United States Patent

[11] **3,545,334**

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[21] Appl. No. **881,956**
[22] Filed **Dec. 4, 1969**
[45] Patented **Dec. 8, 1970**

[54] **BRAIDED ROPE SLING**
1 Claim, 6 Drawing Figs.

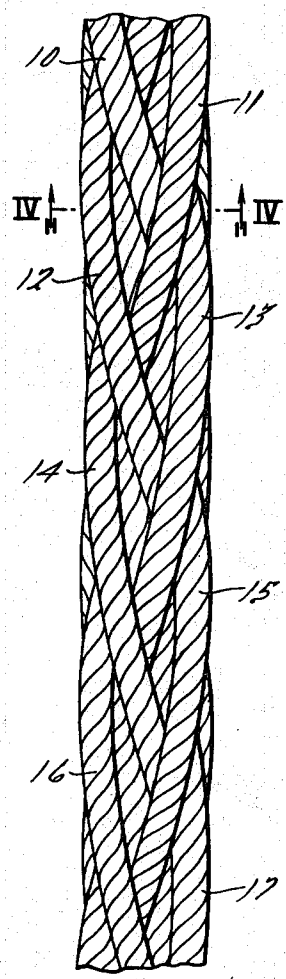
[52] **U.S. Cl.** **87/8**
[51] **Int. Cl.** **D04c 1/12**
[50] **Field of Search** ..... 87/1, 5—11, 33; 57/142, 159

[56] **References Cited**
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Primary Examiner—John Petrakes
Attorney—Harness, Dickey & Pierce

ABSTRACT: A flexible sling for heavy loads consists of eight ropes braided together in a manner which provides a member of square cross section having its greatest density and greatest strength per unit volume along its four corners, successive ropes being repeatedly and alternately plaited in a generally helical path at opposite but equal helix angles and each rope passing always under the same two of the other ropes and then around the other five of the ropes. Lateral displaceability of the ropes tends to distribute loadings among the several ropes and permits limited stretching to reduce shock.



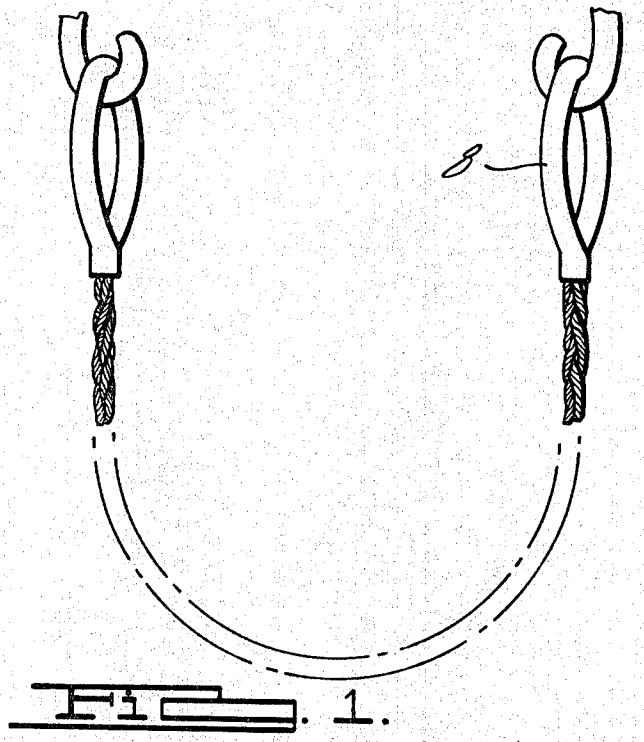


FIG. 1.

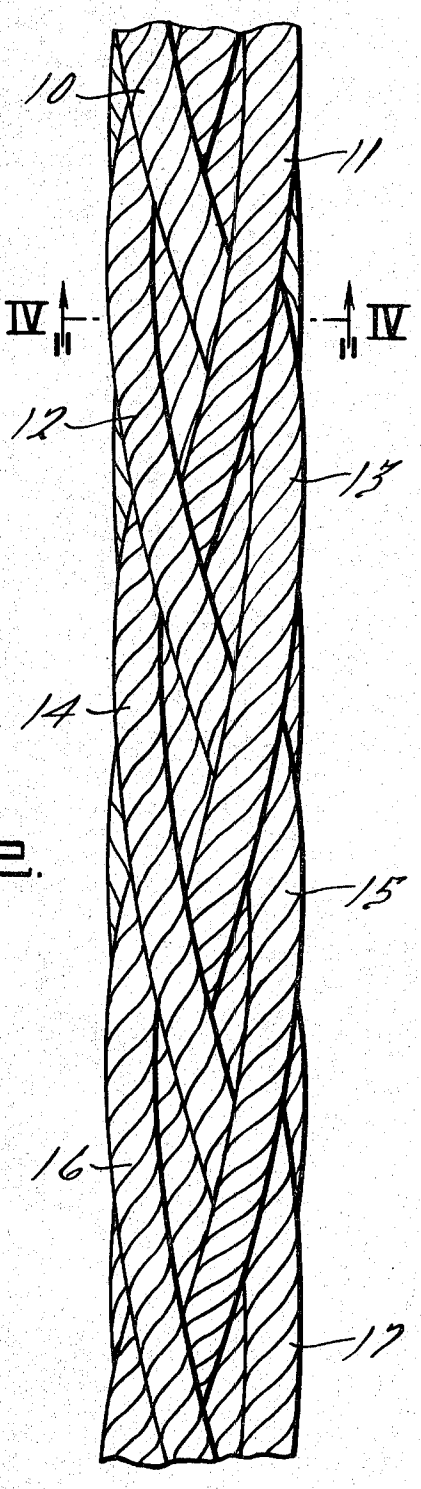


FIG. 2.

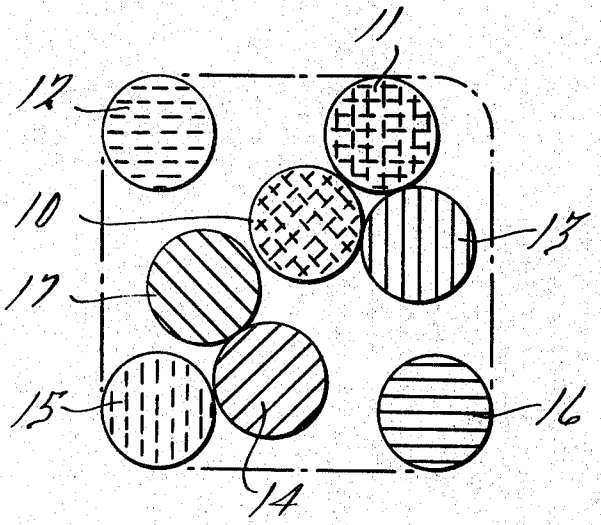


FIG. 4.

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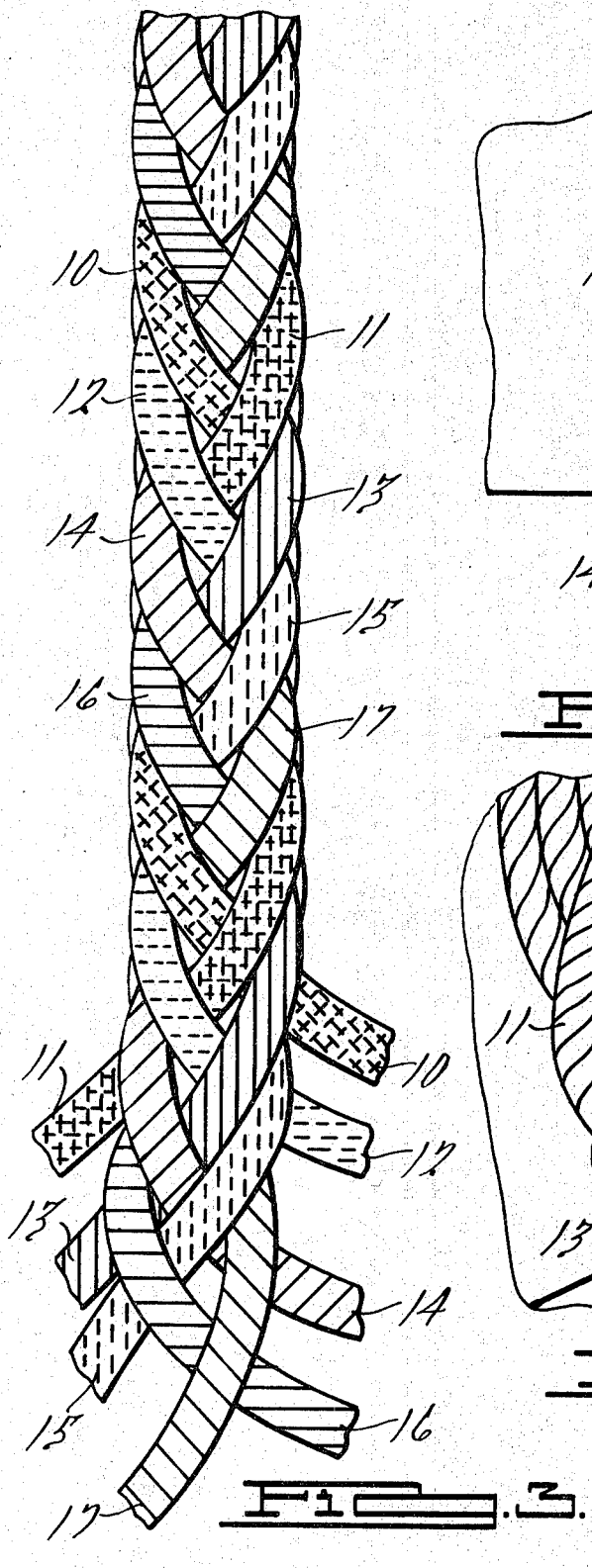


FIG. 3.

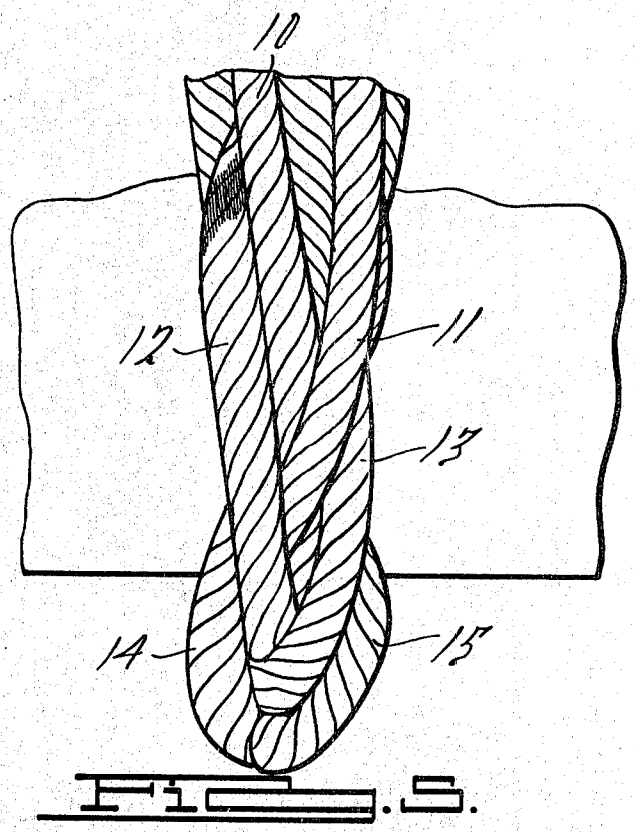


FIG. 5.

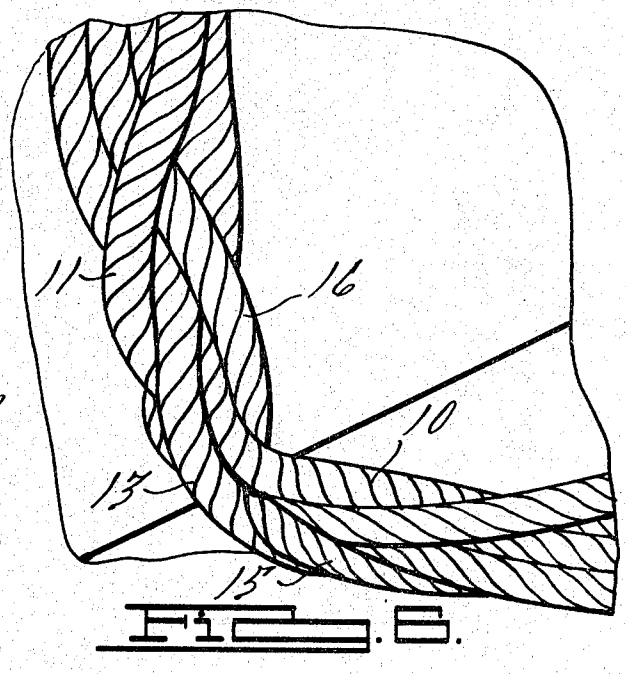


FIG. 6.

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BRAIDED ROPE SLING

BACKGROUND OF THE INVENTION

In the lifting of heavy loads with ropes and slings, where unduly high localized stressings are apt to occur, as for example in the suspension of heavy cargo having sharp corners which cause the rope or sling to be bent about a short radius, the service life of ordinary wire rope is relatively short. Failure is particularly apt to occur in areas where sharp corners of a heavy load directly contact the rope and cause both abrading and sharp bending. It is well known that steel wire rope cannot be bent about a radius which is too small in proportion to the diameter of the rope without causing strand failure. Previous efforts to prolong the life of slings employed in such heavy service have included braiding a plurality of individual ropes of relatively small diameter, which reduces both the failure at the sharp bends and the tendency of the sling to twist and whip, endangering personnel. One such braided type which has been employed in the trade is disclosed in U.S. Pat. No. 2,082,828 to Garris. The braiding arrangement disclosed in the Garris patent, although an improvement upon ordinary wire rope, is still relatively short lived under severe service conditions. The object of the present invention may be summarized as comprising the provision of an improved construction which greatly prolongs the service life of such slings, as compared, for example, with the service life attainable under like conditions of use with constructions such as disclosed in the aforementioned Garris patent.

Other objects and advantages will become apparent upon consideration of the present disclosure in its entirely.

BRIEF DESCRIPTION OF THE FIGURES OF DRAWINGS

FIG. 1 is an elevational view of a sling constructed in accordance with the present invention;

FIG. 2 is a side elevational view of a part of the braided suspension portion of the sling on a larger scale, showing the same straight and as it appears when not under load;

FIG. 3 is a diagrammatic side elevational view of a partially plaited suspension portion, the ropes being shown as braided more tightly than the actual preferred braiding used with wire rope, showing progressive positions in which the ropes are successively overlaid in plaiting;

FIG. 4 is a cross-sectional view taken substantially on the line IV–IV of FIG. 2, and looking in the direction of the arrows;

FIG. 5 is an elevation of a portion of the sling under load, as viewed from the side and looking horizontally in a direction perpendicular to the sidewall of a rectangular load, near the bottom, the individual strands being shown only fragmentarily, and only in this view; and

FIG. 6 is a fragmentary perspective view of the same general area of the sling and load as seen from one side.

DETAILED DESCRIPTION OF PREFERRED FORM OF THE INVENTION

In constructing my improved sling, four individual wire ropes of a length somewhat exceeding twice the desired length of the finished sling are passed through a tubular metal thimble **8** until the thimble is midway on the ropes, leaving eight rope end portions projecting from the thimble. The eight rope portions are then braided in a manner which has been found to have unique advantages where heavy loads having sharp corners must be handled.

In braiding the eight projecting rope portions, four are brought out toward the right and four toward the left, angularly downwardly, in a sequence which is maintained throughout the braiding, four of the ropes thus defining a right-hand group consisting of ropes **10, 12, 14** and **16**, considered downwardly in that order, and the other four defining a similar left-hand group or series consisting of ropes **11, 13, 15** and **17**, as shown in FIG. 3. In order to show the braiding sequence diagrammatically, a color-designating overhatching has been applied to each rope in that view. In FIG. 3 the ropes

are shown braided more tightly than the braiding I prefer to employ with wire rope, in order to better illustrate the relationship of the ropes. The other views illustrate a suitable tightness of braid for wire rope. The braiding shown in FIG. 3 however, is identical except as to tightness and is in fact suitable for nonmetallic rope. To further assist in illustrating the relationship between the several ropes, the ropes **10, 12, 14** and **16**, which plait out to the right, are respectively hatched for orange, silver, brown and blue, and ropes **11, 13, 15** and **17**, which plait out to the left, are respectively hatched for gold, red, purple and green. In FIG. 3, the braiding is shown as partially completed, rope **17** (green) having last been laid over ropes **14** and **16** (brown and blue) and brought out at the bottom of its (left side) group. The last (uppermost) projecting unbraided rope portion of the right group, which is rope **10** (orange) is then passed to the rear and leftward under the braiding, thence upwardly through the middle of the left group, between ropes **13** and **15** (red and purple) and then rightward over ropes **15** and **17** (purple and green) and angularly downwardly to project again to the right at the bottom of the right group. Rope **11** (gold) is then similarly passed around under the braiding toward the right and angularly downwardly, then upwardly between ropes **14** and **16** (brown and blue), and back to the left over ropes **16** and **10** (blue and orange) to project again to the left as the bottom rope of the left group. The last (upper) rope **12** (sliver) of the right group, and then the last rope **13** (red) of the left group, and so on, are then alternately successively plaited in like manner in opposite angular directions and in the sequence indicated by the reference numerals.

The completed braiding assumes a substantially square cross section. Each of the two groups referred to above and shown in FIG. 3 constitutes a series, as noted. On one pair of diagonally opposite corners the ropes **10, 12, 14,** and **16** of the right series lie successively and in that sequence on the outside, close and substantially parallel to each other to define the corners, while on the other pair of diagonally opposite corners the ropes of the left series are similarly arranged. Beneath each corner each rope of the other series passes, in its sequential order, under two successive ropes of the series which defines the corner. Thus although each rope describes a substantial helix, and at the corners the ropes on the outside, which define the corner, lie adjacent and substantially parallel to each other, the rope portions spaced from the corners, including the interior portions, cross one another at greater angles and leave spaces into which parts can move when distorted by loading. The left group ropes define a right-hand helix, and the right group ropes define a left-hand helix. Under tension, the corner portions pull inwardly toward each other. When the assembly is bent sharply around a corner or short radius under load, one of the flat sides orients its on the corner and the ropes on that side spread laterally apart in the corner region, as well as pulling toward the corner, thereby tending to bring more of the ropes into contact with the corner, and distributing the load.

The other thimble is attached by leaving suitable lengths of the two groups unbraided at the farther end, and passing the groups in opposite directions through the thimble, into which they may be secured by sweat soldering or brazing.

This detailed description of preferred form of the invention, and the accompanying drawings, have been furnished in compliance with the statutory requirement to set forth the best mode contemplated by the inventor of carrying out the invention. The prior portions consisting of the "Abstract of the Disclosure" and the "Background of the Invention" are furnished without prejudice in an effort to comply with administrative requirements of the Patent Office.

I claim:

1. A braided assembly of eight ropes for slinging heavy loads wherein the ropes are individually braided in two groups of four, all of the ropes of one group describing left-hand generally helical and parallel paths in a predetermined sequence, all of the ropes of the other group describing right

hand generally helical and parallel paths in a predetermined sequence, each rope of each group passing twice during each 360° of its helix under a pair of sequentially adjacent ropes of the other group, each rope underpassing a different pair but always underpassing the same pair and said pairs of the two groups being staggered to the extent of one rope.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,545,334 Dated Dec. 8, 1970

Inventor(s) Raymond F. Dudley

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 26, "(sliver)" should be --(silver)--
Column 2, line 51, "its" should be --itself--

Signed and sealed this 13th day of April 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents

FORM PO-1050 (10-69)