P. H. SCHNEIDER.

BALL.

APPLICATION FILED SEPT. 27, 1909.

1,109,183. Patented Sept. 1, 1914.

Fig. 1.

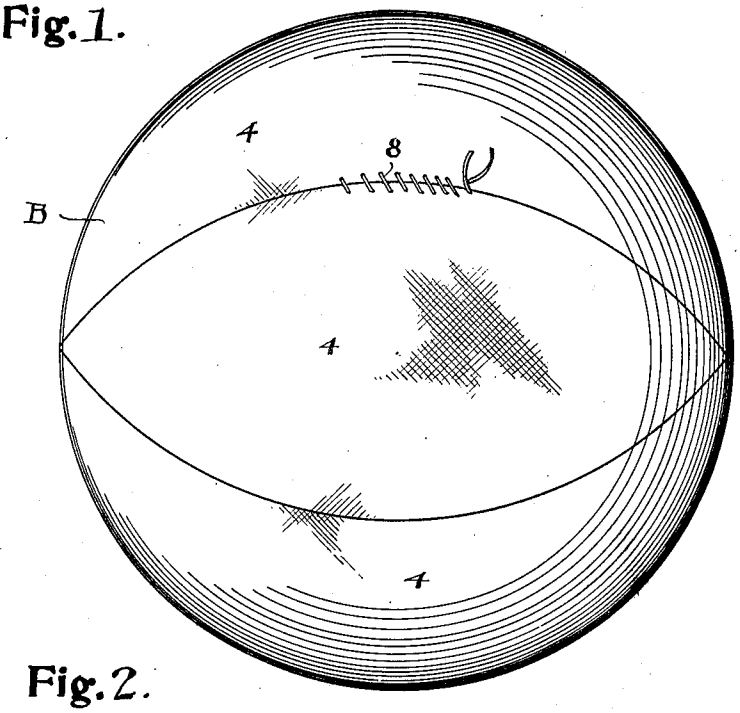


Fig. 2.

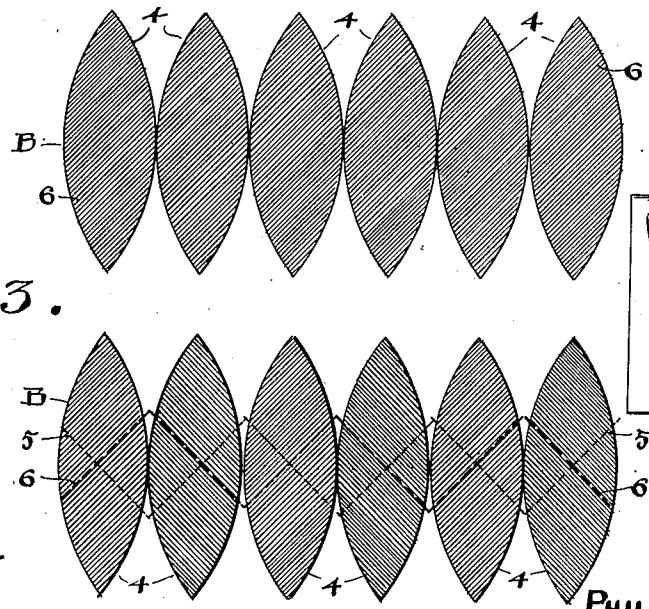


Fig. 4.

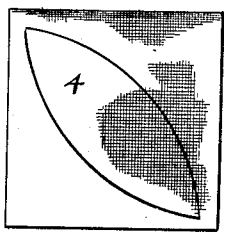


Fig. 3.

ATTEST

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BALL.

1,109,183. Specification of Letters Patent. Patented Sept. 1, 1914.

Application filed September 27, 1909. Serial No. 519,712.

To all whom it may concern:

Be it known that I, PHILIP H. SCHNEIDER, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Balls, of which the following is a specification.

My invention relates to a new and original improvement in balls and covers therefor, and the invention consists in providing a ball or other object capable of being inflated or otherwise distended with a cover of woven fabric adapted to symmetrically form and shape the ball as well as to strengthen the same. In the present case the invention is developed in an inflatable ball of a perfectly spherical shape, and which probably best serves as a medium for illustrating the nature and scope of the invention. As thus illustrated, the ball comprises two separate and independent original members united or brought together in such manner as to constitute a single complete commercial article, and wherein the inner member resembles a common inflatable elastic bag capable of being distended and expanded when blown full of air, and the outer member resembles a cover or jacket having a fixed size and shape to positively and symmetrically define the size and shape of the inner member, substantially as shown and described and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation of the ball or sphere expanded and showing the lacing in one of its seams where an opening is provided to insert a filling or inflatable ball. Fig. 2 is a diagrammatic view of the cover sections showing say the lines of the warp threads in respect to the curved edges of the leaves or sections, and Fig. 3 shows the same series of sections or leaves and warp lines with alternate sections diagrammatically arranged as if finally united and as they appear on the ball. Fig. 4 shows a section outlined in its relative cutting position to a piece of cloth.

Now, considering the invention more closely as to details, the outer member or cover B is formed with or from a series of six equal sections or leaves 4 of substantially elliptical shape and constituting a perfect sphere in outline when sewed together along their edges and distended by the inflation of the rubber bag within.

Of course I am aware that merely making covers for balls and the like with elliptical portions is not new, because leather, felt and other covers for balls have long been made in this way, but this is not all that I do nor does it approach the essence of my invention so far as the cover alone is concerned. In the first place my cover or jacket is made exclusively from a suitable woven fabric, as a good quality of silk or cotton, and the secret of its novelty and value lies in the manner of cutting the sections 4 therefrom and in the manner of uniting them together to prevent twisting or torsional effects so as to obtain a cover which will be absolutely uniform in its resistance on all lines of tension or strain. Now, in a cover of this kind not only uniform tension on all lines about the ball is desirable but it is desirable also that the fabric should be so disposed as to every portion of the ball that whatever yield it may have shall be uniform over all parts of the ball and that there should be no sag or surplus anywhere. To these ends the first necessary step is to properly lay out the goods from which the sections 4 are cut, and these preferably are in alternate contrasting colors, say white and blue, red and black, white and red and the like, and the said goods are placed one upon the other alternately inverted, or laid face to face and back to back in the pile until the desired depth of pieces for cutting be obtained. Then the dies or cutters are brought into position and set at an angle of inclination to the warp or woof lines of the goods of forty five degrees, see Fig. 4. This brings the said lines diagonally across the said sections or leaves as compared with their length and relatively as shown by dotted lines 5 and 6 in Fig. 3.

It is common knowledge that closely woven fabrics have their greatest yield or stretch at an angle to their warp and woof threads and have only a very slight stretch or yield on the direct lines of their warp and woof threads, and that the stretch of the warp threads vary from that of the woof. This variation of yield in a textile fabric makes it quite impractical for use as a cover for balls, especially rubber or other elastic balls, unless the lines of stress on the respective warp and woof threads are equalized about the entire circumference of the ball. Otherwise, the ball will become twisted or distorted and not symmetrical, or a

perfect sphere, and be weaker in some places than in others and therefore more liable to burst or open at the seams. Hence, the value of cutting the leaves or sections 4 as herein set forth and joining the same so that the warp threads in one section will unite with the warp threads in the adjoining sections at a correspondingly diverging angle as shown in the drawings and so on from section to section latitudinally about the ball, or so that like threads in adjoining sections will unite on direct lines diagonally of the axis of the ball. The woof threads usually cross the warp threads at right angles in any fabric, and it necessarily follows that when sections 4 are cut diagonally and alternately inverted as described the same angular relation is sustained between like woof threads as between like warp threads in the different sections, say as shown by the light and dark diagrammatic lines 5 and 6 respectively in Fig. 3. In these views the light lines may be regarded as showing a woof thread, and the dark lines a warp thread. Now this peculiarity may be noted that whereas the respective threads of adjoining sections are disposed at approximately right angles at the equatorial line of the ball, see Fig. 3, a change takes place at the poles, said threads assuming more acute angles relatively to one another in adjoining sections at the poles. But nevertheless, the same continuity of like threads from section to section in an irregular line occurs on all latitudinal lines of the ball, thereby equalizing the tensile strains on the threads of the cover entirely about the circumference from pole to pole. The greater yield in sections 4 on the longitudinal lines of the ball is also taken advantage of by this arrangement of sections one to another to make a perfect sphere. In other words if no give or yield was had on direct lines between the pointed ends of each section 4, the ball would be more or less flattened or inwardly curved between the seams of each section. However, this is impossible with my arrangement because the said sections are cut diagonally of the run of the warp and woof threads to obtain the greatest line of yield in the fabric on the central longitudinal line of each section to meet this very contingency. The meeting edges of the sections are also necessarily cut and joined on a bias with my improved plan and therefore the seams are the strongest possible that can be made.

From the foregoing it will also be apparent that the rubber bulb, the weakest member of the combination, is not only protected by the cover but is given the actual strength and power of resistance and symmetrical shape of the cover. As an example of the strength of both said parts, a ball of say four inches diameter will really sustain a dead weight of two hundred pounds and not collapse, and other sizes of balls are proportionally strong.

In making up and assembling the parts, the cover is finished as shown except that a portion of one of the several seams is left unstitched and provided with lacing 8.

Manifestly a perfectly spherical shape is not necessary to work out the principles of the invention nor is it necessary that the invention should be an inflatable ball, the essential idea in any case being to dispose the threads of the fabric diagonally to the longitudinal and latitudinal lines of the ball in order to get uniformity of tension and yield and fixed and equalized resistance. Cutting of the sections when alternately inverted simplifies the assembling and sewing of the sections together, but I do not wish to limit myself to this particular method of operation. Thus, I may cut all the sections on diagonal lines to the warp and woof, back to back and face to face, or singly or otherwise, and then sew the sections together with the same sides outward, or I may invert each alternate section to present alternate backs and faces of the goods and sew them together in this relation. Either method is practicable and within the scope of my invention, as in either case the threads will run diagonally about the ball in respect to the longitudinal and latitudinal lines thereof.

What I claim is:

In the manufacture of balls and other objects, a cover consisting of a plurality of uniform sections cut from a woven fabric into elliptical shape at an inclination approximately forty-five degrees to the warp and woof thereof and sewed together along their edges, the alternate sections being arranged with their respective warp threads at reverse inclinations latitudinally of the ball and alternately inverted as to their sides, whereby the same angular relation is sustained between like woof threads as between like warp threads, as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

PHILIP H. SCHNEIDER.

Witnesses:

E. M. FISHER,

F. C. MUSSUN.