March 13, 1934. H. G. METCALF 1,950,858

ROPE

Filed Nov. 5, 1932

Fig. 1.

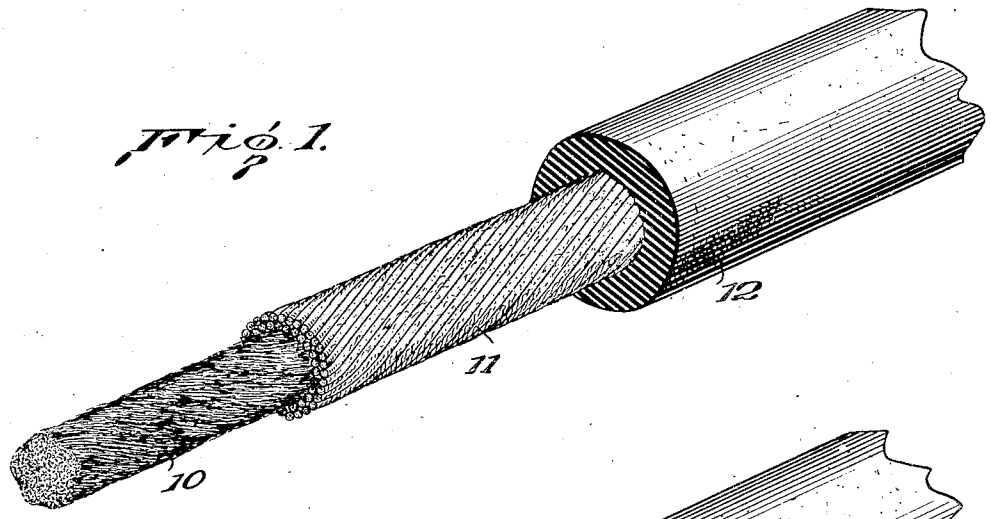


Fig. 2.

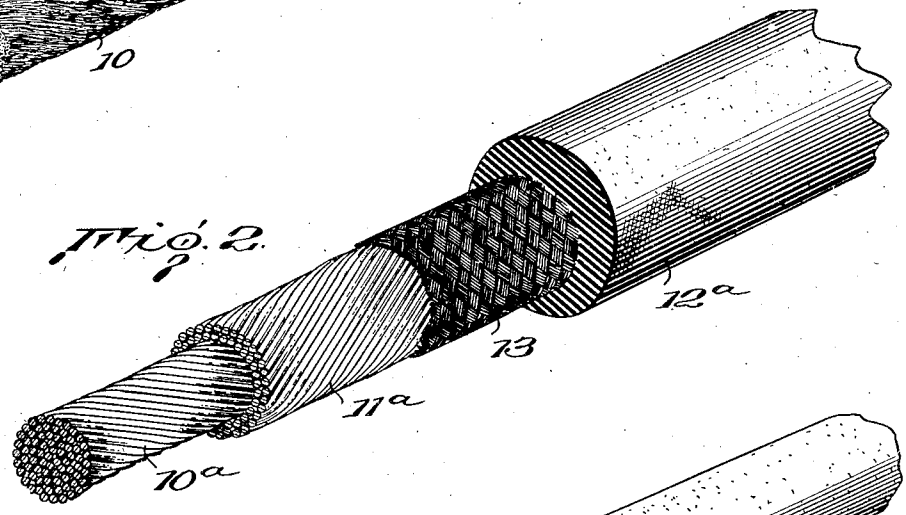
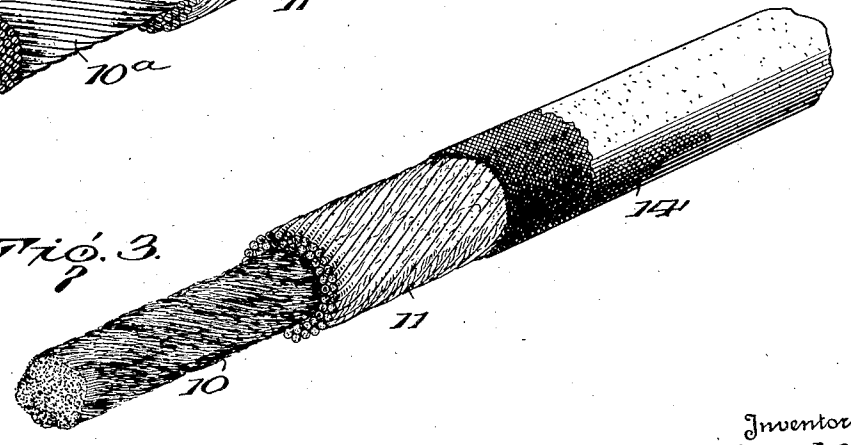


Fig. 3.



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ROPE

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Application November 5, 1932, Serial No. 641,485

2 Claims. (Cl. 117—53)

This invention relates to improvements in ropes.

The primary object of the invention is to impart maximum strength and durability to the rope, this object being accomplished in part by reducing to a minimum the destructive effect of individual structural elements upon other adjacent structural elements of the rope, whether those elements be fibers, yarns or wire strands.

Another feature of the present rope which directly aids in increasing the durability thereof is the effective lubrication of the structural elements throughout the life of the rope.

A still further feature of the present rope is the absolute balance of the several groups of yarns or other structural elements of which the rope is formed. For instance, assuming the rope to be of fiber construction, the yarns are arranged in groups, the disposition of one group of yarns with respect to a second group, being such that the tendency of the rope to twist in one direction will be resisted and counterbalanced by one group while a tendency to twist in the opposite direction will likewise be resisted and balanced by the second group. This original equilibrium is maintained in the rope at all times, regardless of the load imposed thereon.

More particularly, the invention contemplates a stable, single strand rope composed of a core formed of a plurality of structural elements twisted together in one direction and preferably impregnated with a colloid rubber which serves primarily as a lubricant; a second group of structural elements laid on the core with a twist opposite to that of the core; and a stabilizing cover, preferably of rubber to which the last mentioned group of structural elements is attached by the vulcanization.

With these and other objects in view, the invention consists in certain details of construction and combinations and arrangements of parts, all as will hereinafter be more fully described and the novel features thereof particularly pointed out in the appended claims.

In the accompanying drawing,—

Figure 1 is a perspective view of a fiber rope embodying the present invention, one end being shown untwisted to more fully illustrate the interior construction;

Fig. 2 is a similar view showing the preferred constructon for use in wire cables ; and

Fig. 3 is a similar view showing a still further modification.

In the fiber rope of Figure 1 there are a plurality of groups of structural elements, preferably spun yarns and slivers, although bands of fibers may be utilized. Preferably two groups are used, as shown. The inner group 10 of elements, preferably slivers are twisted together in one direction and the other group 11, preferably spun yarns, are applied thereto with a twist in the opposite direction. Additional groups or layers may be utilized in which case each successive group or layer will be applied with a twist opposite to that of the previously applied group. The relative degrees of twist given the two groups, is such that the rope is perfectly balanced and such balance will always be maintained regardless of the load imposed on the rope. That is, any tendency of a load to untwist one group in one direction will inevitably be counterbalanced, so to speak, by reason of the fact that such action will have to twist more tightly a second group. It will be appreciated that any number of groups applied as in the present instance would never result in a stable rope structure, in and of themselves. That is, the several groups of elements thus assembled would not retain their assembled form which is nothing more than a single strand of the peculiar or special formation described. Therefore, in order to impart stability to the single strand which forms the present rope, the assembled elements are enclosed by a suitable cover or sheath 12. Preferably, this cover or sheath is of vulcanized rubber, as illustrated. In addition to functioning as a stabilizer for the finished rope, this cover also serves as a retainer for the lubricant incorporated in the rope interior and will withstand considerable abrasion.

Preferably, rubber latex is utilized as a lubricant although other materials, and particularly mixtures of rubber with natural or artificial resins may be used. Rubber latex such as the commercial latex found on the market today has been found to possess excellent lubricating qualities and is preferred. If desired, the latex may have added thereto any of the well known vulcanizing agents and an accelerator but as it functions better as a lubricant when unvulcanized such additional ingredients are preferably omitted. In fact, as the rubber cover 12 precludes loss of lubricant, it is unnecessary to resort to vulcanization of the latex in the interior of the rope.

In order to prevent wear on the rope elements by the latter rubbing against the interior surface of the hard rubber sheath 12, the elements may be attached to the sheath by vulcanizing. The vulcanizing solution may be a latex com-

pound having combined therewith the necessary vulcanizing ingredients.

This preferred form of single strand rope is produced as follows: The slivers 10 of the inner group are impregnated with latex individually either before or after their formation. These latexed elements are then twisted together and the outer elements 11 applied thereto. This resulting structure is then immersed in a vulcanizing compound of latex after which the rubber sheath 12 is applied and vulcanized to the rope surface. Thus it will be seen that there is produced a stable, single strand rope in which there will be created a minimum amount of cross rubbing of fibers and consequent friction and heat. Also, the rope will have permanent perfect balance and all lubricant originally incorporated in the rope will be retained therein.

In Figure 2 there is illustrated a rope composed of wire strands. The inner group 10*a* and the outer group 11*a* of wires bear the same relation to each other as do the yarns or other elements in the fiber rope of Fig. 1. The inner wires 10*a* may also be lubricated with latex. In this form of rope a wire mesh 13 is preferably applied to the assembled wire strands before the rubber sheath 12*a* is applied. This mesh not only aids in the vulcanization of the sheath to the wire strands but it also aids in resisting deformation of the rope.

In the form of the invention illustrated in Fig. 3 a braid cover 14, impregnated with a vulcanizable compound and attached by vulcanization, is used in lieu of the all rubber sheath. The structural elements may be either of fibers or of metal. It will also be understood that a composite rope may be made by using wire strands in combination with fiber elements, the latter constituting either the inner or outer group.

It should be stated that the groups of elements being twisted in opposite direction, the groups are free to rotate with respect to each other when one group is shortened and the other lengthened by a torsional load placed on the rope. Each group will also move as a body, the adhesive properties of the latex in the inner group aiding in holding them together, and the outer group being attached to the cover. On the other hand, when the present rope is placed under tension, one group of elements will tend to untwist in one direction and a second group in the opposite direction and these tendencies of the two groups being equal, the rope is said to be balanced as hereinbefore described. Not only is the present rope well balanced but the elimination of plural strands adds to its durability by reason of the fact that cross rubbing of fibers or elements is greatly reduced. There being but a single strand, there is no frictional engagement or cross rubbing of strand on strand.

What is claimed is:

1. A stable single strand rope composed of a core of structural elements twisted together in one direction, a plurality of metallic structural elements twisted on said core in the opposite direction, a covering of wire fabric encasing said elements, and a rubber covering vulcanized on said strand.

2. A stable single strand rope composed of a core of structural elements twisted together in one direction, a second group of structural elements twisted on said core in the opposite direction, and a stabilizing covering of braided material vulcanized on the surface of said rope.

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