June 11, 1968 M. G. SANTI 3,387,344

TENSIONING DEVICE

Filed Jan. 24, 1967

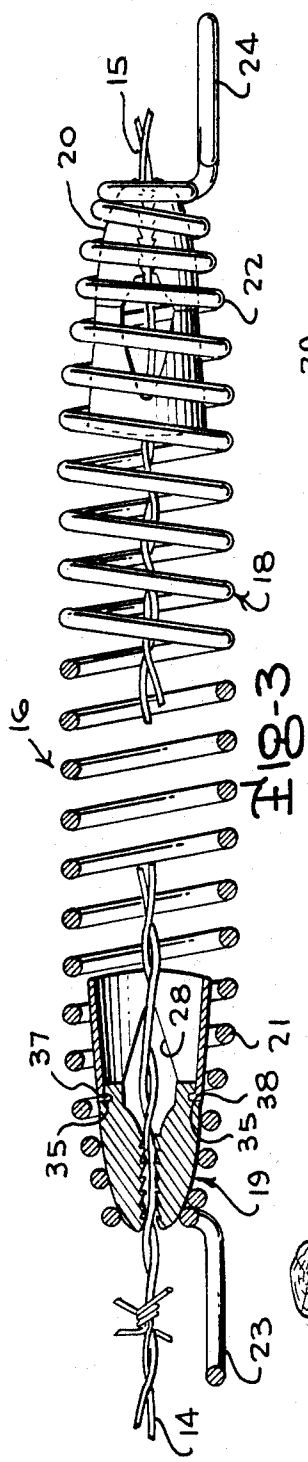


FIG 3

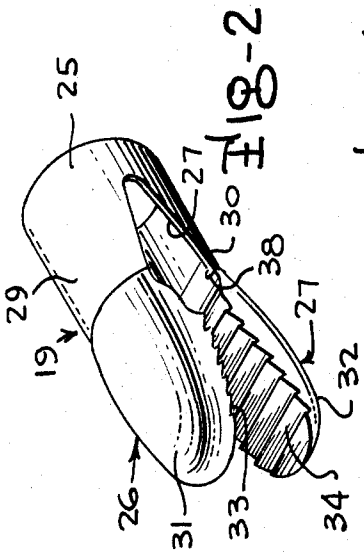


FIG 2

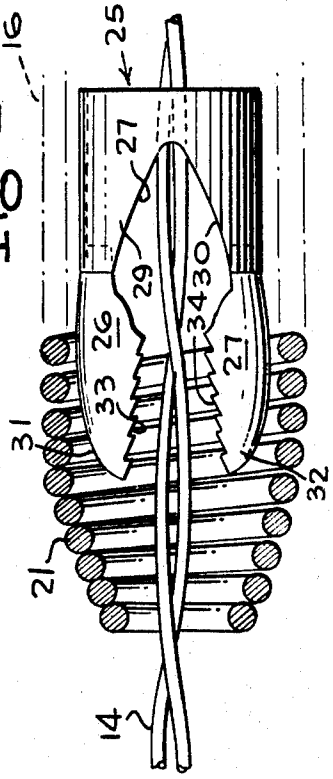


FIG 4

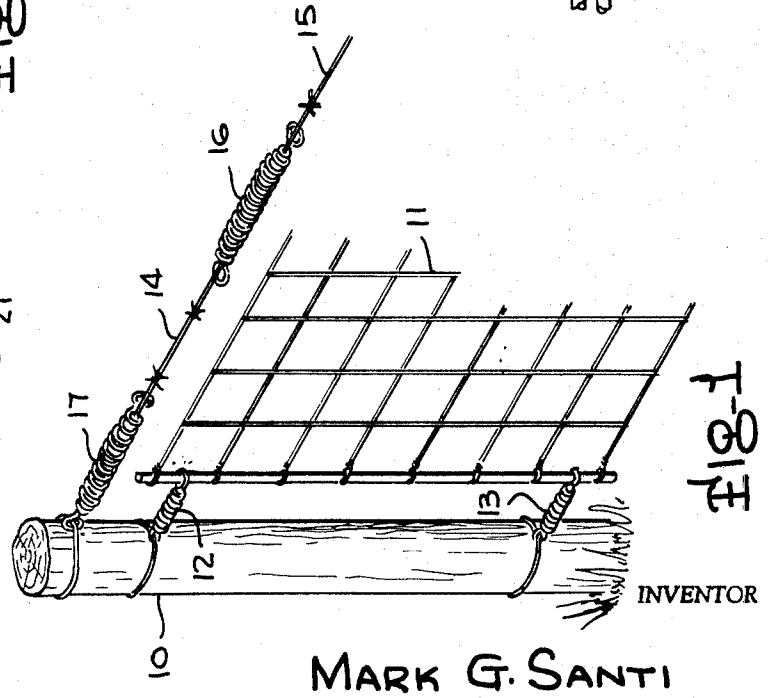


FIG 1

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TENSIONING DEVICE

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ABSTRACT OF THE DISCLOSURE

A tensioning device for a strand of material in the form of a coil having a tapered end with an opening therein for receiving the strand therethrough, a pair of movable gripping jaws disposed within the coil spring, the jaws having contact surfaces engageable with the tapered coil spring end in camming relation whereby the jaws are moved relative to each other and the jaws having opposed gripping surfaces engageable with the strand disposed therebetween in gripping relation when the contact surfaces engage the tapered coil spring end in camming relation and the jaws are caused to be moved together.

Background of the invention

This invention relates to a tensioning device and more particularly to a tensioning device for strands of material such as wire and the like. The invention further contemplates a tensioning device which can be used for splicing the ends of strands of material and maintaining the same under tension.

In many instances, it is desirable to place strands of wire and the like under tension, such as in wire fences and other similar applications. In addition, in other applications it is desirable to splice together two ends of wire and to place the ends of wire under tension. In the prior art, there are numerous types of devices for accomplishing these purposes. However, it has been found that many conventional tensioning devices in the prior art are not entirely satisfactory in construction and performance. Usually, such prior art tensioning devices are complicated in construction and difficult to install. Such devices also have been found not to provide a sufficient tensioning force to maintain either a single strand or a pair of strands spliced together under sufficient tension.

Summary of the invention

The principal purpose of the present invention is to provide a novel tensioning device.

Another object of this invention is to provide a tensioning device suitable for use with a strand of material such as fence wire and the like.

A further object of this invention is to provide a novel tensioning device suitable for splicing together the ends of two strands of material and maintaining the material under tension.

A still further object of this invention is to provide a tensioning device which can be installed on a single strand of wire under tension, which will prevent the loose ends of the wire from whiplashing when the wire is cut at the point where the device is installed.

Another object of this invention is to provide a novel tensioning device for splicing together the ends of two strands of wire and maintaining the same under tension, wherein such device operates to equalize the tensile load along the entire length of the spliced wire.

A further object of the present invention is to provide a novel tensioning device, which is simple in construction and has relatively few components.

A still further object of the present invention is to provide a novel tensioning device which is comparatively

inexpensive to manufacture and relatively simple to install.

Other objects and advantages of the invention will become more apparent to those persons skilled in the art, from the following description of a practical embodiment of the invention, when taken in conjunction with the drawings which accompany, and form a part of, this specification.

Brief description of the drawing

FIGURE 1 is a perspective view of a fence structure in which an embodiment of the present invention is used.

FIGURE 2 is an enlarged perspective view of a gripping member which is utilized in the embodiment illustrated in FIGURE 1.

FIGURE 3 is an enlarged side elevational view of the embodiment shown in FIGURE 1, illustrating a portion thereof in vertical cross-section.

FIGURE 4 is an enlarged vertical cross-sectional view of the embdoiment illustrated in FIGURE 1, illustrating the gripping member in nongripping relation with a strand of wire.

Description of the preferred embodiment

Referring to the drawing there is illustrated a practical embodiment of the invention. FIGURE 1 illustrates an application of the embodiment which includes a fence post **10**, a wire fence **11** connected to the fence post by means of coil springs **12** and **13**, and two strands of barbed wire **14** and **15**. The strands of wire **14** and **15** are spliced together by means of a tensioning device **16**, and the strand of wire **14** is connected to the upper end of the fence post by means of a tensioning device **17** which is similar to the tensioning device **16** in construction and operation.

FIGURE 3 illustrates the tensioning device **16** in greater detail and discloses the ends of the strands of wire **14** and **15** spliced together and maintained under tension. The device generally consists of three components including a coil spring **18** and two identical gripping members **19** and **20** which are disposed within the coil spring. The coil spring is provided with tapered ends **21** and **22** terminating in eye or hook elements **23** and **24**, which can be utilized for securing the tensioning device on another member such as the upper end of the fence post as illustrated in FIGURE 1, or to expand the coil spring axially when the device is being installed, as will hereinafter be described. The tapered ends of the coil spring preferably are formed by diminishing radii of the convolutions of the coil spring.

The coil spring **18** can be formed from any suitable material providing a sufficient tensioning force. Where the device is intended for use in outdoor applications, the coil spring preferably is formed from a galvanized or burnished material, so that it will be capable of withstanding the corrosive effects of inclement weather. In some applications it also may be desirable to construct the coil spring and other components of the device from an electrically conducting material where the device is to be employed as a conductor.

The gripping member **19** consists of a tubular member **25** and a pair of gripping jaws **26** and **27**. The tubular member **25** is constructed from a flexible material, and is recessed as at **27** and **28** to provide a pair of resilient finger elements **29** and **30**. The gripping jaws **26** and **27** are provided with converging contact surfaces **31** and **32** which are substantially rounded outwardly and transversely, and are engageable with the tapered end **19** of the coil spring in camming relation, when the gripping member **19** and the coil spring **18** are moved axially relative to each other, thereby causing the jaw members **26** and

27 to open or close. The jaw members 26 and 27 also are provided with gripping surfaces 33 and 34 which are adapted to grip the strand of wire 14 disposed therebetween when the jaws are moved together.

The jaw members 26 and 27 are secured to the outer ends of the finger elements 29 and 30 by means of a press fit connection. This connection consists of a pair of transversely disposed grooves 35 and 36 which receive flanges 37 and 38 formed on the outer ends of the finger elements 29 and 30, in press fit relation. The jaw members 26 and 27 are constructed of any suitable material having adequate gripping and wear characteristics. It is preferred, however, that the gripping jaws be constructed of a case hardened steel. The gripping member 20 is substantially identical in construction to the gripping member 19.

The gripping members 19 and 20 are permanently carried within the coil spring 18. When the device is not in use, the gripping jaws of the gripping members are spaced apart as illustrated in FIGURE 4. When it is desired to install the device and place a strand of wire under tension, the strand of wire is inserted through an end of the coil spring and through a gripping member, as illustrated in FIGURE 4. The coil spring is then expanded by gripping the member 23 and applying a force along the strand of wire. When the coil spring is sufficiently expanded, the gripping member is moved in the direction of the coil spring expansion. With the gripping member thus in position, the expanded end of the coil spring is released slowly and permitted to contract axially.

As the coil spring contracts and tends to return to its normal condition, the tapered end of the coil spring engages the contact surfaces of the jaws of the gripping member. Continued contraction of the spring provides a camming action between the tapered end of the spring and the contact surfaces of the gripping jaws, causing the jaws to move together, and the gripping surfaces to engage the strand of wire in gripping relation, as best illustrated in FIGURE 3.

It will be appreciated that by installing the device as described, the ends of two strands of wire can be spliced together, as illustrated in FIGURE 3, or a single strand of wire can be secured to a fixed location as illustrated by the tensioning device 17 in FIGURE 1. It further will be noted that the tensile load on the strands of wire can be released simply by expanding the coil spring and backing off the gripping member so that it will not be engaged by the tapered end of the coil spring when the expansion force on the spring is removed and the tapered end of the spring is permitted to return to its contracted position.

In certain instances where it is desired to cut a strand of wire under tension, the tensioning device as described can be installed to prevent whiplash of the severed ends of the strand of wire. This can be accomplished by installing the device in the manner as described, so that the gripping members 19 and 20 are gripping the strand of wire under tension. The strand then can be cut at any point between the gripping members and upon severance of the strand, any reactive force on the severed ends of the strand will be absorbed and dampened by the coil spring interconnecting such ends. As the coil spring is caused to expand, thus absorbing the reactive load applied to the ends of the strand, the gripping jaws of the members 19 and 20 will be caused to grip the free ends of the strand tightly as a result of the additional force being applied on the contact surfaces thereof by the tapered ends of the expanding spring.

It will be appreciated that the invention as described is adapted for numerous commercial and military applications. Specifically, it can be used in all types of fencing, for power and telephone transmission lines, and guy wires, poles and the like. In applications where the tensioning devices may be utilized for power transmission, it is to be understood that the components thereof can be constructed of suitable electrically conducting materials.

From the foregoing detailed description it will be evident that there are a number of changes, adaptations and modifications of the present invention which come within the province of those skilled in the art. However, it is intended that all such variations not departing from the spirit of the invention be considered as within the scope thereof as limited solely by the appended claims.

I claim:

1. A tensioning device for a strand of material comprising a coil spring having a tapered end with an opening therein for receiving said strand therethrough, a pair of movable gripping jaws disposed within said coil spring, said jaws having contact surfaces engageable with said tapered coil spring end in camming relation whereby said jaws are moved relative to each other and said jaws having opposed gripping surfaces engageable with said strand disposed therebetween in gripping relation when said contact surfaces engage said tapered coil spring end in camming relation and said jaws are caused to be moved together.

2. A tensioning device for a strand of material according to claim 1, including means for biasing said jaws apart relative to each other.

3. A tensioning device for a strand of material according to claim 1, wherein said contact surfaces converge in a direction toward said tapered coil spring end.

4. A tensioning device for a strand of material according to claim 1, including gripping means for expanding said coil spring axially.

5. A tensioning device for a strand of material wherein said tapered coil spring end is formed with convolutions of decreasing radii.

6. A tensioning device for a strand of material according to claim 1, including means for biasing said jaws apart relative to each other and gripping means for expanding said coil spring axially, and wherein said contact surfaces converge in a direction toward said tapered coil spring end and said tapered coil spring end is formed with convolutions of decreasing radii.

7. A tensioning device for a strand of material according to claim 1, including a gripping member disposed in said coil spring, said gripping member comprising a tubular member having a pair of axially projecting resilient finger elements, and wherein said gripping jaws are secured on said finger elements.

8. A tensioning device for a strand of material according to claim 7, wherein said contact surfaces converge in a direction toward said tapered coil spring end.

9. A tensioning device for a strand of material according to claim 7, wherein said tapered coil spring end is formed with convolutions of decreasing radii.

10. A tensioning device for a strand of material according to claim 7, including gripping means for expanding said coil spring axially.

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