

Nov. 27, 1923.

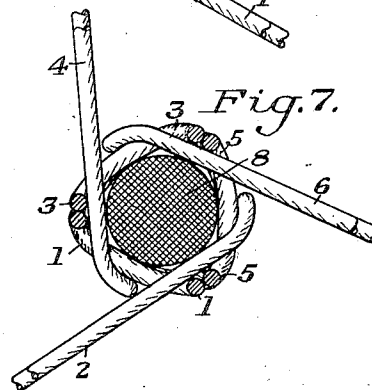
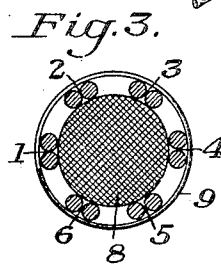
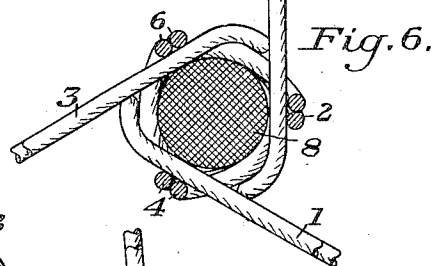
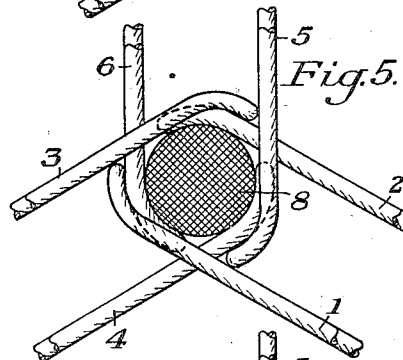
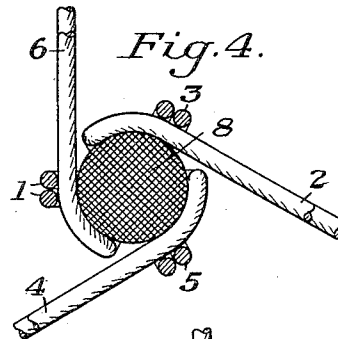
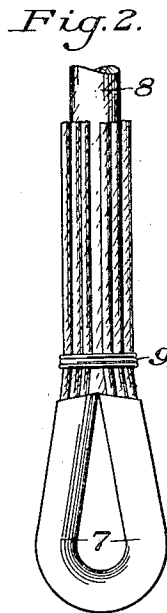
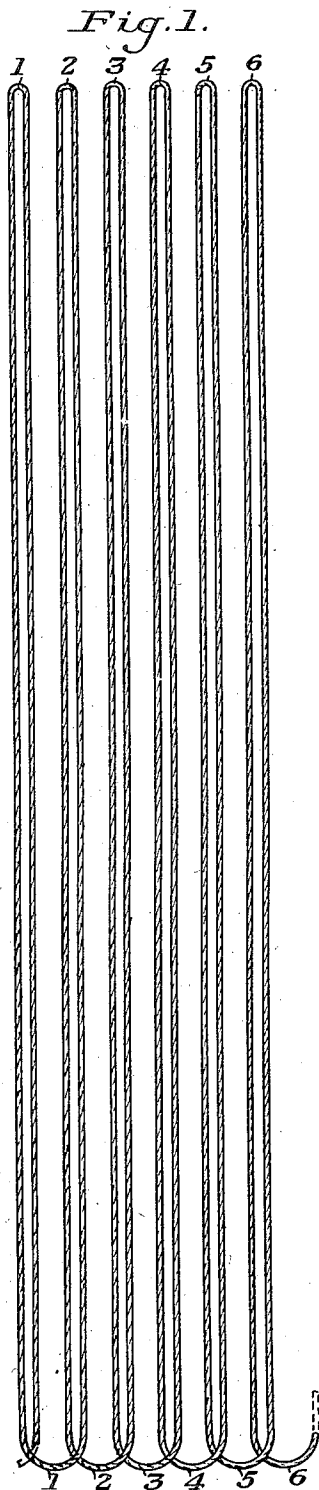
1,475,859

C. NYMAN

PLAITED CABLE SLING

Filed Sept. 1, 1922

3 Sheets-Sheet 1



INVENTOR

Charles Nyman
by his attorney
Byrnes, Stubbins & Pomeroy

Nov. 27, 1923

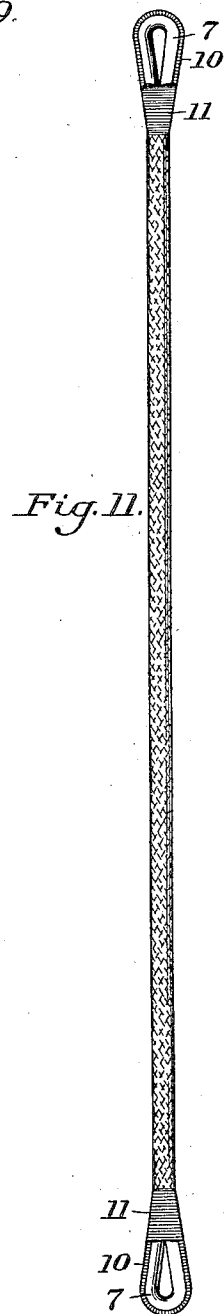
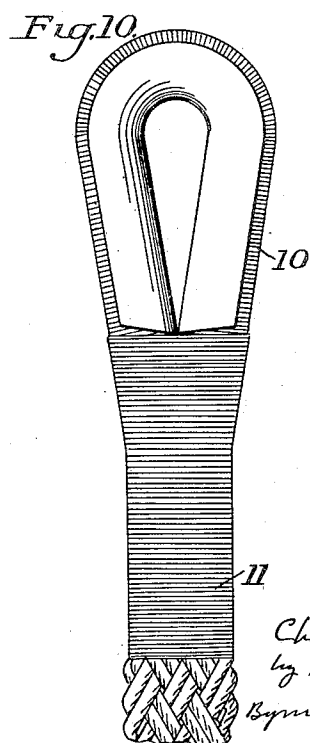
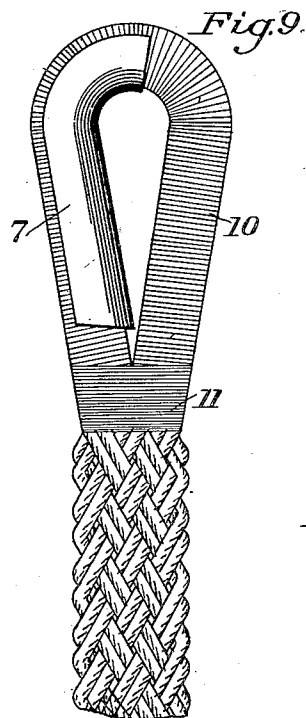
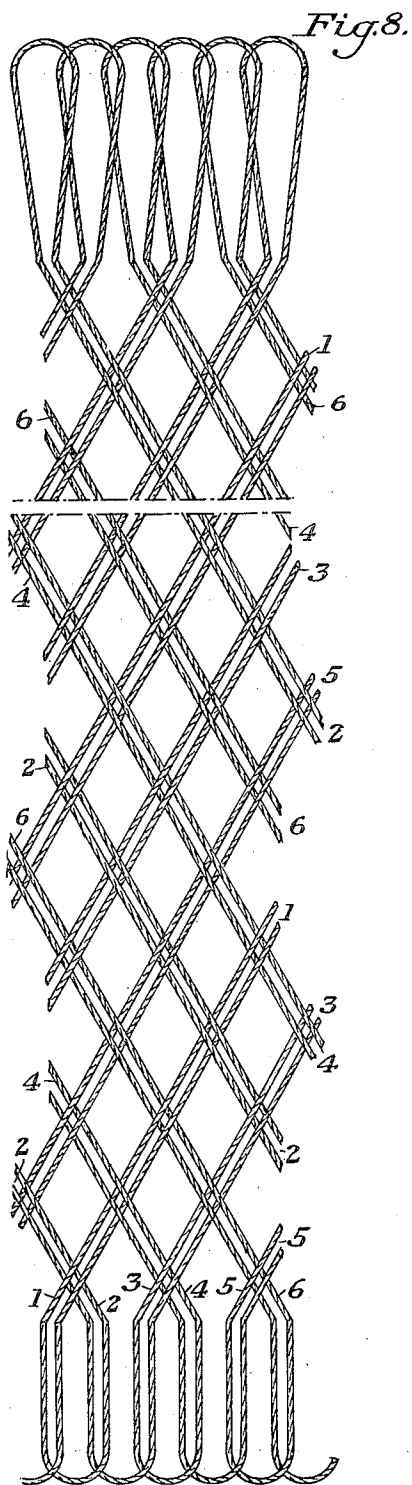
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C. NYMAN

PLAITED CABLE SLING

Filed Sept. 1, 1922

3 Sheets-Sheet 2



INVENTOR

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Nov. 27, 1923

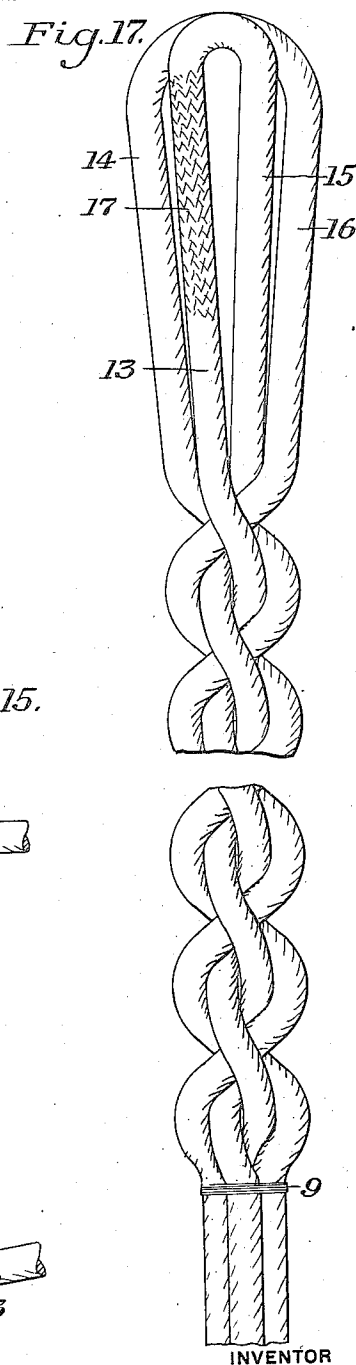
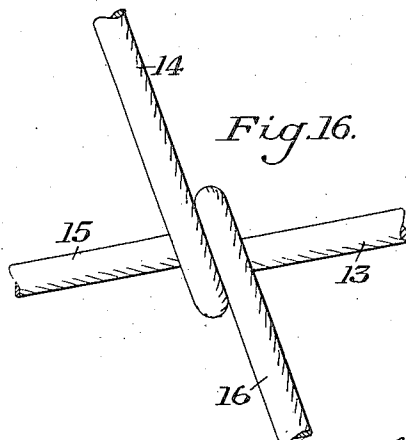
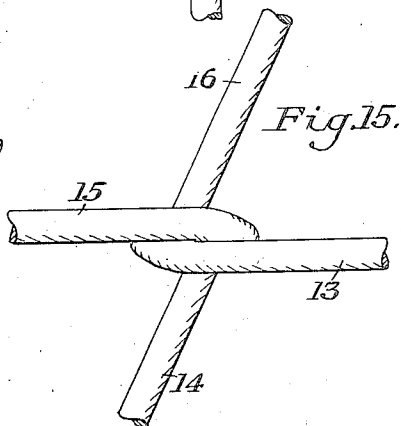
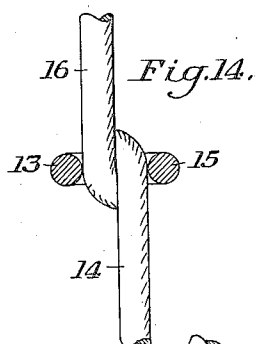
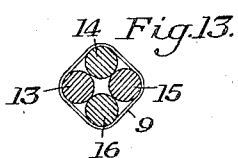
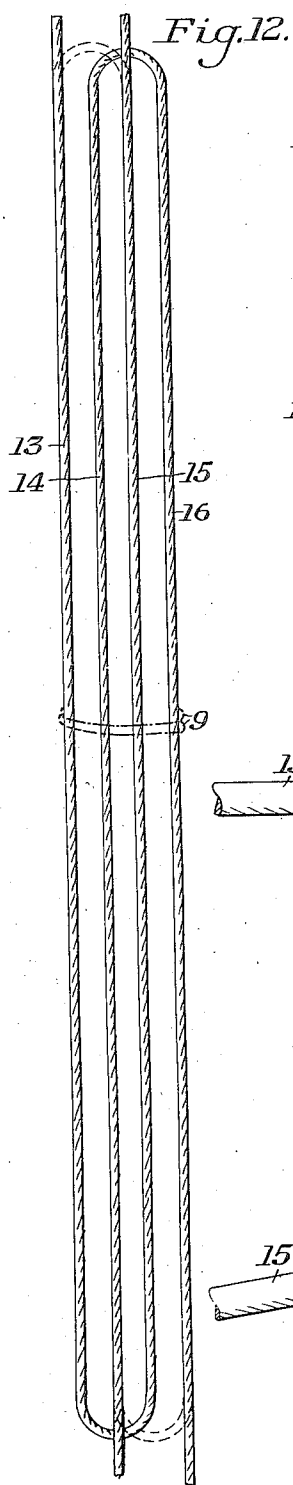
1,475,859

C. NYMAN

PLAITED CABLE SLING

Filed Sept. 1, 1922

3 Sheets-Sheet 3



INVENTOR

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UNITED STATES PATENT OFFICE.

CHARLES NYMAN, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO
DONALD MURRAY, OF WILKINSBURG, PENNSYLVANIA.

PLAITED CABLE SLING.

Application filed September 1, 1922. Serial No. 585,824.

To all whom it may concern:

Be it known that I, CHARLES NYMAN, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Plaited Cable Slings, of which the following is a full, clear, and exact description.

This invention relates to slings, such as are used, for example, in handling structural steel by cranes.

In handling structural steel members, bundles of pipe and articles of a similar nature, slings are commonly employed. These slings comprise a cable-like body portion of sufficient length and tensile strength to accommodate the load and have at each end an eye for engaging the crane hook. In use, the sling is placed around the article to be raised and the eyes are put over the crane hook. Sometimes shackles are carried by one or both eyes.

Slings are generally made in a number of sizes for handling different weights of material, since they must be as flexible as possible to facilitate their use. The slings are in constant use around manufacturing plants and on buildings in process of erection, and suffer considerable wear and abuse. They are frequently subjected to excessive strains, since a light sling will generally be used in preference to a heavier one on account of its greater flexibility.

Slings of chain have been found dangerous in use because of the liability of a link to suddenly break.

Ordinary slings made of twisted cable have been found objectionable in use on account of their tendency to twist upon themselves. If a sling made of twisted cable is stretched by a heavy load and allowed to hang doubled, as is the case when it hangs idle with both eyes over the crane hook, it will twist upon itself instead of hanging free and open as is desired.

Twisted slings have also been found objectionable because when they wear, the small strands of wire of which they are composed are likely to break and untwist. This results in a rough sling that is likely to cut or tear the hands of the workmen when it is being used.

My invention provides a sling that is plaited instead of being twisted and is

therefore free from any tendency to twist upon itself. Moreover, if a wire strand parts, it can only unravel a very short distance before a crossing strand prevents further loosening.

By using a plaited construction I am enabled to utilize a core or body, such as a hemp cable, of considerable diameter. This core forms a pad for the strands and minimizes cutting and chafing. It also gives more body to the sling, making it easier to manipulate.

The forming of eyes in the ends of the sling is generally accomplished by splicing. These splices are hard to make, are not always dependable, and make bulky and unsightly ends on the sling. I have found it possible to plait an entire sling from a single strand, which may be of small cable. It is therefore necessary to splice only the two ends of this elementary strand, the eyes being formed from loops left at the ends of the sling during the plaiting. In this way, the objectionable splices are eliminated.

In the accompanying drawings, illustrating the preferred embodiment of this invention:

Figures 1 to 7 illustrate diagrammatically my preferred manner of making a sling;

Figure 8 is a diagrammatic view of the plait used in making a sling;

Figure 9 is a view, partly broken away, showing the manner of forming an eye in the end of the sling;

Figure 10 shows the finished eye;

Figure 11 is a view of a sling made according to my invention;

Figures 12 to 16 illustrate diagrammatically the manner of making a sling according to my invention when no rope core is used; and

Figure 17 is a view of a partially plaited sling when plaited as shown in Figures 12 to 16.

In the preferred form of my invention, a single elementary strand of suitable length has its ends spliced together to form an endless strand which is formed into an even number of loops as shown in Figure 1. This elementary strand may, if desired, be formed of two or more pieces spliced at their ends into an endless strand. For purposes of illustration, a sling formed from

six loops is shown, and the loops or doubled strands are numbered consecutively 1 to 6. There may be any even number of loops, and the strength of its sling may be varied either by using more loops or a larger size cable. The loops are formed a little longer than the finished sling, since they are shortened somewhat by the plaiting.

The flexible elementary strand from which the loops are formed may be a single wire or cord, but is preferably a small cable, since this gives greater flexibility. The two ends of the strand are spliced together, leaving six loops at each end. The splice is not necessarily at a loop, as shown in Figure 1 by dotted lines, but may be made anywhere in the doubled strands if it is desired to keep the splice away from the eye of the sling.

After the doubled strands are formed, the loops at one end are gathered together over a thimble 7 and the strands are evenly spaced around a core 8, which may be a hemp cable terminating adjacent the thimble 7. A seizing wire 9 temporarily holds the strands in their proper relationship, as shown in Figure 3.

In my preferred method of plaiting, alternate strands are worked in opposite directions, as shown diagrammatically in Figure 8, alternately passing over and under the strands they cross.

Figures 4 to 7 show the sling in section at various points during the plait. In Figure 4, strands 2, 4 and 6 are shown as having been rotated clockwise from their position in Figure 3, passing under strands 3, 5 and 1, respectively. In the next step of the plait, shown in Figure 5, strands 1, 3 and 5 are shown as having been rotated counter-clockwise under strands 4, 6 and 2, respectively. Figure 6 shows their relative positions after strands 2, 4 and 6 have been lifted above strands 1, 3 and 5 by the maker.

As shown in Figure 7, the even numbered strands, 2, 4 and 6 are again rotated clockwise, this time under strands 1, 3 and 5, respectively. The steps of rotating odd numbered strands counter-clockwise and even numbered strands clockwise, are alternated through the length of the sling. This gives in effect a plait such as shown in developed diagrammatic form in Figure 8, with six loops at each end.

It will be evident that if desired the seizing wire 9 may be placed around the double strands at their middle points, and the plaiting carried on in both directions to the end. In case a shackle link is to be carried by one eye of the sling, the elementary strand is threaded the requisite number of times through the shackle link to form the double loops before its ends are spliced together, and then the sling is plaited from end to end. In case no shackle

is employed, the plaiting may be started at the middle of the sling and progress toward each end, the loops at the ends of the double strands being then served with eyes when the ends of the sling are reached.

The rope center 8 may be of any desired size or may be omitted entirely.

The end loops are served with a fine wire 10, which binds them in a compact form and makes a single loop large enough to accommodate the thimble 7, which is re-inserted after the serving has been put on.

To hold the thimble in place, a second serving 11 is added. After both ends have been so treated, the cable may be dipped in oil or asphaltum compound to prevent rust.

It will be understood that my invention is not limited to the use of a single elementary strand.

Figure 12 illustrates two strands as they may be placed to form a sling. Here, the two elementary strands are doubled, as shown, to form four single strands 13, 14, 15 and 16. As mentioned above, the plaiting may start from the middle if desired. In this case, the seizing wire 9 is placed about the strands at about their middle point, and one end is plaited from the seizing wire. The wire is then removed and the plait is started from the middle toward the other end. This method is advantageous where a long sling is to be made, as the strands being handled are only half as long.

Figures 13 to 16 show the sling in section at various points during the plait. In Figure 13, the strands are shown in the position they occupy when fastened by the seizing wire 9. In Figure 14, strands 14 and 16 are shown as having been rotated clockwise from their position in Figure 13, passing under strands 15 and 13, respectively. Figure 15 shows strands 13 and 15 as having been rotated counter-clockwise under the strands 14 and 16, respectively. The strands 14 and 16 are then rotated clockwise from their position in Figure 15, passing under strands 15 and 13, respectively. It will be apparent that this operation of rotating the even numbered strands clockwise and the odd numbered strands counter-clockwise, is the same as shown in the embodiment of Figures 1 to 11, inclusive, even though no rope core has been used.

It will be apparent that in order to make the plait shown in Figures 12 to 17, the ends of the elementary strand cannot be spliced until the plait has been completed. Figure 17 shows strands 13 and 15 as having been joined in a splice 17 to form a loop. This loop along with the loop of strands 14 and 16, is served with wire as before, to form an eye in the end of the sling.

It will be apparent that the splicing of the

strands 13 and 15 at one end of the sling, and corresponding splicing of strands 14 and 16 at the other end of the sling makes in effect a sling comprising two endless elementary strands. The importance of forming a sling from one or more elementary strands is not so much for the convenience of making the sling as in the strength and appearance of the finished sling, the only splices being in the elementary strands instead of in the body of the sling proper, as is the case with the twisted cable sling. It will be apparent that the entire strain of a sling under load is not carried by the splice.

The cable sling has all the strength of wire rope, and will not suddenly break like a chain. Individual wires will break and give warning of overload or weakening of the sling. The plaited sling is more flexible and has not the tendency to twist of a twisted wire cable. There are no splices of the plaited cable as a whole, so that weakened or bulgy places are obviated. The only splice or splices are formed in the endless elementary strand from which the cable is plaited. If such elementary strand is spliced at more than a single place, the splices may be arranged so as not to come at the same place in the completed cable.

While I have described one embodiment of my invention, it will be understood that this does not illustrate the limits of my invention, as changes may be made in the sling or in the manner of making it within the scope of the following claims.

I claim:

1. A plaited cable sling including an endless elementary strand plaited so as to form a sling, substantially as described.

2. A plaited cable sling comprising an endless elementary strand formed into double strands, and a flexible core, the double strands being plaited over the flexible core to form a sling, substantially as described.

3. A plaited cable sling comprising a cable-like body portion and eyes at the ends thereof, the body portion being plaited from an endless elementary strand, substantially as described.

4. A plaited cable sling having an eye at one end, the strands extending from the body of the sling around the eye and back to form the body, the number of strands immediately beyond the eye being substantially the same as at a point in the body remote from the eye, substantially as described.

5. A cable sling having an eye at one end formed of a plurality of plaited strands extending in a continuous manner back and forth through the body and around the eye, substantially as described.

6. A cable sling having a body and an eye at one end, said body being formed of two ply plaited strands, the eye being

formed of loops connecting the plies of the strands to each other, substantially as described.

7. A cable sling having a body and an eye at each end, said body being formed of plaited two ply strands, the plies of each strand being connected to each other at one end of the body by open loops which form the eyes, substantially as described.

8. A cable sling having a body and an eye at each end, said body being formed of plaited two ply strands, the plies of each strand being connected to each other at one end of the body by open loops which form the eyes, said strands being formed of a single endless element, substantially as described.

9. A sling having an eye at each end of its body, formed of two sets of strands, each set being formed of an equal number of pairs of strands, the one set extending in a helical manner about an axis in a clockwise direction, while the other set extends around said axis in a counter-clockwise direction to form the body of the sling, alternate pairs of one set overlying and underlying alternate pairs of the other set, while the other pairs of the first set underlie and overlie the other pairs of the second set, the eyes at the ends of the body being formed of loops connecting the strands to each other, substantially as described.

10. A sling having an eye at each end of its body, formed of two sets of strands, each set being formed of an equal number of pairs of strands, the one set extending in a helical manner about an axis in a clockwise direction, while the other set extends around said axis in a counter-clockwise direction to form the body of the sling, alternate pairs of one set overlying and underlying alternate pairs of the other set, while the other pairs of the first set underlie and overlie the other pairs of the second set, the eyes at the ends of the body being formed of loops connecting the strands to each other, and a flexible core within the body about which the two sets of strands are wound, substantially as described.

11. A sling having a body and an eye at each end formed of pairs of plaited strands having connecting loops at their ends, the body being formed by the plaited portions of the strands, while the eyes are formed of the loops, substantially as described.

12. A sling having a body portion with an eye at each end formed of a plurality of plaited strands and strand connecting loops, the strands and loops being continuous and endless, substantially as described.

13. The method of making a sling with an eye at one end, the steps of doubling strands to form a loop at one end of two strands, arranging said strands in two sets, plaiting the sets and leaving the loops open

to form a sling eye at the other end, substantially as described.

14. The method of making a sling, including forming double strands of a predetermined length with closed loops at both ends, gathering the loops at one end to form an eye, arranging the strands into two sets, each set having an equal number of double strands connected to each other by loops, plaiting said sets from the eye formed of the gathered loops to form the body of the sling, and after the body has been formed forming an eye at the other end of the sling by the loops connecting the strands of each pair, substantially as described.

15. The method of making a plaited cable sling with eyes at its ends, including the forming of a plurality of double strands and plaiting them into a cable sling, and forming the eyes of loops connecting the strands to each other, substantially as described.

16. The method of making a plaited sling, including doubling an elementary strand to form a plurality of double strands with loop ends, and plaiting said double strands into a cable sling, and leaving the loop ends open at both ends to form eyes, substantially as described.

17. The method of making a plaited cable sling, including the forming of an endless elementary strand, doubling the elementary strand to form a plurality of double strands, and plaiting said double strands into a cable sling, substantially as described.

18. The method of making a plaited cable sling, including splicing the ends of a single strand to form an endless elementary strand, doubling the elementary strand to form a plurality of double strands, and plaiting said double strands into a cable sling, substantially as described.

19. The method of making a plaited cable

sling, including forming an endless elementary strand, doubling the elementary strand to form a plurality of double strands, plaiting said double strands into a cable sling, and forming loops at the ends of the double strands into eyes at the ends of the sling, substantially as described.

20. The method of making a plaited cable sling, including the forming of an endless elementary strand, doubling the elementary strand to form a plurality of double strands, and plaiting said double strands over a flexible core and into a cable sling, substantially as described.

21. The method of making plaited cable slings, including the forming of an endless elementary strand, doubling the elementary strand to form an even number of double strands, rotating alternate double strands in opposite directions around the axis of the sling, and alternately passing the rotated double strands over and under the crossing strands to form a plaited cable, and forming the loops at the ends of the double strands into eyes at the ends of the sling, substantially as described.

22. The method of making a plaited cable sling, including the forming of an endless elementary strand, doubling the elementary strand to form an even number of double strands, rotating alternate double strands in opposite directions around a flexible core, alternately passing the rotated double strands over and under the crossing strands to form a plaited cable, and forming the loops at the ends of the double strands into eyes at the ends of the sling, substantially as described.

In testimony whereof I have hereunto set my hand.

CHARLES NYMAN.