April 3, 1945. R. F. WARREN, JR 2,372,868

ROPE

Filed Feb. 10, 1944

Fig. 1.

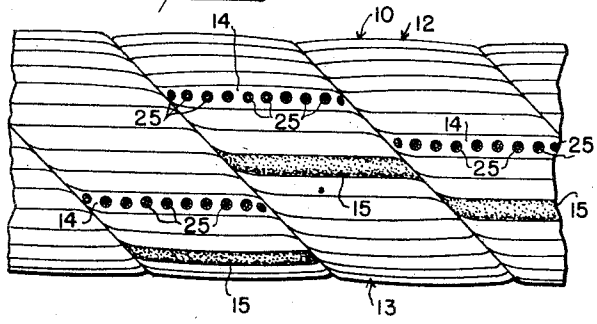


Fig. 2.

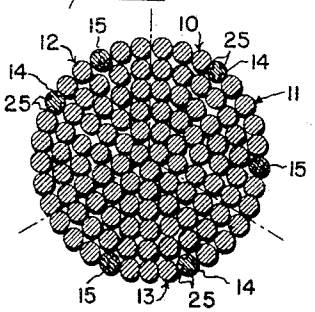


Fig. 3.

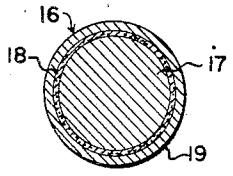


Fig. 4.

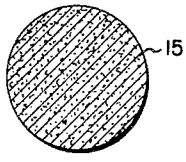


Fig. 5.

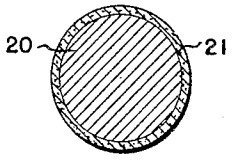


Fig. 6.

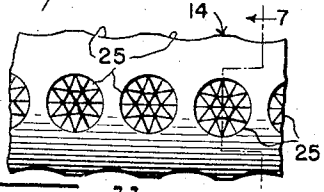


Fig. 7.

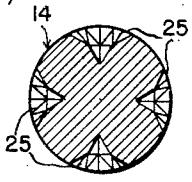


Fig. 8.

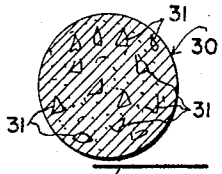


Fig. 11.

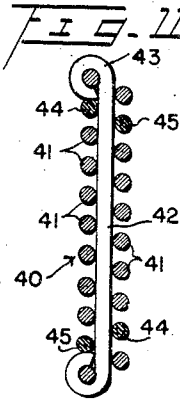


Fig. 9.

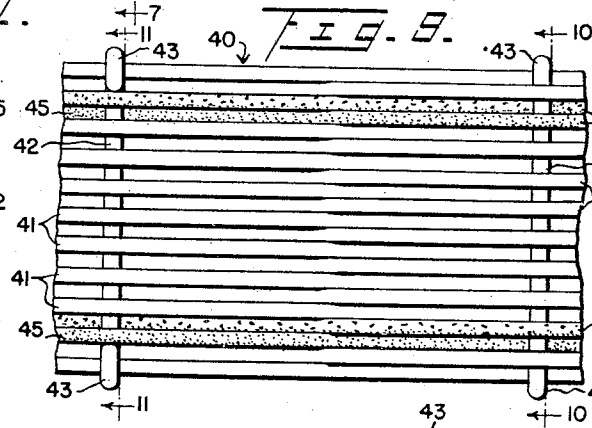
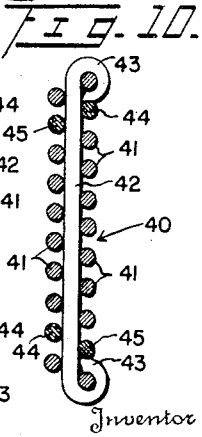


Fig. 10.



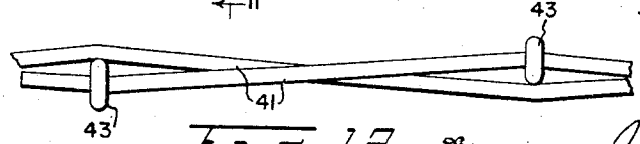


Fig. 12.

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Patented Apr. 3, 1945 2,372,868

UNITED STATES PATENT OFFICE

2,372,868

ROPE

Richard F. Warren, Jr., Stratford, Conn.

Application February 10, 1944, Serial No. 521,842

8 Claims. (Cl. 57—146)

This invention relates to new and useful improvements in ropes or cables and has particular relation to a rope or cable for use along highways, to mark curves in the road, the presence of ditches at the side of the road, etc.

An object of the invention is to provide a highway rope or cable including means for reflecting back a portion of the light impinging on the rope or cable from the headlights of an approaching vehicle.

Another object is to provide a highway rope or cable having means for reflecting back a portion of the light rays impinging thereon from the headlights of an approaching vehicle and also having therein means rendering the rope or cable self-luminous whereby portions of the rope or cable beyond the range or zone of the headlights of an approaching vehicle are also visible to indicate a curve to one side or the other of the course of an approaching vehicle.

Other objects and advantages will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawing wherein satisfactory embodiments of the invention are shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawing—

Fig. 1 is a side elevational view showing a rope or cable made in accordance with the invention;

Fig. 2 is a transverse sectional view through the rope of Fig. 1;

Fig. 3 is an enlarged transverse sectional view through an element or filament which may be used in the rope of Figs. 1 and 2;

Fig. 4 is a view similar to Fig. 3 but showing an element or filament from the rope of Figs. 1 and 2;

Fig. 5 is a sectional view similar to Fig. 3 but showing another modification;

Fig. 6 is an enlarged side elevational view of a short section of an element or filament of the rope of Figs. 1 and 2;

Fig. 7 is a transverse sectional view taken as on the line 7—7 of Fig. 6;

Fig. 8 is a view similar to Fig. 7 but showing another form of element or filament;

Fig. 9 is a front elevational view showing a short section of a rope or cable of another form;

Fig. 10 is a sectional view taken as along the line 10—10 of Fig. 9;

Fig. 11 is a sectional view taken as along the line 11—11 of Fig. 9; and

Fig. 12 is a top plan view of the rope or cable section of Fig. 9.

The rope of the present invention may be made of plastic material and preferably is made of synthetic plastic materials. Vinylidene chloride is an excellent plastic material for my purpose although it will be understood that other plastics may be used in the making of my rope. Particularly other vinyl and styrene compounds may be used although it is to be understood that any of the other plastics as synthetic resins, natural and synthetic lastics, cellulose and its derivatives, protein plastic substances and petroleum plastic derivatives, may be used. In short I may use the various classes of plastic materials identified in my copending application Serial Number 457,207, filed September 3, 1942.

Referring in detail to the accompanying drawing and at first more particularly to Figs. 1 and 2 a short section of rope is generally designated 10 and the same is shown as made up of three strands 11, 12 and 13 although it will be understood that the invention is not limited to this particular structure. Each of the strands in its outer portion includes at least one light reflecting element or filament 14 and at least one luminous element or filament 15. These elements or filaments are of plastic material. The other elements making up the strands 11, 12 and 13 may be plastic filaments, and preferably are such filaments, although they may be of natural fibrous material or of steel, etc., if desired.

Fig. 4 is an enlarged transverse sectional view of one of the filaments 15 and according to the invention a suitable luminous material, as a phosphorescent, a fluorescent or a radio active substance, is mixed with the plastic while both materials are in powdered form or at any other point in the rope making process prior to the extrusion of the plastic into the filaments 15. In the drawing the luminous material is indicated by the stippling and such material is distributed throughout the mass of the plastic and when the filaments 15 are formed the luminous material is distributed all through the filament and is not merely on the surface thereof to be scratched or abraded therefrom during twisting together of the filaments in making the rope or during other handling of the rope or the filaments.

It will be understood that the luminous material being distributed throughout the mass of the plastic material it is not necessary to the present invention that the filaments or rope elements be

formed by the process of extrusion. The compound of plastic and luminous material may be rolled into sheets and strips cut from the latter and twister into filaments for use in place of the filaments 15 of the drawing. When the plastic material used in making the filaments is clear or transparent it will be understood that the luminous properties of the embedded material are effective for the present purpose even though none of the material be actually at the surface of the filaments.

Fig. 3 shows a filament 16 which may be used in place of the filaments 15. Filament 16 is shown as comprising a body 17 of a suitable plastic and on such body is a coating 18 of a luminous material. To protect this coating against the weather, abrasion, and the like, a coating or film 19 is disposed over coating 18. Coating 19 is of a clear or transparent and preferably weather proof plastic material as vinylidene chloride.

In addition to the above constructions the luminous material may be worked into the plastic material and this mixture used as a coating for the body of a rope filament. Thus in Fig. 5 is shown a filament body 20 having thereon a film or coating 21 comprising a mixture of a plastic material and a luminous material. Preferably the plastic material used in this mixture is clear or transparent for the reasons suggested above when considering Figs. 4 and 3. With the construction of Fig. 5 as with the solid construction of Fig. 3 should the outer surface of the filaments be worn away new luminous material will be effective and the filaments will retain their luminous properties even though the plastic used be opaque.

Figs. 6 and 7 are enlarged views of one of the filaments 14. Filaments 14 are designed to reflect back a portion of the light rays impinging on the rope or cable 10 from the headlights of an approaching vehicle. Thus these filaments are faceted to provide them with a multiplicity of reflecting surfaces or faces. In the particular embodiment here under consideration filament 14 is provided with a multiplicity of reflecting faces in each of a series of depressions 25 in the filament. The angularly related faces comprising the surfaces of each depression 25 function as reflectors, and direct back and spread the light rays impinging on them. The precise form of the facets of filament 14 is not controlling.

Fig. 8 shows a modification of the light reflecting filament and in such figure the filament shown is designated 30 and the same is of a plastic material having embedded therein pieces or bits 31 of light reflecting material. The particles 31 may be of very thin glass mirrored on one or both sides as with a flash coating. That is very thin glass is mirrored and then crushed to provide the bits or particles 31. These particles are mixed with the plastic material and then the filaments 30 are formed. Preferably the plastic used is clear or transparent whereby reflecting particles embedded in the body of the filament function and it will be understood that on any wearing away of the filament other particles 31 will be exposed whether the plastic is transparent or not.

In fabricating the rope 10 it will be understood that the filaments 15, 16 and 20 are approximately equivalents and that filaments 14 and 30 are approximately equivalents. Preferably at least one filament of the light reflecting and luminous types is located in the outer portion of each strand 11, 12 and 13 of the rope. When the rope 10 is used in a highway safety fence the filaments 14 will serve to reflect back toward the driver of an approaching vehicle a portion of the light rays from the headlights of said vehicle and thus the driver will easily discern the location of the highway fence and be appraised of curves in the highway as marked by the presence of the fence.

In addition the filaments 15 of the rope 10 will be visible at night without being struck by light beams as such filaments are self luminous and therefore visible in the dark. Thus filaments 15 will serve to notify the driver of a vehicle of a turn or curve in a highway fence when such curve takes the fence to one side or the other of the beams of the headlights of the vehicle and in fact from a point beyond the range of the vehicle headlights.

Figs. 9 through 12 show another form of rope generally designated 40 and which is rather flat and tape-like as is clear from an inspection of such figures. Rope 40 comprises a number of elements 41 sinuously woven with spaced clips 42 arranged at ninety degrees to the elements and secured to the outer or top and bottom elements as at 43. The elements 41 may be of plastic material, fibrous material or they may be metal wires, as desired. Any desired number of the elements 41 are omitted at the desired places and self luminous and reflecting elements substituted. Thus in the drawing filaments 44 and 45 are shown as substituted for the elements 41 at places toward the upper and lower edges of the rope 40. Filaments 44 are the light reflecting filaments and filaments 45 are the self luminous filaments. Thus filaments 44 are any of the filaments 14 and 30 above described while filaments 45 are any of the filaments 15, 16 and 20 above described. The rope 40 may be used in place of the rope 10 and will function in the manner described in connection with the rope 10.

To enhance the desired effect the body 17 of filament 16 and the filament 20 are loaded with an opaque and preferably light reflecting and diffusing material. Preferably the loading material is white and titanium dioxide is suggested for the intended purpose. This white body at the inner sides of the coatings 18 and 21 of the respective filaments amplifies the effectiveness of the luminous materials of the coatings 18 and 21.

Somewhat similarly the body or filament 14 is treated so that it is opaque and preferably it is loaded or filled with titanium dioxide or other white material so that light rays striking the surfaces of the depressions 25 will not be absorbed by the body 14 but will be reflected back.

Having thus set forth the nature of my invention, what I claim is:

1. In a rope, an elongated body comprising a plurality of elongated elements, and one of said elements faceted throughout its length to provide it with a series of reflecting surfaces for reflecting back light rays impinging thereon.

2. A multi-strand highway rope or cable wherein at least one longitudinal element includes means for reflecting back some of the light rays impinging thereon from the headlights of an approaching vehicle, and at least one other longitudinal element thereof includes luminous material whereby to be visible at night beyond the zone of the beams of the headlights of said approaching vehicle.

3. In a multi-strand highway rope or cable, a longitudinal element of a plastic material having embedded therein a plurality of light reflecting

members for reflecting back a portion of the light rays impinging on said element from the headlights of an approaching vehicle.

4. In a multi-strand highway rope or cable, a longitudinal element of a plastic material having distributed throughout its body a plurality of light reflecting members for reflecting back a portion of the light rays impinging on the element from the headlights of an approaching vehicle, and said plastic transparent whereby members completely embedded in said element participate in the reflecting of such light rays.

5. In a rope, an elongated body comprising a plurality of elongated elements, one of said elements faceted throughout its length to provide it with a series of light reflecting surfaces for reflecting back light rays impinging thereon, and said element of an opaque plastic material.

6. In a rope, an elongated body comprising a plurality of elongated elements, one of said elements faceted throughout its length to provide it with a series of light reflecting surfaces for reflecting back light rays impinging thereon, and said element of a white opaque plastic material.

7. A rope or cable comprising an elongated element faceted throughout its length to provide it with a series of light reflecting surfaces for reflecting back light rays impinging thereon, and said element of an opaque plastic material.

8. A rope or cable comprising an elongated element faceted throughout its length to provide it with a series of light reflecting surfaces for reflecting back light rays impinging thereon.

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