Jan. 20, 1970 J. R. ALLARD 3,490,222

WIRE PAYOFF NEUTRALIZER

Filed May 9, 1968 3 Sheets-Sheet 1

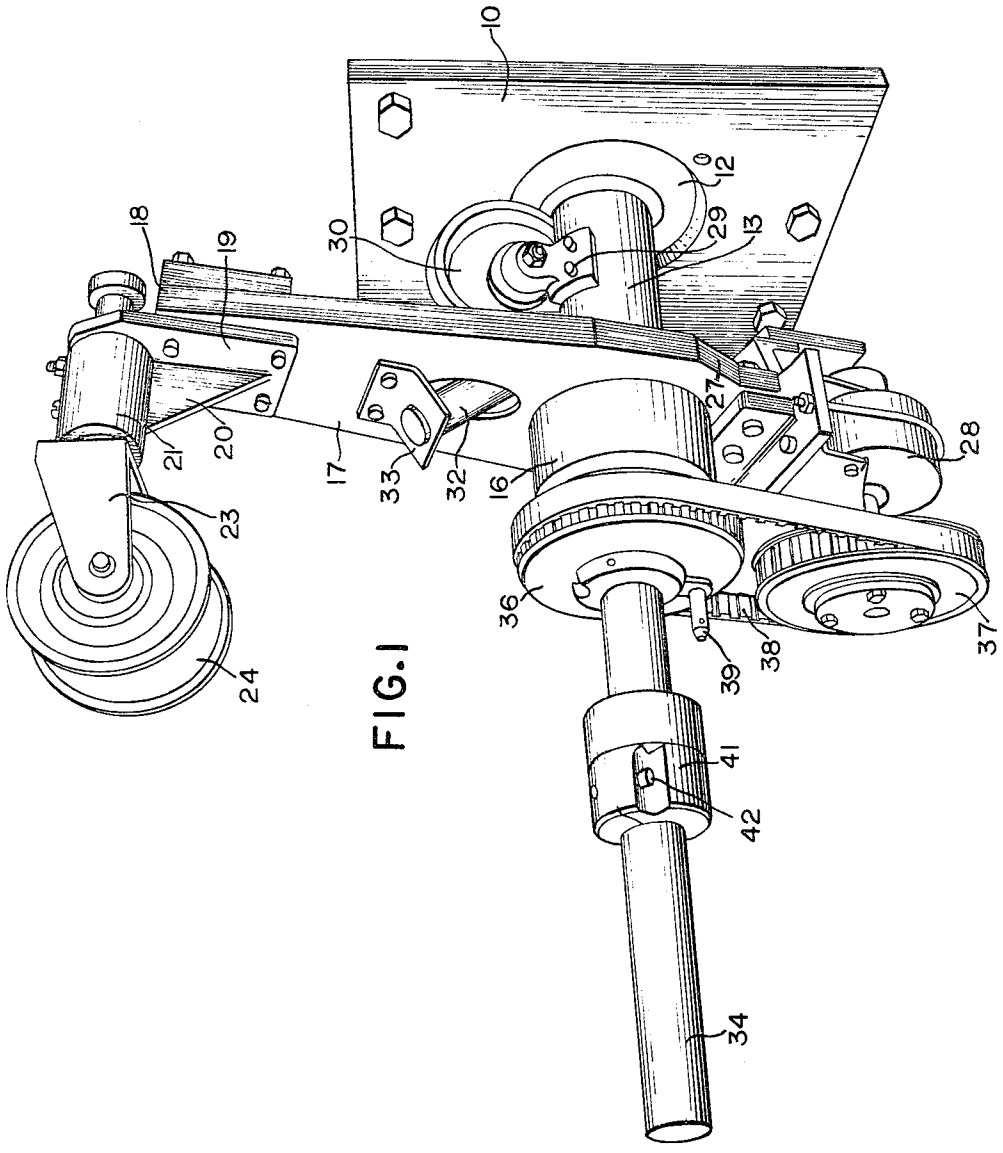


FIG. 1

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WIRE PAYOFF NEUTRALIZER

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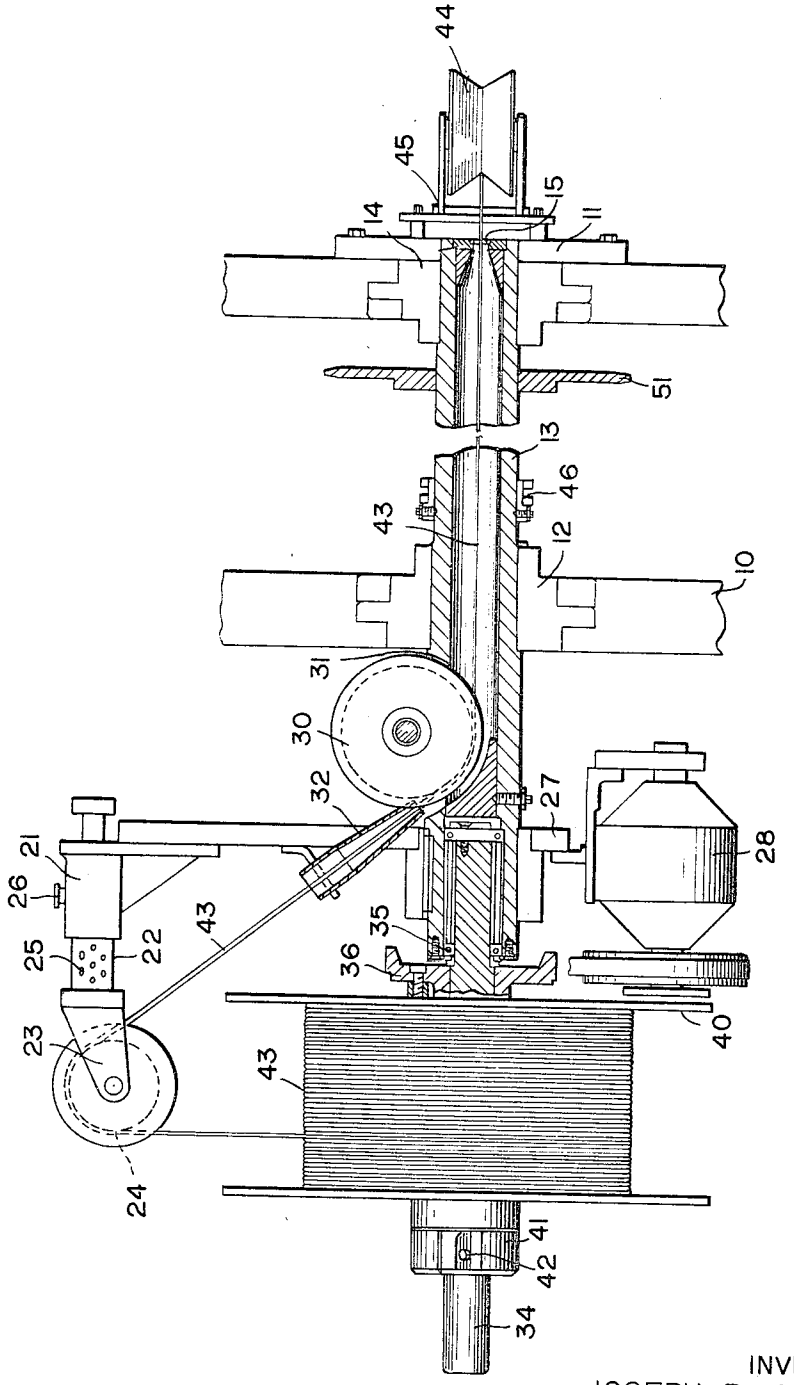


FIG. 2

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WIRE PAYOFF NEUTRALIZER

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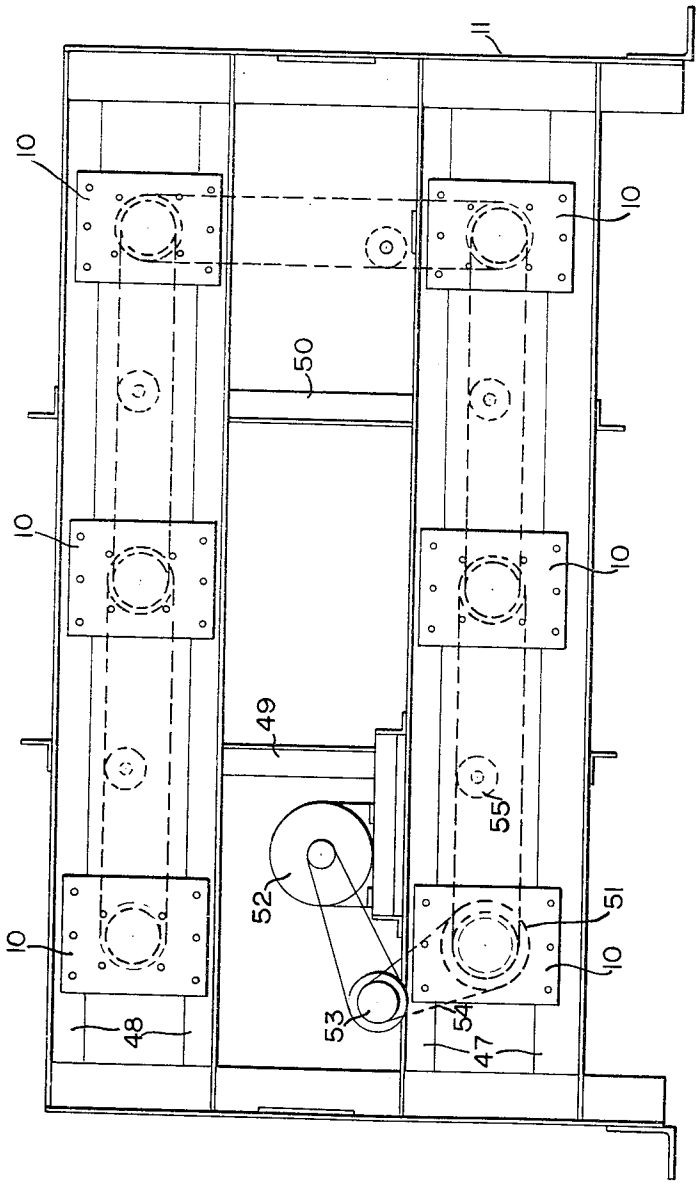


FIG. 3

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3,490,222

WIRE PAYOFF NEUTRALIZER

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Int. Cl. D01b 7/02, 3/02
U.S. Cl. 57—59 15 Claims

ABSTRACT OF THE DISCLOSURE

The invention comprises a device which permits the individual wires of a cable to be payed out linearly to the twisting machine. This permits much higher speeds than the planetary type. The device utilizes a split shaft. The reel is mounted on the idler portion of the shaft and a flyer is mounted on the driven portion of the shaft. The wire runs from the reel to the flyer and back to the inside of the shaft which is hollow. The flyer and shaft rotate at the same speed as the twisting machine and in the same direction. This eliminates the residual twist in the individual conductors or cable strands. By applying a clutching or braking action to the shaft portion on which the reel is mounted, the letoff from the reel can be controlled to provide a predetermined tension and twist.

My present invention relates to cable twisting devices and more particularly to a payoff neutralizer for eliminating the back twist on the strands and the internal strain in the finished cable.

The principal object of the present invention is to provide a device for eliminating the residual twist in the individual strands while feeding them at high speeds linearly to the cable twisting machine.

A further object of the present invention is to provide a payoff neutralizing device which permits accurate control for removing the residual twist and for controlling the tension and number of twists on the individual strands.

Another object of the present invention is to provide a payoff neutralizer which can be readily adapted to handle a plurality of cables in a minimum of space permitting positioning of the device at or adjacent to the twisting machine.

Another object of the present invention is to provide a payoff neutralizing device which will readily keep in step with the higher speeds of the twisting machine and thus permit maximum speed of manufacture of the cable.

A further object of the present invention is to provide a payoff neutralizing device which is simple in construction and easy and economical to manufacture and assemble.

With the above and other objects and advantageous features in view, my invention consists of a novel arrangement of parts, more fully disclosed in the detailed description following, in conjunction with the accompanying drawings, and more particularly defined in the appended claims.

In the drawings,

FIG. 1 is a perspective view of one of the payoff neutralizing units.

FIG. 2 is a longitudinal section through the unit shown in FIG. 1.

FIG. 3 is a side elevation of the supporting frame, the payoff neutralizing units being removed to show the drive.

In the manufacture of cable, both structural and electrical, the individual strands are fed from reels to a twisting machine which receives the multiple strands and rotates them to provide a twist to the finished cable. However, as the individual strands are twisted into cable a residual twist results on each strand which extends rearwardly along the strand. This places an internal strain

on the finished cable which makes it stiff, hard to handle, and difficult to coil properly. To eliminate this, the individual reels are mounted around the perimeter of a planetary device in the form of a large wheel which rotates as the strands are being paid off their individual reels. By turning the planetary device in the same direction as the twist, the residual twist in each strand is eliminated. However, it has been found that the planetary devices are slow, 40 to 50 r.p.m., and 150 to 200 r.p.m. on small reels, and materially slow down the speed at which the twisting machine can be operated.

The present invention thus provides a payoff neutralizing device for eliminating the twist or strain in the individual conductors or strands and permits high speed operation. The device of the present invention is designed to provide a linear movement of the strands rather than a planetary movement of the reels. Thus, the twisting machine can be operated at 400 to 600 r.p.m., and on smaller reels 800 to 1000 r.p.m., and the device of the present invention will keep in step with it. The present invention utilizes a flyer which is rotated at the same speed as the twisting machine. The letoff of the reel is individually controlled to provide the proper tension and twist control. The loading time of the device of the present invention is approximately 25% faster than the planetary type, reducing the down time.

Referring more in detail to the drawings, FIGS. 1 and 2 illustrate a payoff neutralizing unit for handling one reel of wire. The units for each individual reel are identical with this, and, of course, any number of units may be provided. FIG. 3 illustrates a drive mechanism for a device using six units. Each unit comprises a bearing plate **10** which may be mounted at one side of a supporting drive frame **11** shown in FIG. 3. The plate **10** is provided with a large bearing **12** supporting a hollow shaft **13** which extends to the opposite side of the frame **11** into a support bearing **14**. The support bearing **14** is provided with a central opening **15** for a purpose hereinafter to be described.

The shaft **13** extends through the bearing **12** and outwardly of the plate to the left in FIGS. 1 and 2. Mounted adjacent the outer end of the shaft **13** is a heavy collar **16** integrally attached to a large flyer **17** in the form of an elongated plate extending at right angles to the shaft **13** and collar **16** and having a long and a short section on opposite sides of the shaft **13**. The collar **16** is fixed to the shaft **13** so that it rotates with it. At the end of the long section **18** a plate **19** is mounted carrying a bracket **20** extending coaxially with the shaft **13**. The bracket **20** carries a cylinder **21** in which a plunger **22** is slidably mounted. The plunger **22** carries a fork member **23** in which a grooved pulley wheel **24** is rotatably mounted. As the strand of wire leaves the reel in the unit, it must pass over the pulley wheel **24**. It is therefore essential that the pulley wheel **24** be adjustable to different size and widths of reels and be angularly adjustable for the direction of rotation. To this end, the plunger **22** is provided with a plurality of depressions **25** in different angular positions. The cylinder **21** is provided with a dog pointed screw **26**. The screw **26** can thus be loosened and the pulley wheel **24** pulled outwardly as shown in FIG. 2. After its proper distance outwardly and its angle has been determined the screw **26** is then tightened until the dog point engages one of the depressions **25**.

Mounted at the short end **27** of the flyer **17** is a housing **28** containing a tension control clutch or, alternatively, a torque motor. Mounted on the shaft **13**, between the flyer **17** and the bearing plate **10** is a supporting bracket **29** in which a grooved pulley wheel **30** is rotatably mounted, the wheel **30** extending in through a slot

31 to the center of the shaft 13, see FIG. 2. A tapered guide sleeve 32 is angularly mounted in the flyer 17 with its shorter end adjacent the grooves of the pulley wheel 30 and its larger end retained in a bracket 33 mounted on the side of the flyer 17, see FIG. 1.

I now provide an idler shaft 34 mounted in bearings 35 in the end of the hollow shaft 13. This permits independent rotation of the shafts 13 and 34. Adjacent the bearings 35 the shaft 34 is provided with a driving drum 36. The drum 36 is directly above a drum 37 mounted on a shaft from the tension control clutch 28. A belt 38 extends around the drums 36 and 37. The drum 36 is also provided with a laterally extending pin 39 which engages the side of the wire reel 40 when it is mounted on the shaft 34. The reel 40 is held in position on the shaft 34 against the pin 39 by means of a pair of collars 41 with releasable set screws 42 for tightening the split collar on the shaft 34.

Now referring to FIG. 2, the wire 43 leaves the reel 40 vertically to the groove pulley wheel 24. The wire extends over the pulley wheel 24 and then into and through the guide 32 and beneath the pulley wheel 30. The wire 43 now passes through the shaft 13 actually through the center of the shaft and out through the opening 15 on the opposite side of the frame 11. At this point the wire can be set directly into the twisting machine. However, where the twisting machine is positioned at an angle to the side of the frame 11, an additional pulley wheel 44 may be mounted in a bracket 45 around the outside of the bearing opening 15 so that the wire 43 can extend around the groove pulley wheel 44 to the twisting machine.

Now, with the parts assembled as hereinabove described, the wire 43 is drawn into the twisting machine by the operation of the twisting machine itself. This drives the reel 40 causing it and the shaft 34 to rotate. Simultaneously, the shaft 13 is driven through a small sprocket wheel 46 in the frame 11 at the same speed and in the same direction as the twisting machine. It is to be understood that the speed of the shaft 13 may be adjusted, while running, to conform to the speed of the twisting machine. Now, rotation of the shaft 13 will cause rotation of the flyer 17 carried by it. This results in the wire 43, which passes over the pulley wheel 24 on the flyer to be given a twist as it leaves the reel in the same direction as the twisting machine, thus eliminating the residual twist in the wire 43.

It is contemplated that the twisting machine will operate from 400 to 600 r.p.m. giving the individual strands of wire 400 to 600 twists per minute. By rotating the shaft 13 and the flyer 17 at the same speed and in the same direction the residual twist in the individual wire is eliminated. However, the reel is driven by the pull of the wire and the number of twists per foot is controlled by the relationship between the speed of the twisting machine and the linear speed of the wire passing through it. Furthermore, the wire must be at proper tension. To this end the tension control clutch 28 acts as a brake. As the flyer and the clutch both rotate the belt 38 is connected from the clutch to the drum 36 on the reel shaft 34. The clutch can then be operated to provide a braking action on the shaft 34 and reel 40 to provide the necessary tension control and twist control. Instead of the tension control clutch 28, a driving or torque motor may be used to accomplish the same purpose.

To feed the individual strands to a twisting machine, any number of units hereinabove described may be employed. A suitable supporting frame may be provided to hold two or more of these units. In FIG. 3, I have illustrated a drive mechanism for six units on a single frame 11. The frame 11 is provided with suitable horizontal supporting angle irons 47 and 48 and suitable vertical supporting irons 49 and 50. It is preferable to mount the six units three above three as shown in FIG. 3. The lower bearing plates 10 are mounted on the horizontal

angle iron 47 and spaced so that the vertical angle irons 49 and 50 extend between them. The upper bearing plates 10 are mounted on the horizontal angle iron 48 above the lower ones. Each shaft 13 carries a small sprocket wheel 46 and a large sprocket wheel 51. Drive is provided from a large motor 52 driving a small sprocket wheel 53. The sprocket wheel 53 is connected by a sprocket chain 54 to the large sprocket wheel 51 on the shaft 13 immediately below it to the left in FIG. 3. The drive is by a series of sprocket chains from the large wheel 51 to the small wheel 46 on the next shaft to the right and then back over the idler 55 vertically adjustable on the vertical angle iron 49. The idler 55 is vertically adjustable to take out the slack in the drive sprocket chain. Similarly the drive runs from the central lower shaft to the outer shaft to the right and then from there upwardly to the upper shaft to the right from the upper right shaft to the upper central shaft and then finally from the upper central shaft to the upper shaft to the left. Thus each set of sprocket chains passes over two shafts.

The above described drive is of course illustrative. It provides for a simultaneous drive of a plurality of shafts 13 at the same speed. Any other drive device accomplishing the same results may of course be used. The tension control on the individual strands of wire may be simultaneous or may be individually controlled at each shaft. This is optional.

It is thus obvious that by feeding the individual strands linearly through the hollow shafts 13 large cumbersome rotations of multiplicity of wheels is eliminated. The speed of the neutralizer is only limited by the speed with which the flyer 17 can rotated. Again, by driving the flyer at between 400 and 600 r.p.m., the same speed as the twisting machine the resultant cable is without internal strain and the individual conductors or strands are free of residual twists. The cable will lie limp and will coil easily without twisting. Other advantages of the present invention will be readily apparent to a person skilled in the art.

I claim:

1. A payoff neutralizer for a cable twisting machine comprising a support, a hollow shaft rotatably mounted in said support, a flyer mounted adjacent one end of said shaft, means for rotatably mounting a reel of wire in axial alignment with the end of said shaft, the wire passing from the reel to the outer end of said flyer and then into and through said shaft to a cable twisting machine, and means for rotating said shaft and flyer.

2. A payoff neutralizer as in claim 1, wherein said shaft and flyer are rotated in the same direction and at the same speed as the cable twisting machine.

3. A payoff neutralizer as in claim 1, wherein said reel mounting comprises a bearing mounted in the end of said shaft, an auxiliary shaft in axial alignment with said shaft and having one end mounted in said bearing to allow independent rotation of said shaft and auxiliary shaft, a drum wheel mounted on said auxiliary shaft and having a pin for engaging a reel of wire, a movable collar mounted on said auxiliary shaft for locking a reel against said drum, and means for rotating said drum and auxiliary shaft.

4. A payoff neutralizer as in claim 1, wherein said flyer comprises an elongated plate, said shaft passing through said plate adjacent one end thereof to provide a long and a short section extending at right angles to said shaft, a grooved pulley wheel rotatably mounted adjacent the end of said long section, a pulley wheel mounted on said shaft and communicating with the inside thereof, and a guide mounted on said flyer and extending toward said pulley wheel, the wire from the reel extending over said grooved pulley wheel, through said guide and beneath said pulley wheel into said shaft.

5. A payoff neutralizer as in claim 3, wherein said shaft

and flyer are rotated in the same direction and at the same speed as the cable twisting machine.

6. A payoff neutralizer as in claim 4, wherein said shaft and flyer are rotated in the same direction and at the same speed as the cable twisting machine.

7. A payoff neutralizer as in claim 3, wherein said drum and auxiliary shaft rotating means is adjustable for controlling the speed and tension of the wire leaving the reel.

8. A payoff neutralizer as in claim 4, wherein a clutch device is mounted at the end of said short section, a shaft extends from said clutch device, a drum is mounted on said shaft, and a belt extends around said drum and reel mounting means, said clutch controlling the speed and tension of the wire leaving the reel.

9. A payoff neutralizer as in claim 8, wherein said clutch device includes a torque motor.

10. A payoff neutralizer as in claim 1, wherein said support comprises an open frame and a plurality of hollow shafted units are mounted in said frame, said rotating means driving the said plurality of shafts simultaneously.

11. A payoff neutralizer as in claim 7, wherein said shaft and flyer are rotated in the same direction and at the same speed as the cable twisting machine.

12. A payoff neutralizer as in claim 8, wherein said shaft and flyer are rotated in the same direction and at the same speed as the cable twisting machine.

13. A payoff neutralizer as in claim 3, wherein said flyer comprises an elongated plate, said shaft passing through said plate adjacent one end thereof to provide a long and a short section extending at right angles to said shaft, a grooved pulley wheel rotatably mounted adjacent the end of said long section, a pulley wheel mounted on said shaft and communicating with the inside thereof, and a guide mounted on said flyer and extending toward said pulley wheel, the wire from the reel extending over said grooved pulley wheel, through said guide and beneath said pulley wheel into said shaft.

14. A payoff neutralizer as in claim 13, wherein said drum and auxiliary shaft rotating means is adjustable for controlling the speed and tension of the wire leaving the reel.

15. A payoff neutralizer as in claim 13, wherein a clutch device is mounted at the end of said short section, a shaft extends from said clutch device, a drum is mounted on said shaft, and a belt extends around said drum and reel mounting means, said clutch controlling the speed and tension of the wire leaving the reel.

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U.S. Cl. X. R.

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