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APPARATUS FOR FORMING TWISTED CABLE

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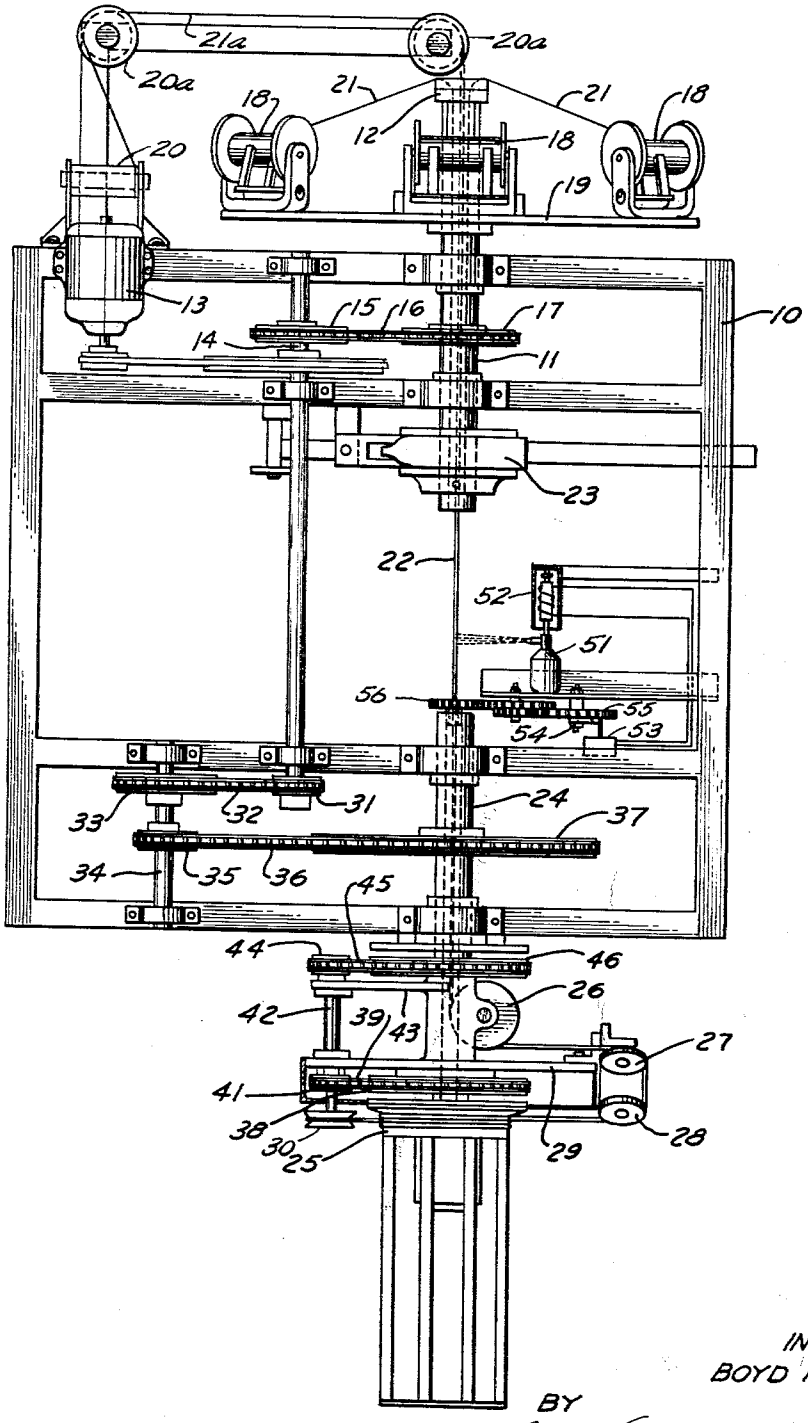

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APPARATUS FOR FORMING TWISTED CABLE

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This invention relates to apparatus for forming twisted cable and more particularly to apparatus for twisting a multi-strand cable and collecting the same in loose coils for storage and transportation.

In the manufacture of twisted cable a plurality of wires are twisted together in a rotating twister head and the cable so formed has been led directly from the twister head to a take-up reel on which the cable is wound under tension. This has been necessary because the cable leaving the twister head has a residual twisting stress tending to cause it to untwist slightly. Therefore, the only way such cable could be handled and stored is in a confined condition, such as that produced by winding it under tension on a reel. Otherwise, the cable tends to snake and tangle with danger of injury to persons in the vicinity and with damage to the cable.

Wire in the form of single strands has been stored and shipped in loose coils and it would be highly advantageous both from the standpoint of economics and ease of handling to treat twisted cable in the same way. It is therefore one of the objects of the present invention to provide apparatus for forming twisted cable in which the residual twisting stress in the cable is neutralized so that the cable can be handled in loose coils.

Another object is to provide apparatus for twisting cable in which the cable is taken directly from the twisting head to a dead block take-up unit and is so wrapped on the dead block as to remove residual twisting stress therein. The cable may then be taken from the dead block in the form of loose coils which may be easily and economically handled.

The above and other objects and features of the invention will be more readily apparent from the following description when read in connection with the accompanying drawing, in which:

The single figure is a diagrammatic view of cable twisting apparatus embodying the invention.

The twisting apparatus, as shown, is supported on a frame, indicated at 10, which may be either vertical or horizontal for passage of the cable through the apparatus in either a vertical or a horizontal direction. Commonly the cable would pass in a horizontal direction, although this is not essential.

The cable is formed in a twister head which, as shown, comprises an elongated tube 11 rotatably mounted in the frame and formed with a flared collar 12 at its outer end into which the wires to be twisted in the cable are fed. The twister head 11 may be driven by a motor 13 driving a shaft 14 on which a sprocket 15 is secured. The sprocket 15 is connected by a chain 16 to a sprocket 17 on the twister head so that the twister head will be rotated when the motor is running.

Wire to form the cable is drawn from a plurality of reels or spools 18 mounted on a carrier plate 19 which is secured to and rotatable with the twister head. The spools 18 are preferably positioned around the twister head and the wires therefrom, as shown at 21, extend into the collar 12 and are twisted together as the twister head turns to form the cable, indicated at 22. Preferably a brake mechanism 23 is provided to stop the twister head and to hold it against rotation when desired.

A core wire 21*a* is fed into the twister head and the wires 21 are twisted around it. The core wire is taken

from a spool 20 mounted on the frame 10 and is led over guide sheaves 20*a* axially into the twister head 11.

The cable after being twisted in the twister head is conveyed directly to a dead block take-up unit supported on the frame 10 which draws the cable through the twister head and forms it into loose coils. The dead block take-up unit comprises a tubular shaft 24 through which the cable runs axially and on the outer end of which a dead block 25 is rotatably mounted. The cable passing through the shaft 24 passes over a guide sheave 26 extending through an opening into the shaft and radially outward over guide sheaves 27 and 28. The sheaves 27 and 28 are carried by a plate or spider 29 secured to and rotatable with the shaft 24 and serves to guide the cable around the rim of the dead block and onto the dead block.

Since the sheaves 27 and 28 lie at an angle to the plane in which the cable is wound, they tend to put a spiral into the cable as it is wound onto the dead block. In order to remove this spiral an additional sheave 30 is provided at a point diametrically opposite to the sheaves 27 and 28 and whose axis is parallel to the axis of the dead block. The cable passing from the sheave 28 passes once around the dead block as shown and is then drawn over the sheave 30 and returns to the dead block to be wound thereon. Since the sheave 30 is parallel to the dead block it will re-form the cable with a proper cast to lie smoothly on the dead block without any tendency to spiral so that the cable will lie in a relatively tight coil when it is removed from the dead block.

The shaft 24 is driven by the motor 13 through a reducing drive so that its speed will be less than the speed of the twister head. The ratio of the speeds may be varied, depending upon the number of wires coming into the cable and the amount of twist desired so that each unit of length of the cable will be twisted through the desired number of turns as the cable passes through the twister head. As shown, the shaft 14 carries a small sprocket 31 which is connected through a chain 32 to a larger sprocket 33 on an idler shaft 34. A smaller sprocket 35 on the idler shaft is connected through a chain 36 to a large sprocket 37 on the shaft 24 to drive the shaft 24 at a desired reduced speed. It will be seen that the speed ratio between the twister head and the take-up shaft 24 may be changed easily by changing the sprockets.

The dead block is held against rotation in any desired manner as, for example, in the manner more particularly described and claimed in the patent to Keesee, No. 2,847,-171. As shown, however, the dead block is connected to a sprocket 38 and a chain 39 gears the sprocket 38 to a sprocket 41 carried by an idler shaft 42 which is journaled in the plate 29 and an arm 43 secured to the shaft 24 to turn around the shaft 24 as it rotates. The idler shaft 42 carries a second sprocket 44 of the same size as the sprocket 41 which is geared through a chain 45 to a sprocket 46 of the same size as the sprocket 38 and which is fixedly mounted on the frame 10. With this construction as the shaft 24 rotates, the sprocket and chain mechanism gears the dead block to the fixed sprocket 46 so that the dead block will be held against rotation.

In order to mark the cable to indicate increments of length thereof, means are provided periodically to spray the cable with paint. As shown, the spray means comprise a conventional paint spray can 51 mounted adjacent to the cable as it passes from the twister head to the hollow shaft 24. A solenoid 52 is provided periodically to open the valve of the paint spray can so that it will spray a spot of paint on the cable. The solenoid is controlled by a switch 53 which is periodically closed by a cam 54 on a pinion 55. The pinion 55 is driven through a speed reduction train by a drive pinion 56 secured to the tubular shaft 24.

As the apparatus operates to form the cable, the switch

53 will be closed periodically to open the valve of the paint spray can so that it will spray a spot or short strip of paint on the cable. The length of the paint mark may be adjusted by positioning the switch relative to the cam 54 and by design of the cam so that the valve will be maintained open for any desired interval of time. Preferably a quick-drying paint, such as lacquer, is employed which will be dry by the time it reaches the sheave 26, but if desired a felt wiper, not shown, may be mounted to contact sheave 26 to wipe off any undried excess paint that may have been deposited on the previous revolution.

In operation, the twister head 11 and the shaft 24 turn in the same direction, but at different speeds. As the wires 21 pass through the twister head they will be twisted into the cable 22 and at this point the wires in the cable will have a residual stress tending to untwist the cable slightly. The cable is preferably twisted counterclockwise so that when the cable is being stretched after being pulled from the coil, the twist therein will tend to tighten. As the cable passes over the guide sheaves 26, 27 and 28 and is wound onto the stationary dead block in the same direction of rotation as that in which the twister head turns, the cable tends to be unwound as it goes onto the dead block. By correctly proportioning the speed ratios of the twister head and shaft 24 and the diameter of the dead block the cable may be untwisted just sufficiently to neutralize the residual twisting stress therein so that it lays on the dead block in a neutral coiled condition. The coiled cable can easily be taken from the dead block in indefinite lengths into a container or around a central stem for storage and handling and can easily be taken from the container or stem for use without any snaking or tangling. When the wire on the spools is exhausted, new spools may be substituted and the ends of the wires thereon welded to the ends of the wires on the previous spools so that indefinite lengths of cable can be formed. Therefore, by the present invention twisted cable can easily and economically be handled in much the same manner as single strand wire without requiring tight confinement or reeling it under tension. Furthermore, the cable is easier to handle in use because there is no residual twisting stress therein so that it does not tend to coil or tangle when it is withdrawn from the container or stem.

While one embodiment of the invention has been shown and described herein, it will be understood that it is illustrative only and not to be taken as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. Apparatus for forming a twisted cable comprising a rotatable twister head, means on the twister head for carrying a plurality of spools of wire which is twisted into a cable as the head rotates, a take-off device including a tubular shaft rotatable synchronously with the twister head, the cable from the twister head passing axially through the shaft, a take-up block adjacent to the end of the shaft and coaxial therewith, means holding the take-up block against rotation, and guide means carried by the shaft to guide the cable radially from the shaft and then inwardly onto the block to be wrapped on the block as the shaft turns, the head and shaft turning in the same direction thereby to untwist the cable as it is wound on the block to neutralize residual twisting stress in the cable.

2. Apparatus for forming a twisted cable comprising a rotatable twister head, means on the twister head for carrying a plurality of spools of wire which is twisted into a cable as the head rotates, a take-off device including a tubular shaft rotatable synchronously with the twister head, the cable from the twister head passing axially through the shaft, a take-up block adjacent to the end of the shaft and coaxial therewith, means holding the take-up block against rotation, a first guide roll carried by the shaft on an axis transverse thereto guiding the cable radially outward from the shaft and a pair of axially spaced guide rolls carried by the shaft radially spaced therefrom for rotation therewith, one of said pair of guide rolls receiving the cable from the first guide roll and the second guiding the cable onto the block to be wrapped thereon as the shaft turns, the head and shaft turning in the same direction thereby to untwist the cable to neutralize residual twisting stress therein as the cable is wrapped on the block.

3. Apparatus for forming a twisted cable comprising a tubular rotatable twisting head, a support carried by the head carrying a plurality of spools of wire which is fed into the head and twisted into a cable as the head rotates, a tubular rotatable shaft coxial with the head through which the cable passes axially, a take-up block coaxial with the shaft adjacent to one end thereof, means to hold the take-up block against rotation, guide means carried by and rotatable with the shaft to guide the cable radially outward therefrom and then radially inward onto the block to be wrapped on the block as the shaft turns, and drive means for driving the head and the shaft in the same direction and including reducing means to drive the shaft at lower speed than the head.

4. Apparatus for forming twisted cable comprising a rotatable twister head, means on the twister head carrying a plurality of spools of wire which is twisted into a cable as the head rotates, a take-off device including a tubular shaft rotatable synchronously with the twister head into which the cable passes axially, a take-up block adjacent to the end of the shaft and coaxial therewith, means holding the take-up block against rotation, a first guide roll carried by the shaft on an axis transverse thereto to guide the cable radially outward from the shaft, a pair of spaced guide sheaves carried by the shaft for rotation therewith and spaced apart in a plane at an acute angle to the shaft axis, one of said sheaves receiving the cable from the guide roll and the other guiding the cable onto the block, a third sheave carried by the shaft for rotation therewith angularly spaced from the pair of sheaves and rotatable on an axis parallel to the shaft axis, the cable passing from the block over the third sheave and back to the block to remove any spiral bias therefrom, and means to rotate the head and shaft in the same direction.

5. Apparatus for forming twisted cable comprising a rotatable twister head, means on the twister head carrying a plurality of spools of wire which is twisted into a cable as the head rotates, a take-off device including a tubular shaft rotatable synchronously with the twister head and in the same direction into which the cable passes axially, a take-up block adjacent to the end of the shaft and coaxial therewith, means holding the take-up block against rotation, a first guide roll carried by the shaft on an axis transverse thereto to guide the cable radially outward from the shaft, a pair of spaced guide sheaves carried by the shaft for rotation therewith and spaced apart in a plane at an acute angle to the shaft axis, one of said sheaves receiving the cable from the guide roll and the other guiding the cable onto the block, and paint spray means operated synchronously with rotation of the shaft periodically to spray paint on the cable as it travels from the twister head to the shaft.

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