A. E. RHOADES.

CYLINDRICAL BALL OF YARN.

APPLICATION FILED DEC. 6, 1909.

954,344. Patented Apr. 5, 1910.

Fig. 1.

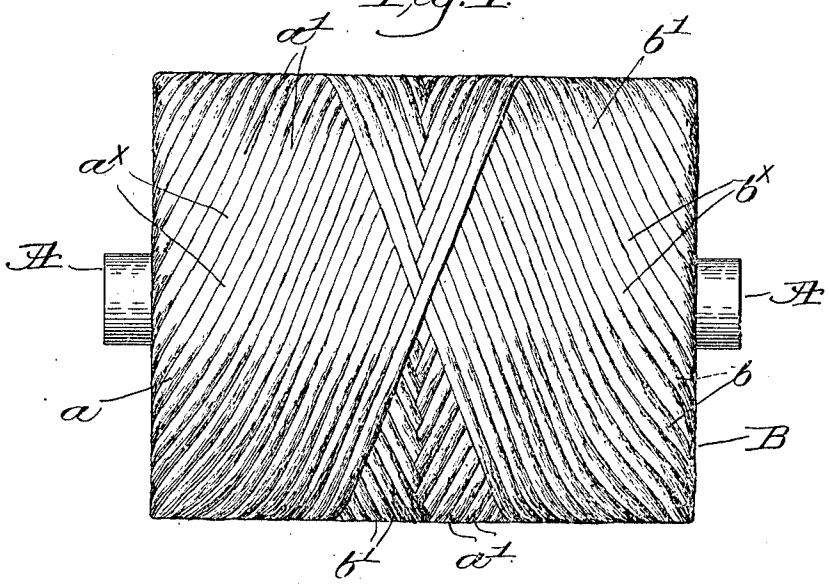
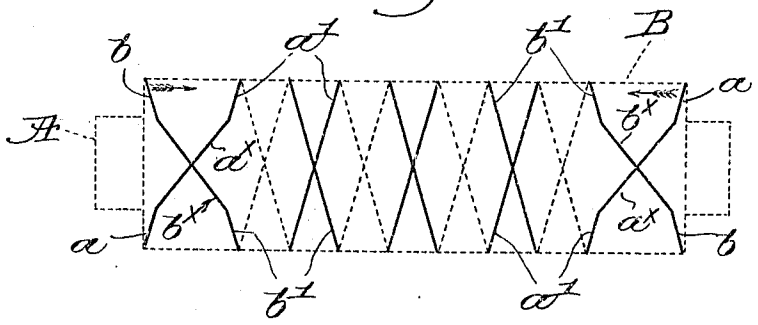


Fig. 2.



Witnesses,
Edward F. Allen.
Joseph M. Ward.

Inventor,
Alonzo E. Rhoades,
by Crosby Gregory,
Attys.

UNITED STATES PATENT OFFICE.

ALONZO E. RHOADES, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

CYLINDRICAL BALL OF YARN.

954,344. Specification of Letters Patent. Patented Apr. 5, 1910.

Application filed December 6, 1909. Serial No. 531,482.

To all whom it may concern:

Be it known that I, ALONZO E. RHOADES, a citizen of the United States, and resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Cylindrical Balls of Yarn, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention has for its object the production of a novel ball composed in the present instance of yarns or threads gathered together into a loose or untwisted chain or rope and laid in spiral coils in a peculiar manner, to form a cylindrical mass having flat, parallel ends, the spiral coils having each a deflection or bend therein near the ends of the ball to securely and firmly bind the yarns thereat and thereby obviate bulging of the ends of the ball.

In the manufacture of yarn balls the chain or rope of yarns is led through a traversing guide-eye and laid upon a roll or beam helically from end to end of the ball, and in some forms of balling apparatus a quick reversal of the guide-eye is provided, to avoid an undue accumulation of the yarns at the ends of the ball, as such accumulation thereat would result in a ball of greater diameter at its ends than in the middle. While this quick reverse of the spirally laid coil has obviated the undesirable accumulation of yarn at the ends of the ball the latter still has an objectionable tendency to bulge or swell outward at its ends, particularly near the core or center, apparently due to the fact that the yarn is not as securely and firmly bound in at the ends of the ball as it should be, resulting in some softness in the yarn mass and permitting the bulging referred to. In my studies and experiments to overcome such bulging at the ends of the ball, which trouble is intensified by the soft and loose structure of the chain or rope of yarns, I have discovered that by binding in the yarn chain adjacent the ends of the ball more securely and firmly the bulging can be overcome, and such secure and firm binding in is effected by making a slight bend or deflection in each of the spiral coils of each layer near the ends of the ball, the point where each spiral coil is reversed being beyond such deflection or bend. The deflections or bends in the spiral coils of one layer cross the deflectors or bends in the oppositely laid coils of the layer beneath, and while such construction of the ball binds the yarn mass tightly and firmly at the ends of the ball it also appears to compact the yarn, for there is no improper accumulation of yarn at or near the ends of the ball, and its desired cylindrical contour is maintained. As each spiral coil has a uniform pitch between the two deflections or bends therein, and the points at which the winding of the coil is reversed there would naturally be a tendency to accumulate the yarn between such points of reversal and the deflections, but as no such accumulation results in actual practice I am constrained to believe the correctness of the before-mentioned theory, viz:—that the deflections or bends compact or compress the yarn mass, and thus counteract the tendency to accumulation.

Whether or not my conclusions are correct the fact remains that a ball constructed in accordance with my present invention is of uniform diameter throughout, it has flat ends which do not bulge or squeeze out, and the shape of the ball is maintained indefinitely.

Figure 1 is a view in side elevation of a yarn ball embodying my present invention; Fig. 2 is a detail showing clearly the crossed deflections or bends in the spiral coils of two successive layers, the under coil being laid in one direction relatively to the axis of the ball, and the upper coil in the opposite direction, the ball being indicated by dotted lines and showing the coils near the center or core.

In practice a ball is wound upon a roll, beam or spindle which is rotated as the yarn is led thereto and traversed from end to end of the roll, and under ordinary circumstances the winding operation or formation of the ball will be performed by appropriate mechanism, forming no part of this invention. It may be stated, however, that in order to lay the spiral coils in each layer the traversing guide or trumpet common to balling machines will be so actuated or controlled that its normal speed is varied momentarily just before and just after each reversal of movement thereof, such variation being preferably an increase of speed.

In Fig. 2, which is in large measure diagrammatic, the cylindrical outline of the ball is indicated by dotted lines at B, and the roll or beam on which the ball is wound is shown at A, and referring to the outermost spiral coil of yarn, in full lines, it will be seen that said coil—which is laid by a traverse from right to left—has portions a, a of uniform pitch at the ends of the layer in which it lies, and a portion a' of the same uniform pitch throughout the greater part of the length of the layer, and intervening portions $a^{\times}$ of an increased pitch. These portions $a^{\times}$ of increased pitch form deflections or bends in the coil, as will be manifest, and it will be seen that such coil is reversed in the winding beyond each of the deflections or bends.

From what has been said hereinbefore it will now be clear that on the traversing movement of the guide for the coil of yarn, beginning at the right, the initial movement at uniform speed imparts the portion a of the spiral of uniform pitch, and then the momentary increase in the speed of the guide results in the deflection or bend $a^{\times}$ having an increased pitch. Thereafter the speed of the guide is uniform and the pitch of the portion a' of the spiral coil is uniform, then the bend or deflection $a^{\times}$ at the left, Fig. 2, is due to the momentary increase in the speed of the guide, followed by the uniform pitch portion a of the spiral when the guide is again moving at its normal speed. Taking the reverse spiral coil in what will be considered the under layer, which of course is the one previously laid, the uniform pitch end portions are shown at b, b, the long intervening portion of uniform pitch at b', and the deflections or bends of increased pitch are shown at $b^{\times}$.

It will be noted that the deflections $a^{\times}$ are opposite in direction to and cross the deflections $b^{\times}$, such deflections or bends acting to bind or compact the yarn mass near the ends of the ball, layer by layer, as the winding progresses, so that in the completed ball the ends are flat and parallel, as shown in Fig. 1, and the character of the winding hereinbefore described maintains the ends flat and prevents any squeezing out or bulging thereat. As a result my improved ball is firm and compact, retains its cylindrical shape indefinitely, and unwinds easily and without troubles from tangling or falling together of the coils.

In Fig. 1 the completed ball is shown, and as the coils of the outer layer are closely laid up the bends or deflections thereon are seen, but not so clearly as in Fig. 2, because as the ball increases in diameter the deflections do not show so plainly as they do nearer the core, while the deflections of the layer beneath are hidden altogether, but said Fig. 1 gives a very clear illustration of the external appearance and cylindrical shape of the completed ball.

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

1. A cylindrical ball of yarn consisting of successive superimposed layers extending from end to end of the ball and in each of which the spiral coils of yarn have portions of uniform pitch at the ends and throughout the major part of the layer and intervening portions of a different pitch to form thereat binding deflections or bends in the coils near the ends of the ball.

2. A cylindrical ball of yarn consisting of successive superimposed layers extending from end to end of the ball and in each of which the spiral coils of yarn have portions of uniform pitch at the ends and throughout the major part of the layer and intervening portions of an increased pitch to form thereat binding deflections or bends in the coils near the ends of the ball, such deflections in the coils of one layer crossing the deflections in the coils of the layer beneath.

3. A cylindrical ball of yarn in which the chain of yarns is coiled spirally in successive layers each of which extends to the end of the ball and in which the point where each spiral coil of the chain is reversed is beyond a short deflection or bend therein which interrupts the uniform pitch of the spiral near the end of the ball and serves to bind the yarn mass thereat and maintain flat the end of the ball.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ALONZO E. RHOADES.

Witnesses:
G. L. Bell,
E. D. Osgood.