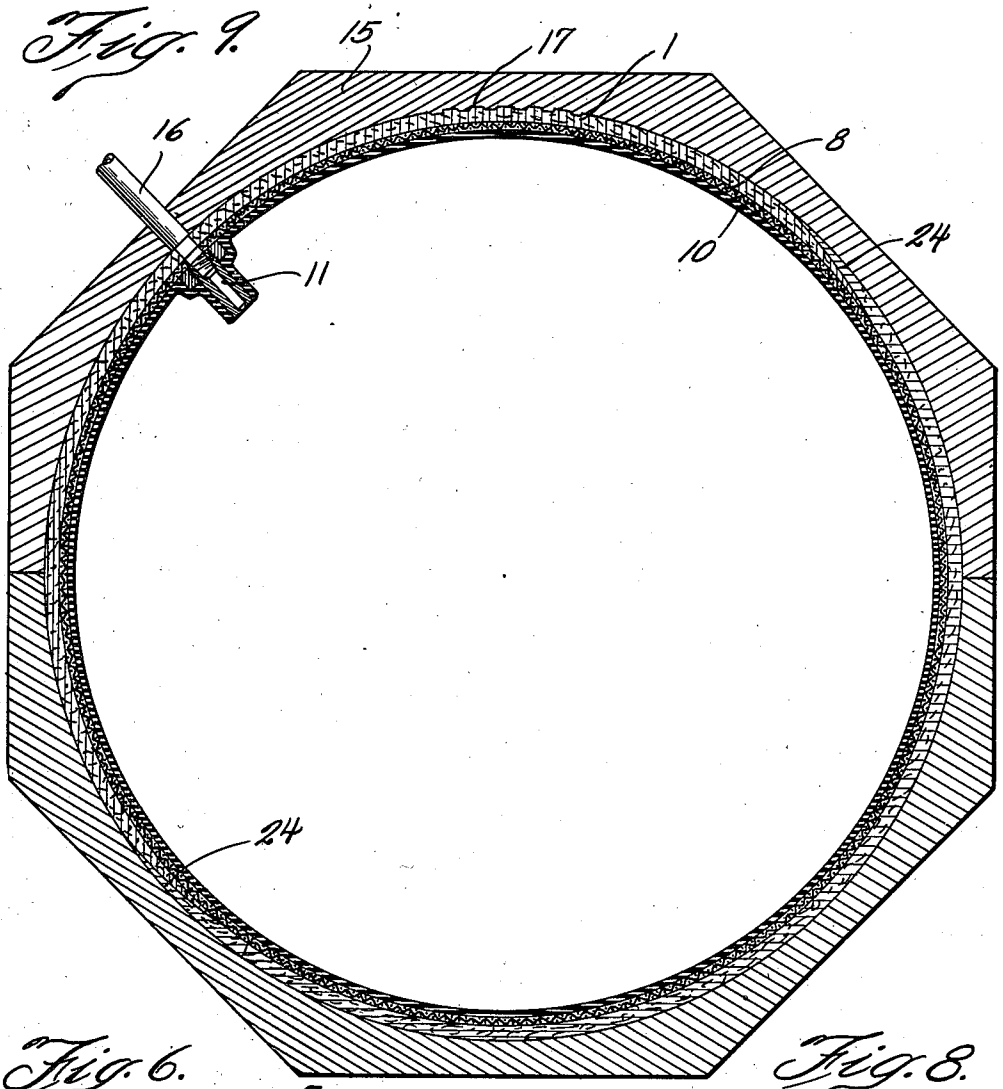


Fig. 6.

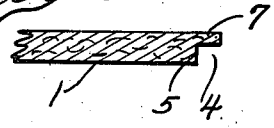
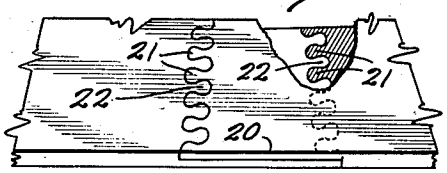


Fig. 8.



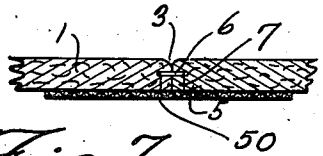


Fig. 7.

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Fig. 10.

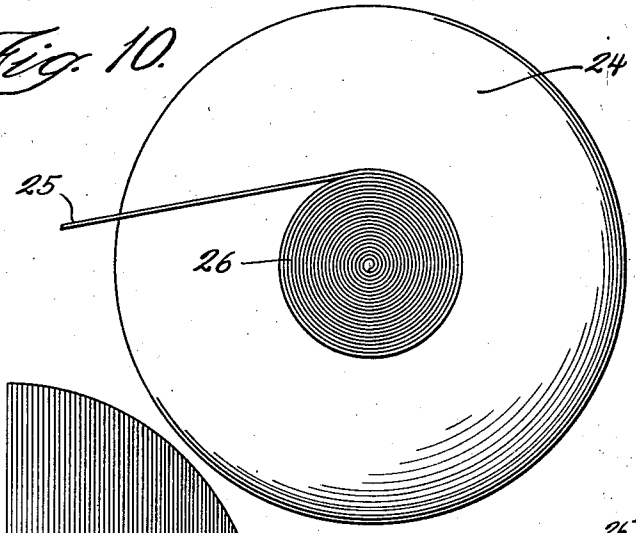


Fig. 11.

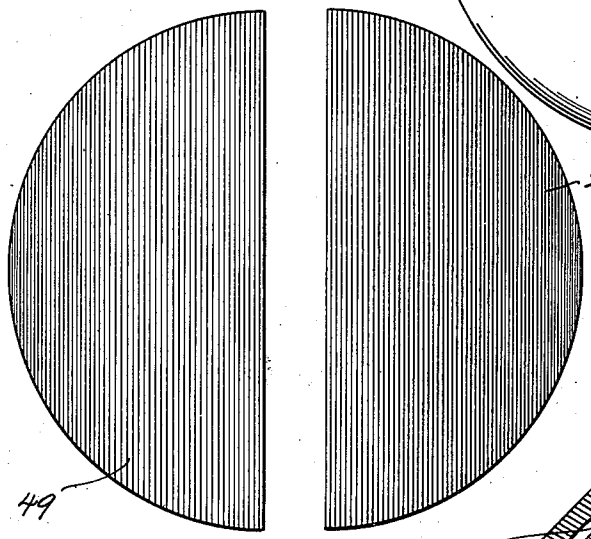




Fig. 14.

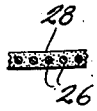
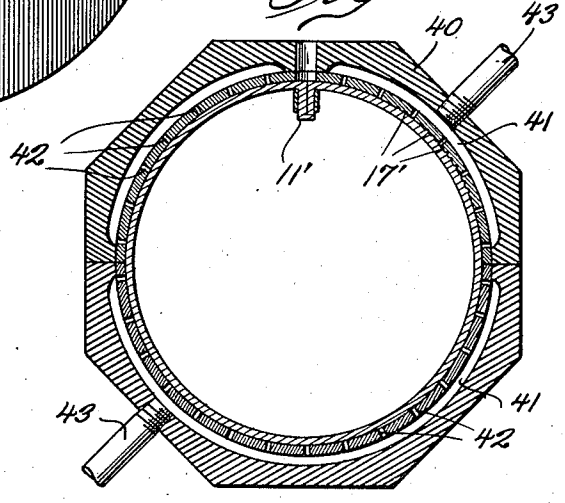


Fig. 15.

Fig. 13.



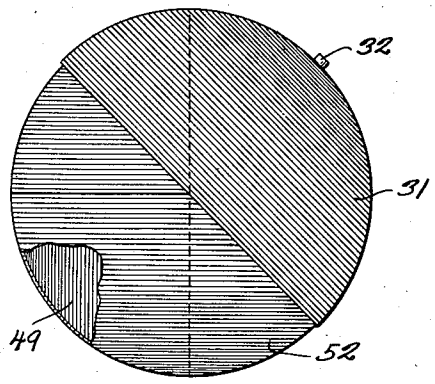


Fig. 12.

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UNITED STATES PATENT OFFICE

2,110,183

INFLATABLE BALL

Ira I. Tubbs, Coral Gables, Fla.

Application July 25, 1935, Serial No. 33,005

12 Claims. (Cl. 273—65)

My invention relates to that general class of devices wherein an outer cover of leather or other suitable wear-resisting material is provided of suitable form, having an air-tight resilient sack or bladder positioned within it so that the bladder may be inflated to expand the outer cover, thereby providing a highly elastic and resilient article especially useful and desirable as basket balls, footballs, soccer balls, speed balls and the like.

The object of my invention is to provide a device of the kind described wherein means are provided for limiting the expansion of the internal air-tight sack and thus control the tension upon the cover part. This limiting means may be an independent part of the device or it may be formed as a part of the internal bladder, in which case the ball remains of substantially its present construction except that the bladder member has means for restraining its dilation when inflated, thus providing a ball more serviceable, durable, resilient and reliable than balls as heretofore made, and in which the ball will retain its form and size in service and continue with a true rebound through the life of the ball. This means provided for limiting and determining the stress upon the cover prevents distortion of the ball regardless of the pressure within the internal bladder.

To this end my invention consists in the novel constructions, arrangement and combination of parts, herein shown and described and more particularly pointed out in the claims.

In the accompanying drawings, wherein like or similar reference characters indicate like or corresponding parts:

Fig. 1 is a central transverse section of my improved ball;

Fig. 2 is a fragmentary section of a portion of the wall of the device, shown in Fig. 1 but enlarged to more clearly show the construction;

Fig. 3 is a fragmentary section similar to Fig. 2 showing a slightly modified construction.

Fig. 4 is a fragmentary section similar to that shown in Fig. 2 but showing another slightly modified form of my device;

Fig. 5 is a fragmentary plan of one form of a non-expansible element adapted for use in my device;

Fig. 6 is an enlarged view of a marginal part of a cover section.

Fig. 7 is a view similar to Fig. 6 but showing the margins of two sections connected as in service;

Fig. 8 is a perspective view of a modified form of a connecting seam between the sections;

Fig. 9 is a central transverse section of a form or mold which I have found very useful and important in the construction of my device showing a sectional elevation of one of my improved balls in place in the same.

Fig. 10 is an elevation of a form employed in the construction of a modified form of my device;

Fig. 11 shows two of the parts constructed as in Fig. 10 in their proper relation but slightly separated to more clearly show the construction.

Fig. 12 shows the completed modified form of the air-tight element and pressure-resisting means shown in Figs. 10 and 11.

Fig. 13 is a transverse central sectional view of a die or mold which I have found of great value in producing my improved balls.

Fig. 14 is a transverse section of a coated cord or wire, such as preferably used in the construction of the parts shown in Figs. 11 and 12.

Fig. 15 is a fragmentary section across the wires or elements used in the construction of the parts shown in Figs. 11 and 12.

In the form shown in the drawings, my device comprises a cover part 1, preferably consisting of any desired number of sections 2—2 and with seams 3—3 connecting the several sections together at their margins. The cover is preferably formed of leather or other suitable material with the sections shaped in the usual or any desired manner so that they may be made to readily assume a proper curvature and the finished ball will be true, smooth, regular and accurate in form.

In the form shown in Figs. 1, 6 and 7 the seams 3 are produced by splitting the margin of the section and removing a small portion 4 along the edge as shown in Fig. 6, and thereafter placing the longer faces 7—7 of the sections together and stitching them through the portions of reduced thickness at the margin as at 6, and thereafter turning them as shown in Fig. 7. When thus constructed the part 7 bends down against the part 5 and the stitching 6, thus firmly and securely uniting the margins and forming a seam which is or may be substantially smooth and flush upon both the inner and outer surfaces; making it possible, if desired, to eliminate the turning of the ball during the process of manufacture.

It may also be desirable in some kinds of balls, or where it is desired to especially reinforce the seams or connections between the sections to provide a reinforcing part or band 50 as shown in Fig. 7 of canvas or other suitable material to extend across the seam and cement or otherwise

secure the same to the cover sections upon the interior of the cover at opposite sides of the seam to relieve the seam of substantially all undesirable stress.

Any suitable means may be provided to limit the stress upon the cover and especially on the seams 3. As shown in Fig. 1, an element 8 is provided formed of fine, resilient wire 9, as shown in Fig. 5, of the proper form and size to snugly fit within the interior of the cover and accurately correspond thereto in size and shape, the size being preferably just sufficient to snugly fill the cover and hold the same fully distended.

An air-tight member or bladder 10 is provided within the cover 1 and element 8 of suitable form and size to fill the interior of the element 8 when expanded and to press the non-expansible element outward to the limit of its capacity, receiving substantially the full stress of the air pressure within this member, thus limiting the stress exerted by the bladder 10 upon the cover.

In the form shown, a valve 11 is provided upon the bladder 10 and is connected thereto in any suitable manner so that air may be introduced through the valve into the bladder but that any air within the bladder normally cannot escape past the valve.

As shown, a portion 12 of the valve protrudes through a suitable opening 14 in the element 8 and cover 1 so that inflating means may be conveniently attached to the valve at the exterior of the ball to inflate the bladder to the desired pressure. Any suitable or well known form, construction, or types of valve may be employed for this purpose, it being merely desired that the valve be so attached to the bladder that it will not leak and shall be conveniently accessible from the outside of the cover.

Under some conditions it has been found desirable to cement or otherwise attach the element 8 and bladder 10 to the cover 1 so that the parts 12 will be firmly held in position in the opening 14 and displacement prevented between the element and cover 1.

In the form shown in Fig. 4, the fabric of the element 18 is coated and filled with rubber or other suitable material and arranged within the cover as hereinbefore described. In this construction where a wire fabric is employed as a base this coating tends to hold the wires in position and prevent buckling or other injury to the element from handling, assembling or in making inspection or repairs. This form provides an air-tight non-expansible bladder, the valve of which may be the same as hereinbefore described or of any desired form or construction.

In some balls or articles it has been found desirable to employ the construction shown in Fig. 3. In this form the element 28 corresponding to the element 8 in Figures 1 and 2 is placed in my improved ball immediately within the cover 1, and a shield 29 of canvas or other suitable material is provided within the element 28 arranged to entirely and smoothly cover its interior and the expansible air-tight member or bladder 30 is positioned within the shield 29 which protects the member or bladder from injury in case any parts of the element 28 should become displaced or broken in service or handling and will prevent the broken part from engaging or injuring the bladder.

In the form shown in Fig. 10 a suitable form 24 is provided and a fine resilient cord or wire 25 or other suitable means is spirally wound as at 26 upon the form as shown, preferably with suitable means provided to assist in retaining the wire in position upon the form. For this purpose the form 24 may be coated with caoutchouc or other rubber-like substance to hold the wire in position, or as shown in Fig. 14, the wire may be coated with a similar adhesive material 27, so that as it winds upon the form it will tend to hold to the surface of the form and to the adjacent wires, as shown in Fig. 15, thus spacing the turns of the wire from each other as desired and providing a matrix 28 to permanently seal the member when completed. In the preferred construction the matrix is thus constructed in hemispheres 49, as shown in Fig. 11, and these hemispheres when suitably set to retain their form are brought together with their open faces contacting and are thus vulcanized to form a complete unit.

Where greater strength is desired, and in fact under ordinary circumstances, it is preferred to use a second pair of similarly formed hemispheres, 52, as shown in Fig. 12, with their uniting edges crossing the meeting line of the first hemispheres 49, at substantially right angles; and, if extreme strength is desired, a third pair 31, of these members may be mounted upon the exterior of the spheres formed by hemispheres 49 and 52, arranging them so as to bring the wires of the various hemispheres into such relation to each other as to obtain the greatest possible tensile strength for the structure when completed. As before mentioned, the finished article is provided with a valve 32 as hereinbefore described and the entire structure is vulcanized, or otherwise permanently set, so that it will permanently retain its form and construction and the wires will be prevented from becoming detached from the completed air-tight sphere which is then enclosed in the cover as hereinbefore described.

In producing my improved device, I have found it desirable and expedient to employ a die or mold 15 as shown in Fig. 9. This mold may be constructed of any desirable material having sufficient strength and rigidity to avoid injury or distortion when in service. The cover member 1 constructed in any desired manner or as hereinbefore described and with the part 8 suitably positioned therein are placed within the mold, and the mold is then closed and held in closed position by any suitable means not shown. The valve 11 is then connected to suitable inflating means 16 so that air or other fluid may be forced into the element 8 and any desired pressure may be applied.

Under some circumstances I have found the mold or die 40, shown in Figure 13, very desirable. In this form chamber 41 is formed in the walls of the mold with any desired number of openings or channels 42—42, leading to the inner face of the mold and connections 43—43 extending into the chambers 41, so that piping or other suitable means may be attached to the connections 43—43, so that when a cover or other parts are placed in the form the air may be exhausted between the form and the part to securely hold the part in position in the form and prevent its displacement during further manipulation or when placing the air-tight member within the cover. The cover member 1 constructed in any desired manner or as hereinbefore described and with the element 8 and member 10 suitably positioned therein are placed within the mold, and the mold is then closed and held in closed position by any suitable means not shown. The valve 11 is then connected to suitable inflating means 16 so that air

or other fluid may be forced into the member 10 and any desired pressure may be applied.

The inner surface of the mold or die may be finished in any desired manner, such as to produced pebbling or other appearance, also to stamp words, numbers, letters, a trade-mark or the like, as at 17—17, upon the surface of the cover. The ball is then inflated sufficiently to force the cover with any desired pressure against the inner surface of the mold or die, thus causing the ball to accurately correspond in size and form to the interior of the mold, it being found that sufficient force may be exerted in this manner to permanently set the size and form of the various parts and at the same time imprint any desired markings or surface indications upon the cover that may be desired, so that when the mold is opened, and the ball removed after the pressure has been suitably reduced, the ball will remain perfect in form and permanently retain the markings thus imprinted or indented upon the cover.

The several sections of the cover may be united by stitched seams in the usual manner or as hereinbefore described. The connection shown in Fig. 8 has proven very desirable, however, and in this form stitches may, if desired, be entirely dispensed with. In this form the sections are halved or split along their margin to provide a thinner portion 20, and dovetails 21 of any desired form or size are provided along the margin and also along the junction of the split or halved portion and that of full thickness. When thus constructed the halved or split portions of adjacent sections may be cemented together with the dovetails 20 and 22 interlocking to form a permanent connection.

In the form shown in Fig. 9, the seams 24 are merely scarfed to a thin edge and united with cement in the manner employed with leather belts or other similar articles, leaving a smooth flush surface at each side of the seam with the cover of substantially uniform thickness.

In articles having an inflatable member or bladder to hold a cover distended it is obvious that the usual seam having a part projecting into the interior of the ball will cause irregular rebound and also tends to distort the cover and cause injury to the bladder, while with the uniform contour seams such as herein described, the bladder and elements will contact equally throughout the entire cover and will insure perfectly regular rebound, also especially when seam reinforcing means is provided, such as described in connection with Fig. 7, the seams become very strong and have substantially no tendency to stretch or distort, aiding materially to preserve the shape of the cover as well as the life of the inflatable member.

Having thus described my improvement, it is obvious that various immaterial modifications may be made in my device without departing from the spirit of my invention, hence I do not wish to be understood as limiting myself to the exact form or construction shown.

What I claim as new and desire to secure by Letters Patent is:

1. In an inflatable ball, a cover comprising a plurality of sections means connecting said sections at their margins, said connections being substantially flush with both surfaces of said cover, and an air-tight member formed to fit within and fill said cover, in combination with flexible, non-expansible and continuous means within the cover adapted to limit the expansibility of said member.

2. In an inflatable ball, a cover comprising a plurality of sections, means connecting said sections at their margins, said connecting means being substantially smooth with the inner surface of said cover, and an air-tight member formed to fit within and fill said cover in combination with a flexible, non-expansible element formed to fit within and conform to the shape of said cover adapted to limit the expansibilty of said member and thereby the tension upon said cover and said connecting means.

3. In an inflatable ball, a cover comprising a plurality of sections of suitable material, means connecting said sections at their margins, the seams between said sections being formed by splitting the material near the margin, removing a strip at one side of said split, connecting the longer edges of the sections and turning the connected parts inward to co-operate with the remainder of the thickness of the section to form a seam substantially smooth and flush with the surface of said sections.

4. In an inflatable ball, a cover comprising a plurality of sections connected at their margins, a connecting seam between said sections formed by splitting the material at the margin removing a part at one side of said split, connecting the longer edges of the sections and turning the connected parts inward to co-operate with the remainder of the thickness of the section to form a seam, in combination with a continuous non-expansible element within the cover extending across said seams adapted to limit the tension upon the seams when in service.

5. In an inflatable ball, a cover comprising a plurality of sections of suitable material, means connecting said sections at their margins, the connection between said sections being formed by splitting the material near the margin, removing a strip at one side of said split and securing the split parts together.

6. In an inflatable ball a flexible cover comprising a plurality of connected sections in combination with an air-tight member formed to fit within said cover and reinforcing means adapted to control the form and size of said member comprising a plurality of strengthening elements arranged to form a hollow matrix, with means connecting said elements adapted to hold the same in position.

7. In a resilient ball, a cover comprising a plurality of sections, seams connecting said sections at their margins, and an air-tight member formed to fit within said cover, in combination with means comprising a plurality of strengthening elements arranged to form a hollow matrix of suitable form, in combination with means connecting said elements adapted to hold the same in position, and an air-tight member within said matrix.

8. In a resilient ball, a plurality of strengthening elements arranged to form a hollow matrix of suitable form, in combination with means connecting said elements, adapted to hold the same in position and adapted to cooperate with said elements to form an air-tight space within the matrix.

9. In a resilient ball, a cover comprising a plurality of sections, seams connecting said sections at their margins, and an air-tight member within said cover, in combination with means extending across said seams and sections, adapted to limit the expansibility of said member, comprising a plurality of strengthening elements arranged to form a hollow matrix of suitable form

to enclose said member, in combination with means connecting said elements adapted to hold the same in position.

10. In a resilient ball, a cover comprising a plurality of sections, seams connecting said sections at their margins, in combination with flexible means adapted to limit the stress upon said seams, comprising a plurality of strengthening members arranged to form a hollow matrix of suitable form to snugly fit within said cover and means, connecting said elements adapted to hold the same in position.

11. In a resilient ball, a cover comprising a plurality of sections and an air-tight member formed to fit within said cover in combination with means formed to fit within said cover and enclose said member; said means cooperating with the adjacent surfaces of said cover and said member, and permanently attached to each.

12. In a resilient ball, a cover comprising a plurality of sections and an air-tight member formed to fit within said cover in combination with means positioned between said cover and said member, permanently attached to each and connecting the sections of said cover and said air-tight member.

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