April 3, 1956 E. A. SILVER 2,740,185

KNOT

Filed Oct. 28, 1952

FIG. 1

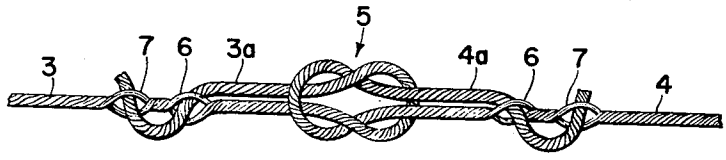
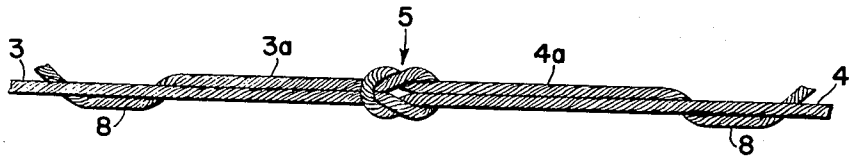


FIG. 2



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United States Patent Office

2,740,185

Patented Apr. 3, 1956

2,740,185

KNOT

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Application October 28, 1952, Serial No. 317,268

2 Claims. (Cl. 28—78)

This invention relates to an improved union or connection between portions of a flexible strand of fibrous material such as twine, cord, rope, or the like.

In a great variety of circumstances, where it is necessary to unite the ends of twine or cord portions or the like by tying same together, and more specifically in the case of bale ties for which the present invention is particularly adapted, it is important that the breaking strength of the knot or union approaches as closely as possible the breaking strength of the strand itself to the end that economical utilization may be made of the flexible strand material.

With this in mind it is the primary object of the instant invention to provide a connection or union having a considerably increased strength proportionate to the strength of the twine or other flexible strand portions which it serves to unite.

The best mode contemplated by me for carrying out my invention, is illustrated in the accompanying drawings in which:

Figure 1 illustrates a plan view showing two portions or sections of baler twine united in accordance with the preferred embodiment of the invention, the knot or union being shown in loose condition before tension is placed on the united strand portions to draw the knot tight; and

Figure 2, a view similar to Figure 1 showing the knot after tension has been placed on the united strands or strand portions.

Referring now in detail to the accompanying drawings, I have shown two sections or portions 3 and 4 respectively of a flexible fibrous strand such as twine, cord or the like. Each portion of the strand comprises a plurality of fibers twisted together in conventional manner. In the preferred usage of the invention these portions 3 and 4 will comprise the opposite end portions of a length of twine which will be disposed about a bale of hay, straw or the like to function as a bale tie.

These portions are connected by a knot 5 of the type which leaves reversely directed bitter ends 3*a*—4*a* respectively of said portions projecting from the knot along side of the portions 3—4.

I prefer to employ a conventional square knot as shown, as this is the strongest knot known to me of the type above mentioned, and when used with my invention results in a connection of superior strength. However, other knots of the same general class or type may be used successfully with the invention, in which case the tensile strength of the resulting connection will be significantly increased over that of the knot itself.

After the square knot 5 is loosely formed, as shown in Figure 1, each of the bitter ends 3*a*, 4*a* respectively is spliced one or more times through the adjoining main strand or section of its respective portion 3 or 4. In the drawings each such bitter end is spliced twice at relatively spaced points through its respective main strand,

each splice being formed in usual manner by spreading apart the fibers of the main strand to form spaced eyelets 6 and 7, through which the bitter end is inserted, same being inserted first through the eyelet 6 adjacent the knot 5 and then reversely through the more remote eyelet 7.

Before applying tension to the main portions or sections 3 and 4 to draw the square knot 5 tight, it is desirable to first pull the bitter ends 3*a*, 4*a*, as far as possible through the eyelets 7 to straighten out the bowed portions 8, shown in Figure 1, and thus remove the slack from the splices. Thereafter when tension is exerted on the strand portions 3 and 4 to tighten up the knot 5, the knot and its associated splices will assume the appearance substantially as shown in Figure 2.

Such placing of tension on the strands or portions 3 and 4 will tend to constrict the eyelets 6 and 7 about their respective bitter end portions 3*a* and 4*a* to frictionally resist withdrawal movement of same and consequent sliding of twine within the knot 5. It is believed that the reduction of the sliding of twine within the knot 5 is responsible in large part for the increased tensile strength of the connection of the instant invention, as it has been found that the sliding of the parts of a knot relative to each other will tend to wear away and successively break the outer fibers of the strands, thus locally weakening the strands and causing eventual failure within the knot.

It has been found by actual experience that where a square knot is used to connect strands of conventional bale twine, the tensile strength of the knot may be expected to average roughly around 50 per cent that of the twine itself. Where the bitter ends of the twine forming the knot are spliced once through the adjoining main strands, as at the parts designated 6 in the drawing, the strength of the resulting connection is appreciably increased, often approaching 60 per cent of the twine strength. And where the bitter ends are spliced twice through the adjoining twine strands, as in the preferred embodiment, a somewhat disproportionate and striking increase in tensile strength of the connection may be expected, the resulting connection often having from seventy to eighty per cent of the tensile strength of the twine.

Prior to my invention it will be apparent from the foregoing that only a small proportion of the tensile strength of twine, cord, or the like has been utilized where portions of the twine were connected by knots, inasmuch as the knots employed had a tensile strength which was only a relatively small proportion of that of the twine itself. By increasing the proportionate strength of the connection or knot to a very appreciable and significant extent, my invention makes possible the more economical and efficient employment of the twine or other flexible strand material.

Having thus described my invention I claim:

1. In a pair of flexible strands united by a square knot and wherein each of said strands includes substantially parallel sections extending from said knot, the improvement wherein one of said sections of each said strand is spliced through the other section thereof to form a closed loop.

2. In a pair of flexible strands united by a square knot and wherein each of said strands includes substantially parallel sections extending from said knot, the improvement wherein one of said sections of each said strand is spliced a plurality of times through the other section thereof to form a closed loop.

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