(No Model.)

C. P. MITCHELL.

TWINE BALL.

No. 408,842. Patented Aug. 13, 1889.

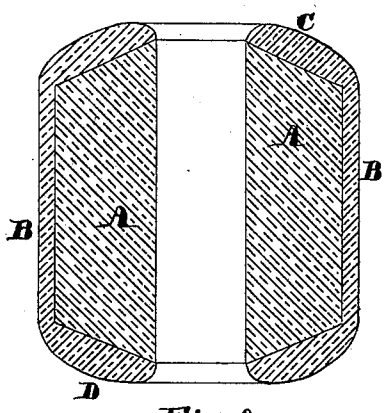


Fig. 4.

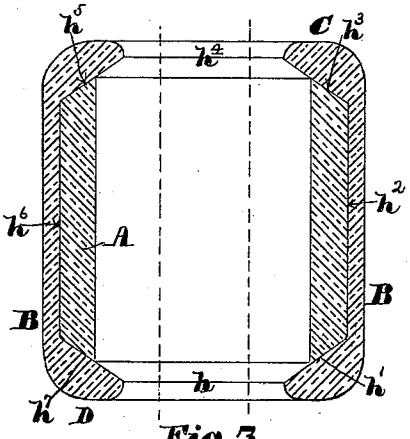


Fig. 3.

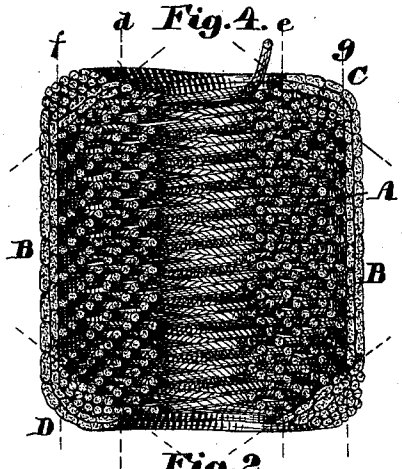


Fig. 2.

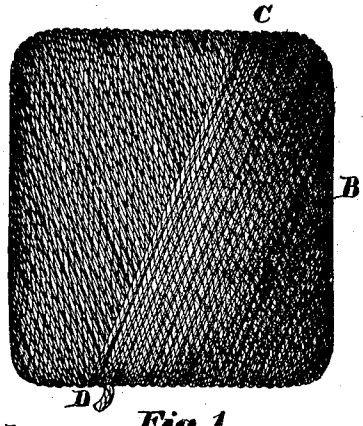


Fig. 1.

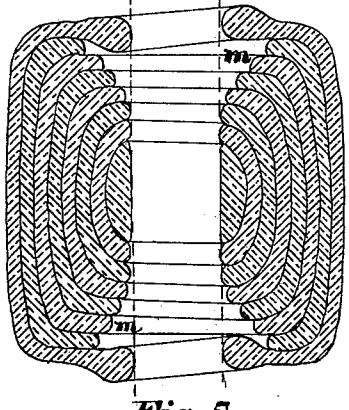


Fig. 5.

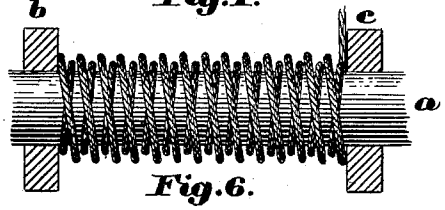


Fig. 6.

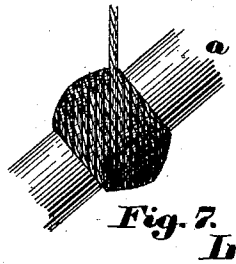


Fig. 7.

Witnesses:

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Inventor:

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by N. P. Lombard

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UNITED STATES PATENT OFFICE.

CHARLES P. MITCHELL, OF BOSTON, MASSACHUSETTS.

TWINE BALL.

SPECIFICATION forming part of Letters Patent No. 408,842, dated August 13, 1889.

Application filed April 17, 1889. Serial No. 307,528. (No model.)

To all whom it may concern:

Be it known that I, CHARLES P. MITCHELL, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Twine Balls, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to balls of twine or other fibrous material, and has for its object the production of balls of twine and other like material that shall contain an increased length of material for a given size of ball as compared with the balls now in general use, and that can be unwound from the inside without getting entangled.

The nature of my invention will be readily understood by reference to the description of the drawings, and to the claims to be hereinafter given, and in which my invention is clearly pointed out.

Figure 1 of the drawings is an elevation of a ball of twine embodying my invention. Fig. 2 is a longitudinal section of the same. Fig. 3 is a longitudinal section of same in outline after a portion of the twine has been drawn from the center. Fig. 4 is a longitudinal section of a slightly-modified form of ball, but embodying the same principles. Fig. 5 is a longitudinal section of a ball wound as now generally practiced. Fig. 6 illustrates the manner of winding the central portion or main body of my ball; and Fig. 7 illustrates the manner of winding the balls as now generally practiced, and shown in Fig. 5.

In the drawings, A is the main body of my improved ball, which is formed by winding the twine or cord spirally around a spindle *a* in successive layers, the threads in one layer crossing the threads in the next previous layer at acute angles, as shown in Fig. 6.

The coils of each layer may be wound close or open, as may be desired, and in winding the main body of the ball of the shape shown in Fig. 4 I wind them quite close; but in winding a ball the main body of which has a shape as shown in Figs. 2 and 3 I prefer to wind the layers to build the cylinder up to the diameter of the collars *b c* somewhat more open, so that the coils of one layer shall cross the coils of another layer at a sufficient angle to bind the end coils and prevent their being displaced. In the drawings the coils are shown more open than necessary, in order to more clearly illustrate the same.

In winding the main body of my improved ball the spindle *a* is revolved about its axis at the desired speed, and the twine or cord is guided thereto by a carrier-arm, which is made to traverse back and forth through a given length of stroke, the speed of said traverse relative to the revolutions of the spindle being regulated according to the pitch that it is desired to give to the spiral or the degree of closeness that the twine is to be wound.

In order to wind the ball shown in Fig. 2, I propose to use upon the spindle *a* two collars *b c* at a distance apart equal to the length of the ball less the thickness of the outside covering at each end, and the twine-guide has a traverse given to it at each stroke equal to the distance between said collars less the diameter of the twine or cord being wound until a cylinder of twine is formed having a diameter equal to the diameters of said collars and to the distance between the dotted lines *d e* on Fig. 2, after which the traverse of the twine or cord guide or carrier is diminished slightly at each stroke until the cylinder of twine has increased to a diameter equal to the distance between the dotted lines *f g* on Fig. 2, when the ball or package will have an outline corresponding in size and shape to the figure bounded by the lines h, h', h^2, h^3, h^4, h^5, h^6, and h^7 in Fig. 3, the ends of the ball being in the form of frustums of cones. The outer covering B is then applied by winding the twine or cord obliquely from corner to corner, as from C to D, (see Figs. 2 and 3,) the ball being slowly rotated about the axis of its spindle, so as to lay each successive coil of the twine or cord close to the preceding one, as shown in Fig. 1.

In some cases I dispense with the collars on the spindle and vary the traverse of the twine guide or carrier at each layer after the first, so that the main body of the ball before the outer or finishing cover is applied thereto shall present conical ends the bevel of which commences at the spindle, as shown in Fig. 4, and then apply the finished layers or covering, as before described.

Heretofore balls of twine and other like ma-

terial have been wound around the spindle in planes oblique to the axis of said spindle, as illustrated in Fig. 7, and continuing to wind layer after layer in the same manner until the ball is finished, when it has a longitudinal section, as shown in Fig. 5, in which at each end is a chamber or cavity *m*, which is waste room, and very materially affects the quantity of twine or cord contained in a ball of a given size.

The cavities *m m* are a necessary consequence of winding the ball in the manner now practiced, for the reason that if the cavities were filled by allowing each layer to fill down to the spindle indicated by the dotted lines in Fig. 5 the piling up of the twine or cord near the spindle due to the crossing of the several coils over each other at that point would so elongate the ball in the direction of the length of the spindle as to make it of an undesirable shape.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A ball of twine or other like material made up of a series of cylindrical layers of varying lengths, the outer of which are of less length than the inner ones and all wound spirally, and an outer or finishing covering of one or two layers wound about said cylindrical body in planes oblique to the axis of said cylinder.

2. A ball of twine or other like material the main body of which is in the form of a cylinder having frusto-conical ends, and having a finishing layer or covering wound in planes oblique to the axis of said cylinder and inclosing said frusto-conical ends, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 15th day of April, A. D. 1889.

CHARLES P. MITCHELL.

Witnesses:
N. C. LOMBARD,
WALTER E. LOMBARD.