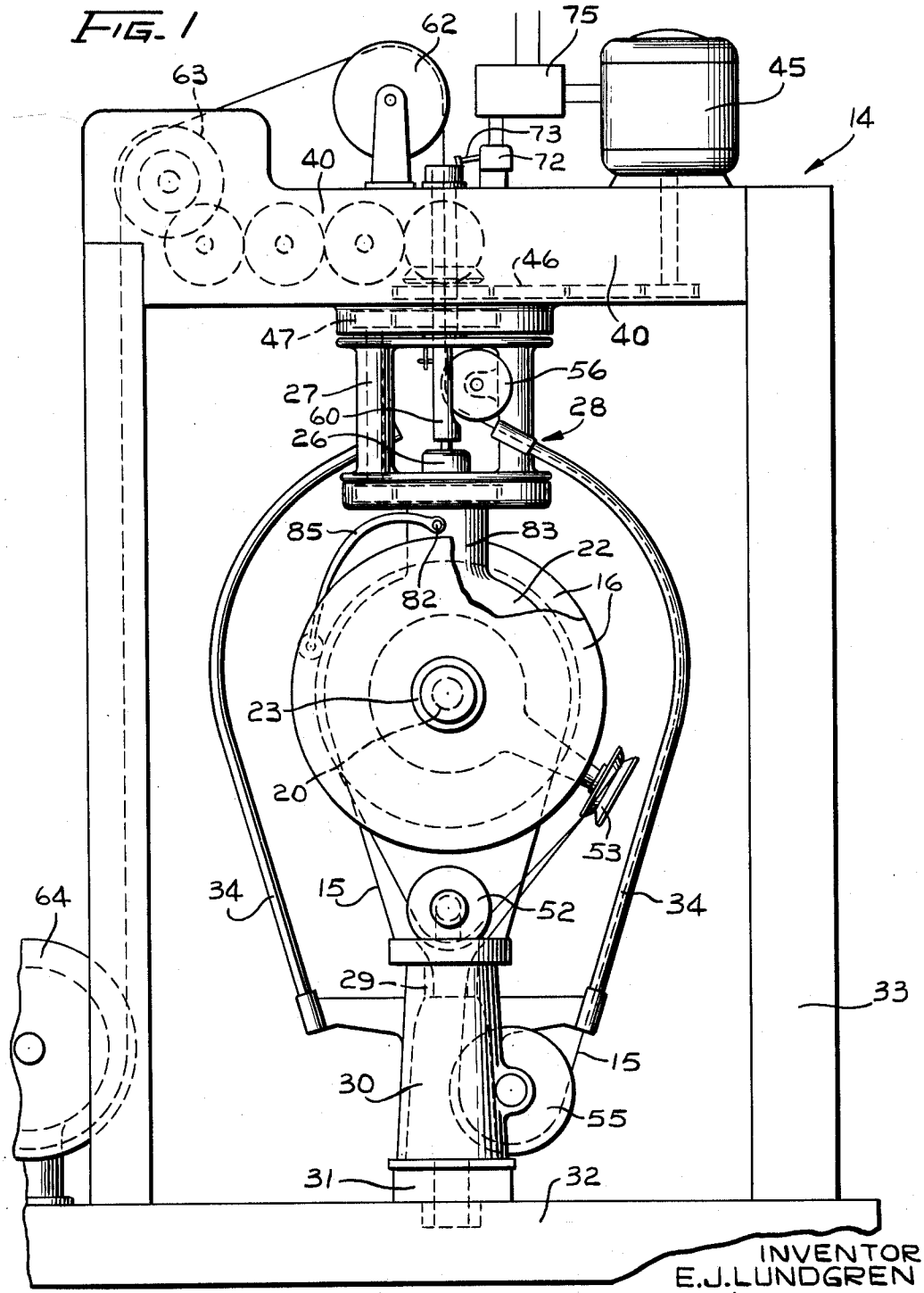
March 8, 1966 E. J. LUNDGREN 3,238,711

WIRE DEPLETION CONTROL FOR WIRE TWISTING APPARATUS

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FIG. 1



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FIG. 2

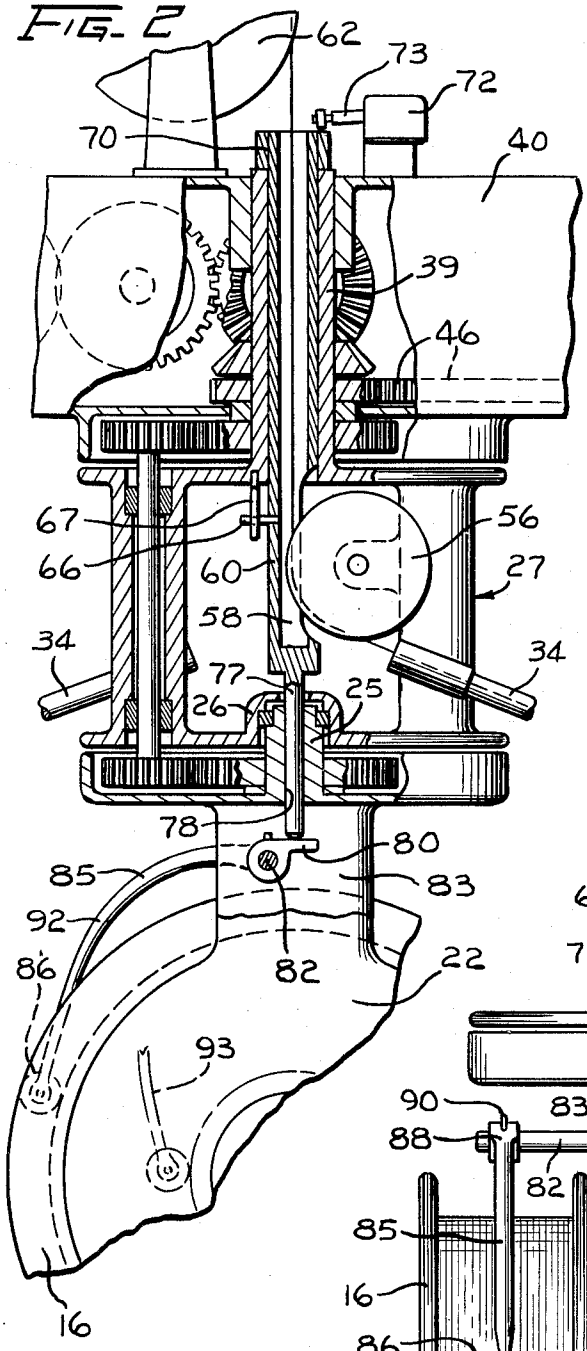


FIG. 4

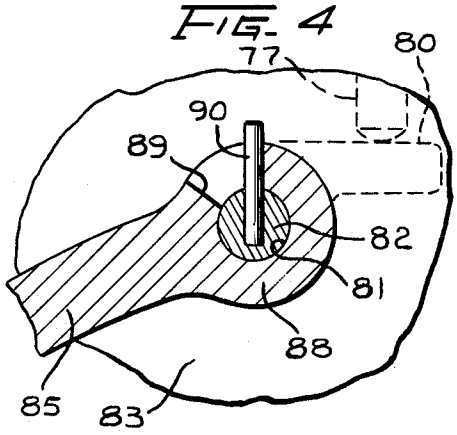
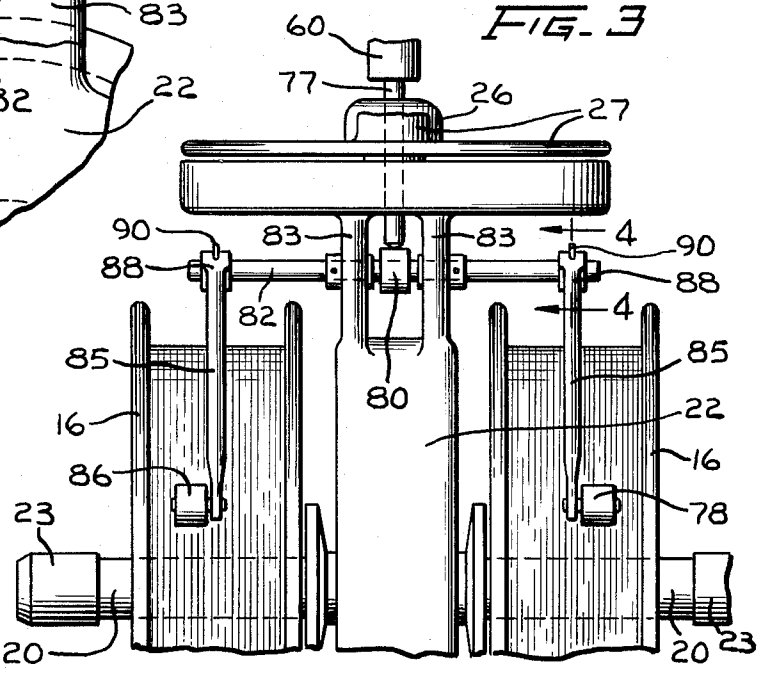


FIG. 3



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WIRE DEPLETION CONTROL FOR WIRE TWISTING APPARATUS

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This invention relates to a wire depletion control mechanism, and more particularly to a wire depletion control mechanism for high speed wire twisting apparatus.

An object of the invention is to provide a novel and effective wire depletion control for wire twisting apparatus.

A control mechanism illustrating certain features of the invention as applied to a wire twisting apparatus may include an actuating rod mounted in the uper head of a flyer of the wire twisting apparatus for rotation therewith about a vertical axis and for limited vertical movement relative thereto. The flyer is driven by a motor drive about a pair of reels and a support therefor and serves to twist the wires about a vertical axis as the wires are withdrawn from the reels and are guided along a predetermined path and directed upwardly along the axis through a vertical passageway in the actuating rod during a portion of their advancing movement, the twisted wires being wrapped around and advanced by a capstan and wound onto a take-up reel, the capstan and the take-up reel being driven by the motor drive.

The control mechanism includes a switch fixedly mounted above the actuating rod for actuation thereby in response to the movement of the rod to a predetermined upper position for rendering the motor drive unoperative and stopping the apparatus. At its lower end the actuating rod engages a lifting cam which is secured to a shaft pivotally supported on the reel supporting member. Sensing arms individual to the reels and biased into engagement with the wire thereon are operatively connected to the shaft through lost motion connections and are effective individually when the major portion of the wire has been unwound from the reel to impart pivotal movement to the lifting cam and effect the actuation of the control switch and the stopping of the wire twisting apparatus when the condition of the wire on the reel approaches depletion.

Other objects, advantages and novel aspects of the invention will become apparent upon consideration of the following detailed description, in conjunction with the accompanying drawings, in which:

FIG. 1 is a fragmentary side elevational view of a wire twisting apparatus embodying the present invention;

FIG. 2 is an enlarged fragmentary vertical sectional view of the wire twisting machines;

FIG. 3 is an elevational view of a portion of the mechanism shown in FIG. 2 and looking from the left-hand side thereof; and

FIG. 4 is an enlarged detailed sectional view through a portion of one of the sensing elements of the control mechanism taken on the line 4—4 of FIG. 3.

Referring to the drawings, the invention is illustrated in connection with a conventional wire twisting apparatus 14 for withdrawing a pair of wires 15 from a pair of supply reels 16 and twisting the wires together for use in telephone communication lines and the like. The supply reels 16 are rotatably supported on a pair of spindles 20 extending horizontally from opposite sides of a stationary support 22 and the reels are locked onto the spindles 20 by removable locking collars 23.

At its upper end, the support 22 is provided with a trunnion 25 (FIG. 2) that is journaled in a bearing 26 on the upper head 27 of a rotatable flyer 28, and at its lower end, the support 22 is provided with a hollow trunnion 29 (FIG. 1) that is supported in a hollow lower head 30 of the flyer. The lower head 30 of the flyer is supported on a bearing 31 on a base 32 of a frame 33 of the apparatus. A pair of tubular wire guides 34 secured to the lower head 30 of the flyer extend upwardly around the reels 16 and the frame member 22 and are secured to the upper head 27 of the flyer.

Extending upwardly from the upper head 27 of the flyer is a hollow trunnion 39 (FIG. 2) which is rotatably supported in suitable bearings in an upper member 40 of the frame 33. Rotation is imparted to the flyer 28 by a motor 45 through suitable gearing 46 interconnecting the motor and the hollow trunnion 39 of the flyer. Suitable gearing 47 is provided for holding the support 22 against rotation while the flyer 28 is rotating.

The wires 15 are withdrawn individually from the pair of supply reels 16 and are guided over fixed pulleys 52 and 53 individual to the reels 16 and are directed downward through the hollow trunnion 29 and are twisted together as they advance onto a pulley 55 on the lower head 30 of the rotating flyer. The pair of twisted wires are then directed upwardly through one of the tubular guides 34 onto a guide pulley 56 on the flyer head 27 and are further twisted as they advance upwardly through an axial passageway 58 of an actuating rod 60 supported in the hollow trunnion 39 of the flyer. The pair of wires continues around a pulley 62 supported on the upper frame member 40, is wrapped around and advanced by a capstan 63 and is wound onto a take-up reel 64. The capstan 63 and the take-up reel 59 are driven by suitable drive means from the motor 45.

The actuating rod 60 forms part of the wire depletion control and is mounted within the hollow trunnion 39 for limited vertical movement relative thereto, and is keyed for rotation with the flyer by means of a pin 66 (FIG. 2) which extends laterally from the hollow rod 60 and is guided for vertical movement in a slot formed between a pair of fingers 67 secured to the head 27 of the flyer. At its upper end the hollow actuating rod 60 has secured thereto a collar 70 which forms a shoulder for engaging the upper end of the hollow trunnion 39 to limit the downward movement of the actuating rod and to support it in a predetermined lower position.

A switch 72 is mounted on the upper frame member 40 adjacent the upper end of the control rod 60 and has an actuating element 73, one end of which is positioned above the collar 70 for actuation thereby. The switch 72 is connected to a control circuit indicated diagrammatically at 75 (FIG. 1) for effecting the disconnection of the motor 45 from a source of electrical power and the stopping of the twisting apparatus in response to actuation of the switch.

The lower end portion 77 of the hollow rod 60, which is solid and of reduced diameter, is slidably supported in a bore 78 in the trunnion 25 of the stationary support 22 and is engageable at the lower extremity thereof with a cam or lifting member 80. The cam 80 is secured to the intermediate portion of a shaft 82 that is journaled for oscillatable movement in spaced bearing portions 83 of the stationary support 22. Mounted on the laterally extending end portions of the shaft 82 are two feelers or sensing arms 85 that curve laterally and downwardly from the shaft 82 and have weighted rollers 86 (FIG. 3) secured to the free ends thereof for biasing the sensing arms into engagement with the wire on the reels 16.

The apertured hubs 88 on the upper end of the sensing arms 85 are provided with slots 89 (FIG. 4) that cooperate with pins 90 on the shaft 82 to connect the sensing arms to the shaft and to permit limited pivotal movement relative thereto. The pin and slot lost motion

connection between the sensing arms 85 and the shaft 82 permits free movement of the weighted end of either of the sensing arms 85 from an outer position indicated at 92, FIG. 2, in which it is supported on a full reel of wire to a second or intermediate position indicated in dotted lines at 93 in which the sensing arm is supported on the wire after a predetermined major portion of the wire has been unwound from the supply reel. At this point, the sensing arm 85 is operatively connected to the shaft 82 and supports the cam 80 in engagement with the lower extremity of the end portion 77 of the actuating rod 60. As the wire continues to unwind and approaches the state of depletion, further movement of the sensing arm 85 will effect the raising of the actuating rod 60 through the cam 80 and the actuation of the switch 72, through the actuating element 73, when the supply of wire has been reduced to a predetermined amount, to cause the twisting apparatus to come to a stop, through the control circuit 75, with a relatively short length of wire remaining on the reel.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In a wire twisting apparatus having:
stationary means for supporting a pair of reels of wire concentric with a horizontal axis;
a flyer rotatable about the reels and said reel supporting means for guiding the wires from the reels through a predetermined path and twisting them about a vertical axis;
means for supporting said flyer for rotation about said vertical axis;
drive means for rotating said flyer and for advancing the wires;
the combination therewith of a wire depletion control comprising an actuating rod mounted on said flyer coincident with said vertical axis for rotation with said flyer and for limited vertical movement relative thereto and having a passageway for guiding the twisted wire upwardly along said axis from a position within the path of rotation of said flyer to a position outside of such path;
sensing members individual to said reels pivotally mounted on said reel supporting means within such path of said flyer and biased into engagement with the wire on the reels;
means mounted on said stationary means within the path of said flyer and responsive to the unwinding of the wire from either one of the reels to a condition approaching depletion and the movement of the sensing member associated therewith to a predetermined position for raising said actuating rod to a predetermined upper position; and
means mounted on the outside of the path of said flyer and responsive to the movement of said actuating rod to said upper position for rendering said drive means unoperative.

2. A wire twisting apparatus comprising:
stationary means for supporting a pair of reels of wire concentric with a horizontal axis;
a flyer rotatable about a vertical axis and about the reels and said reel supporting means for twisting the wires as they advance along said axis;
stationary frame means for supporting said flyer for rotation;
an actuating element mounted on said flyer for rotation therewith about said vertical axis and for limited vertical movement relative thereto and having a passageway for movement of the twisted wires upwardly along said axis from a position within the path of rotation of said flyer to a position outside of such path;

a lifting member pivotally mounted on said reel supporting means within the path of said flyer for imparting vertical movement to said actuating member;
a pair of feeler arms individual to said reels pivotally mounted on said reel supporting means within the path of said flyer and biased for movement into engagement with the supply of wire thereon;
means mounted on said stationary frame means within the path of said flyer and operatively connecting the feeler arms to said lifting member and operable in response to the unwinding of the wire from either one of said reels to a condition approaching depletion and the movement of either one of said feeler arms to a predetermined position for actuating said lifting member to effect the movement of said actuating element to a predetermined upper position;
drive means for effecting the rotation of said flyer and the advancement of said wires; and
means including a control member mounted outside of the path of said flyer and actuated by the movement of said actuating element to the upper position for rendering said drive means unoperative.

3. A wire twisting apparatus comprising:
stationary means for supporting a pair of reels of wire concentric with a horizontal axis;
a flyer rotatable about a vertical axis and about the reels and said reel supporting means for twisting the wires as they advance along said axis;
stationary frame means for supporting said flyer for rotation;
an actuating rod mounted on said flyer for rotation therewith about said vertical axis and for limited vertical movement relative thereto and having a passageway for movement of the twisted wires upwardly along said axis;
a shaft mounted on said reel supporting means for oscillatory movement about an axis parallel to said horizontal axis;
a cam secured to said shaft for imparting vertical movement to said actuating rod;
a pair of feeler arms individual to the reels pivotally supported on said shaft;
means for biasing said feeler arms into engagement with the supply of wire on the reels;
means for connecting said feeler arms to said shaft for limited pivotal movement relative thereto to a predetermined position to permit the unwinding of a predetermined amount of the wire from said reels and for effecting the rotation of said shaft in response to further unwinding of the wire to effect the rotation of said cam and movement of said actuating rod to a predetermined upper position;
drive means for effecting the rotation of said flyer and the advancement of said wires; and
means including a control member actuated by the movement of said actuating rod to said upper position for rendering said drive means unoperative.

4. Apparatus as defined in claim 3 wherein said means for connecting said feeler arms to said shaft comprises a slot in one end of each of said arms and a pin on said shaft individual to said arms and cooperable with said slot therein; and
wherein said means for biasing said feeler arms comprises a weighted roller supported at the other end of each of said arms.

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