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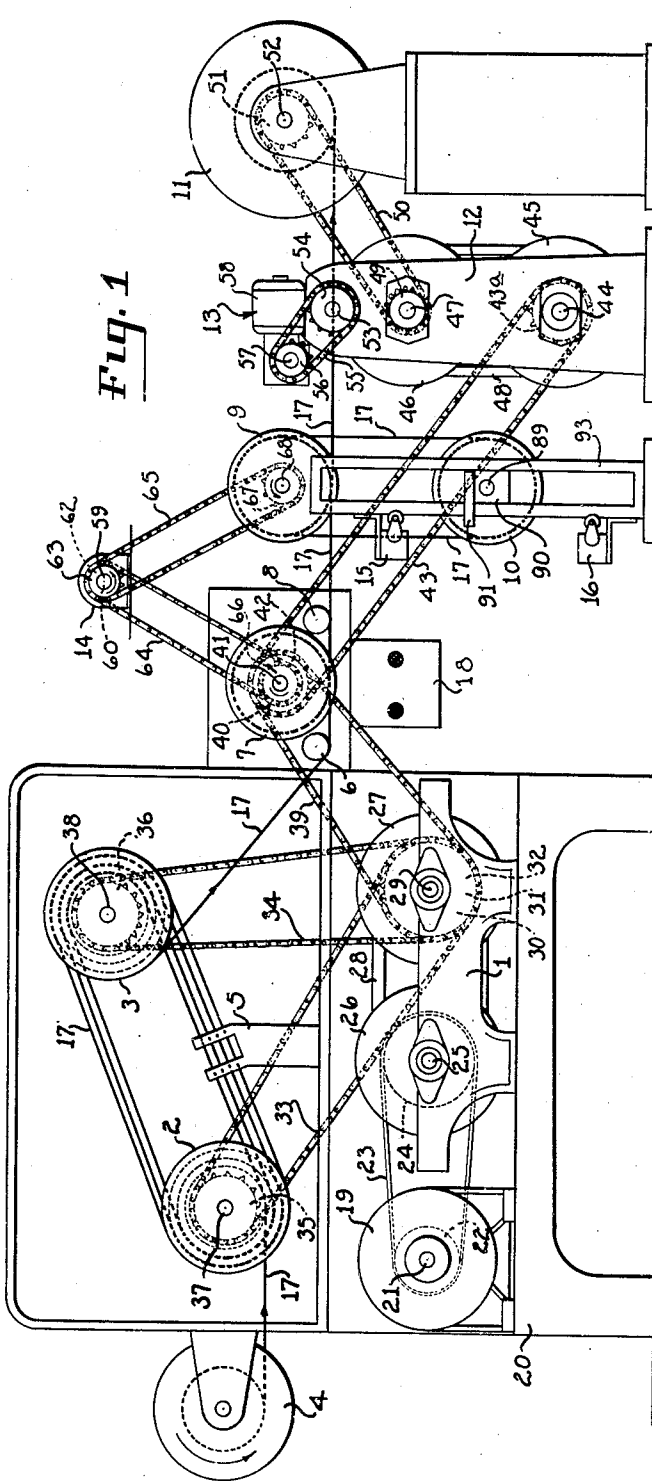
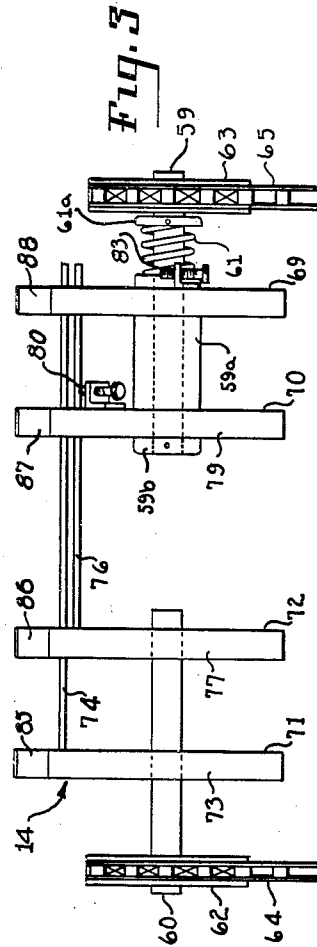
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2,255,935

WIRE DRAWING AND SPOOLING APPARATUS

Filed Nov. 25, 1938

3 Sheets-Sheet 1



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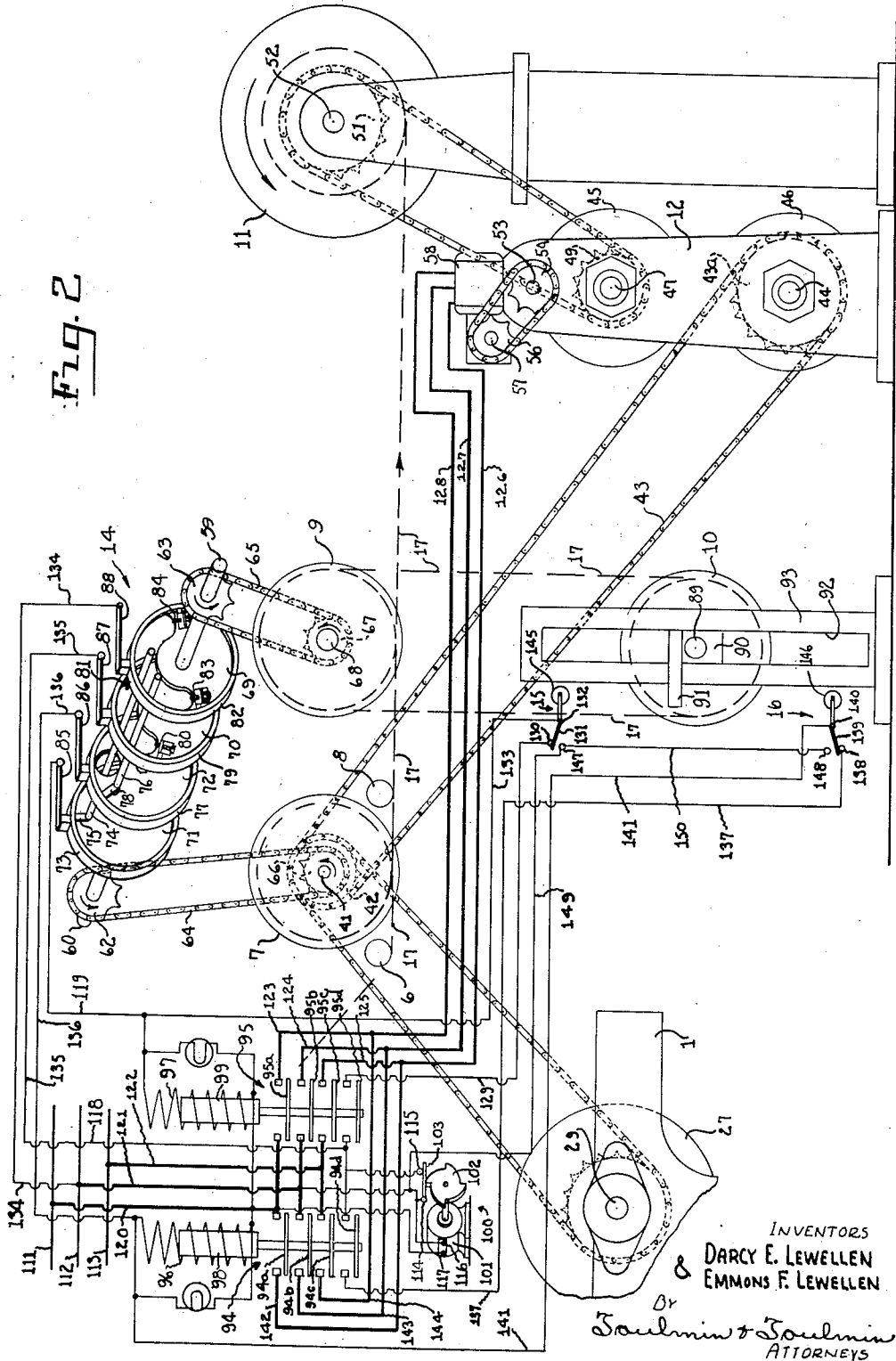
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WIRE DRAWING AND SPOOLING APPARATUS

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Fig. 2



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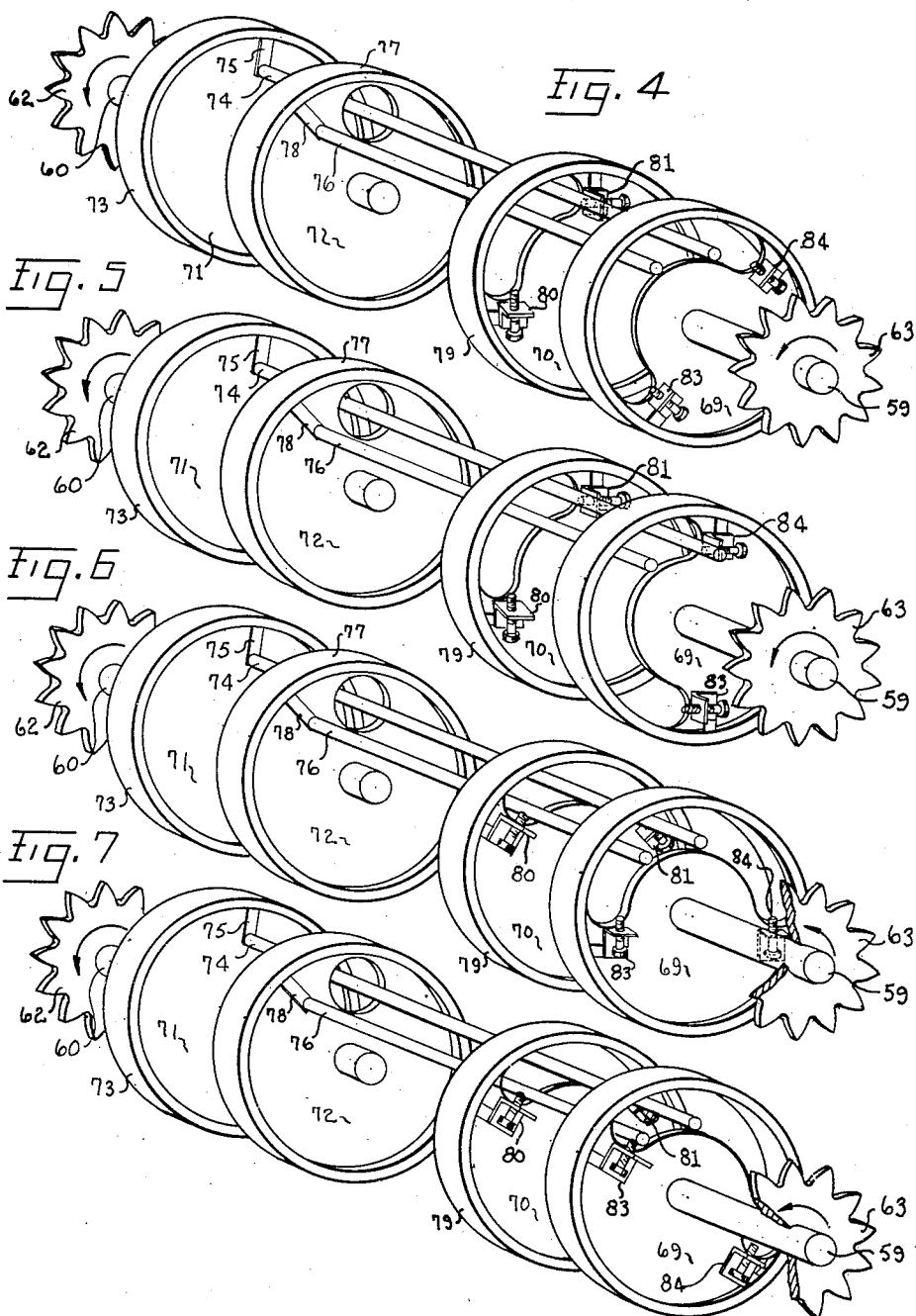
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WIRE DRAWING AND SPOOLING APPARATUS

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3 Sheets-Sheet 3



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2,255,935

WIRE DRAWING AND SPOOLING APPARATUS

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Application November 25, 1938, Serial No. 242,252

13 Claims. (Cl. 242—25)

This invention relates to wire drawing and spooling apparatus, and in particular, to control systems for controlling such apparatus.

One object of this invention is to provide a wire drawing and spooling apparatus having a control system which controls the speed at which the wire is drawn by means responsive to the speed of the wire.

Another object is to provide a wire drawing and spooling apparatus, wherein the speed of the wire actuates electrical control mechanisms for increasing or decreasing the speed at which the wire is being wound upon its receiving spool in response to the speed of the wire being drawn.

Another object is to provide a wire drawing and spooling apparatus, wherein an electrical control system is provided for altering the speed of the wire-receiving spool to compensate for the angular position of the wire as it is wound in layers on the spool, and also to compensate for the different diameters of these layers of wire as the winding proceeds, this electrical control system being responsive to the speed of the wire being drawn.

In the drawings:

Figure 1 is a side elevation of the wire drawing and spooling apparatus arranged according to the present invention.

Figure 2 is a diagrammatic perspective view of the electrical control system and the principal mechanical elements of the apparatus shown in Figure 1 controlled by this electrical control system.

Figure 3 is a side elevation of the electrical control contactor employed in the electrical control system of Figure 2.

Figures 4, 5, 6 and 7 are perspective views of the principal elements of the electrical control contactor with the elements thereof in different positions, according to the different behavior of the apparatus during operation.

In general, the wire drawing and spooling apparatus of this invention consists of a supply spool, sheaves upon which the wire runs while being drawn through the drawing dies to reduce its diameter to the desired dimensions, a capstan for pulling the wire to create the drawing force, a plurality of control drums around which the wire passes in loops, these drums being employed for control purposes, and a receiving spool for receiving the wire which has been drawn. The sheaves and the capstan are driven by a first variable speed transmission at a suitable speed, whereas the receiving spool is driven by a second variable speed transmission, the speed of which

is controlled by a pilot motor which, in turn, is controlled by a rotary contactor. This rotary contactor includes a pair of independently rotating shafts, one shaft being driven from the capstan and the other from one of the control drums. According to the relative speeds of the two shafts, certain contacts are made or broken, whereby the pilot motor of the second variable speed transmission is caused to rotate in a forward or reverse direction to alter the setting of the second variable speed transmission in accordance with the speed of the wire so that the receiving spool will be driven at a speed which compensates for the varying speed of the wire due to the angularity of its position as it passes from one end of the receiving spool to the other end thereof, while being wound, and also to compensate for the varying diameters of the layers of wire as they accumulate upon the receiving spool.

Hitherto, wire drawing and spooling apparatus has been controlled by means responsive solely to the tension of the wire, the control mechanism being operated by changes in the tension of the wire as governed by a spring-urged mechanism. In contrast to this, the present invention regulates the winding of the wire upon the receiving spool, according to the speed of the wire rather than merely according to its tension.

In winding wire on a receiving spool, even though the spool runs at a constant speed and is winding a single layer of wire across the spool, the speed of the wire actually increases as it is wound from the center toward the end of the spool, in either direction. The speed also decreases as the layer being wound starts from the end of the spool and winds toward the center of the spool from either side thereof. In addition to the change of the speed of the wire, due to its position upon the spool in a given layer, the speed of the wire also increases when it starts winding on the next layer outward from the axis of rotation of the spool. This constantly changing speed of the wire thus takes place in conformity with the changing location of the wire upon the spool, even though the spool is run at a constant speed. In the present invention this changing in the speed of the wire during winding varies the speed of one shaft of the rotary contactor and causes the engagement of electrical contacts which act to increase or decrease the speed at which the receiving spool is being driven so as to maintain an approximately constant winding speed for the wire. In short, therefore, the present invention provides control means sensitive only to the speed of the wire for controlling the speed at which the receiving spool is being driven.

Mechanical construction

The mechanical elements of the apparatus are shown in Figure 1. The principal mechanical elements are generally designated as a first variable speed transmission 1 for driving the sheaves 2 and 3, with multiple diameter grooves upon which the wire is drawn from a wire supply spool 4, through the drawing dies 5, the wire then passing under a roller 6, thence around a capstan 7 and under a roller 8, to a fixed control drum 9. After passing around the drum 9 the wire continues around a vertically movable control drum 10 to form a plurality of loops, which vary in length as the control drum 10 moves up and down. The control drums 9 and 10 are provided with a plurality of grooves so that the wire makes a plurality of loops before proceeding onward to the receiving spool 11. The receiving spool 11 is driven by a second variable speed transmission 12, the speed of which is adjusted by a pilot-operated device 13, in accordance with the operation of the rotary control contactor 14. The electrical control system is likewise subject to the control of an upper limit switch 15 and a lower limit switch 16, operated in response to the rising or falling of the control drum 10. The wire itself is designated 17 during its entire course from the wire supply spool 4 to the wire-receiving spool 11. A signal box 18 is provided for indicating the operative condition of the electrical circuit. A motor 19, mounted upon the frame 20, operates the apparatus.

The motor 19 is provided with a drive shaft 21 carrying a pulley 22, from which a belt 23 drives a pulley 24 on the input shaft 25 of the cones 26 of the first variable speed transmission 1. The cones 26 are connected with the cones 27 by means of the belt 28. The cones 27 are mounted upon the output shaft 29 which carries sprockets 30, 31 and 32. From the sprockets 30 and 31 the chains 33 and 34 drive the sprockets 35 and 36 upon the shafts 37 and 38 of the sheaves 2 and 3, respectively. From the sprocket 32 the chain 39 drives the sprocket 40 upon the shaft 41 of the capstan 7. Also mounted upon the capstan shaft 41 is a sprocket 42 from which a chain 43 drives a sprocket 43^a on the input shaft 44 of the second variable speed transmission 12. The shaft 44 carries the cones 45 which drive the cones 46 on the output shaft 47 by means of the belt 48. The output shaft 47 carries a sprocket 49 from which the chain 50 drives the sprocket 51 upon the receiving spool shaft 52, by which the wire-receiving spool 11 is driven.

The second variable speed transmission is provided with a speed-adjusting shaft 53 by the rotation of which the cones 45 and 46 may be moved toward or away from one another so as to vary the output speed of the transmission for a given input speed. The constructions of the variable speed transmissions 1 and 12 are conventional and are known to those skilled in the art. The control arrangement involving the control shaft 53 and the pilot-operated device 13 is disclosed in the Lewellen Patent No. 2,117,486, issued May 17, 1938. For this purpose the speed-adjusting shaft 53 carries a sprocket 54, from which a chain 55 extends around the sprocket 56 on the low speed output shaft 57 of the pilot motor 58.

The rotary control contactor 14 is provided with shafts 59 and 60, carrying sprockets 62 and 63 (Figure 2) from which the chains 64 and 65 run to sprockets 66 and 67 upon the capstan shaft

41 and control drum shaft 68 respectively. The operation of the pilot-operated device 13 is controlled in accordance with the relative speeds of the shafts 59 and 60 of the rotary contactor 14, as hereinafter explained. In the rotary contactor 14 the shaft 59 carries discs 69 and 70, whereas the shaft 60 carries discs 71 and 72. The discs 69, 70, 71 and 72 are made of insulating material. The discs 69 and 70 are loosely mounted upon the shaft 59, whereas the discs 71 and 72 are firmly fixed to the shaft 60 (Figure 3). The loosely mounted discs 69 and 70 are spaced apart by a spacer 59^a and yieldingly urged by a coil spring 61 toward a collar 59^b fixed to the shaft 59. Spring 61, in turn, engages a second collar 61^a, likewise fixed to the shaft 59. The drive is thus a yielding drive by reason of the spring 61 holding these loosely mounted parts against the collar 59^b.

The disc 71 carries a metallic contact band 73 for conducting electricity to and from a contact bar 74 mounted in the disc 71, and connected to the band 73 by the conductor 75. A similar contact bar 76 is mounted upon the disc 72, and is connected to the contact band 77 thereon through the conductor 78. The disc 70 carries a contact band 79 which is electrically connected to adjustable contacts 80 and 81. The disc 69 carries a contact band 82, which is electrically connected to the contacts 83 and 84. The contacts 80, 81, 83 and 84 are preferably in the form of screws so that they are adjustable as regards their positions of engagement with the contact bars 74 and 76. Contact with the bands 73, 77, 79 and 82 is made by means of the arms 85, 86, 87 and 88, respectively. The control drum 10 is mounted upon a shaft 89, which is rotatably supported in the bearing blocks 90, one of which carries an arm 91 for actuating the limit switches 15 and 16. The bearing blocks 90 move up and down in guide slots 92 within the frame 93, according to the length of the loops formed by the wire 17 as the strands pass between the drums 9 and 10.

Electrical circuit and operation

In the electrical control circuit the various wires shown in Figure 2 are most conveniently designated during the discussion of the operation. In addition to the motors and switches previously described, the circuit of Figure 2 contains a pair of four-blade contactor switches 94 and 95 having operating coils 96 and 97 and armatures 98 and 99. Also provided is an intermittent contactor 100, consisting of a motor 101 rotating a star cam 102 engaging a switch blade 103. In the circuit of Figure 2 the power lines for supplying current to the pilot motor 58 are indicated with heavy lines, and the control circuit in light lines.

Current from an outside source is supplied through the power lines 111, 112 and 113. Before starting the winding operation the wire 17 is passed from the supply spool 4, around the various grooves in the sheaves 2 and 3, thence around the roller 6, the capstan 7 and the roller 8, thence around the multiple grooves on the control drums 9 and 10 so as to form a plurality of loops therebetween, and finally from the last groove in the drum 9 to the wire-receiving spool 11. As the control drum 9 is fixed to the shaft 68, the movement of the wire 17 drives the shaft 68 in a counterclockwise direction, and by means of the sprockets 67 and 63 and chain 65 drives the shaft 59 of the rotary control contactor in

a counterclockwise direction. The shaft 41 of the capstan 7 drives the other shaft 60 of the rotary control contactor 14 through the sprockets 66 and 62 and chain 64, as previously mentioned. The main driving motor 19 is then started and drives the first variable speed transmission 1, the output shaft 29 of which drives the sheaves 2 and 3, the capstan 7 and the input shaft 44 of the second variable speed transmission 12, as previously described. The first variable speed transmission 1 is adjusted so as to give an output speed suitable for moving the wire 17 at an appropriate rate through the drawing dies 5 by which the wire is successively reduced to smaller diameters. The output speed of the output shaft 47 of the second variable speed transmission 12 is automatically adjusted during operation, in accordance with the shifting of its speed-adjusting shaft 53 by the pilot motor 58, in accordance with the action of the rotary control contactor 14 and the electrical circuit associated therewith.

The purpose of the automatic control system including the rotary contactor 14 is to cause the second variable speed transmission 12, through its output shaft 47, to drive the wire-receiving spool shaft 52 at a rotational speed which will wind the wire on the receiving spool 11 at approximately the same speed as the speed possessed by the wire passing from the capstan 7. When the shafts 59 and 60 of the rotary control contactor 14 are revolving at exactly the same speeds, no control action takes place because the contact bars 74 and 76 of the rotary contactor 14 cannot come into engagement with any of the contacts 80, 81, 83 or 84. As the wire 17 is drawn through the drawing dies 5 and is subsequently wound upon the wire-receiving spool 11, the diameter of the winding on the spool 11 increases. Furthermore, as the linear speed of the wire 17 increases, due to the change in angularity of the wire in traveling from one side of the spool 11 to the other, the speed of the shaft 68 will be increased and with it the speed of the rotary control contactor shaft 59. As both of the rotary control contactor shafts 59 and 60 rotate in the same counterclockwise direction, when the speed of the shaft 59 is increased slightly by the increased speed of the wire as it is wound upon the wire-receiving spool 11 for the foregoing reasons, the contact screw 81 comes into engagement with the contact bar 74.

In the intermittent contactor 100 the motor 101 rotates the star cam 102, which opens and closes the circuit through the switch blade 103 at a regularly timed rate, so as to intermittently connect and disconnect the contacts 114 and 115. The intermittent contactor motor 101 operates continuously because the circuit is completed from the power line 112 to the motor contact 116, thence through the motor windings to the motor contact 117, and thence back to the power line 111. When the switch blade 103 is closed upon the contacts 114 and 115 by the star cam 102, the circuit is completed from the power line 112 to the contact 114, through the switch blade 103, the contact 115, thence through the wire 118, the contact arm or brush 87, the band 79, the contact 81, the contact bar 74, the connection 75, the band 73, the contact arm or brush 85, the wire 119, the operating coil 97 of the contactor switch 95, the line 120 to the power line 111 (Figure 2).

This energizes the coil 97 and closes the blades 95^a to 95^d of the contactor switch 95, thereby connecting the power lines 120, 121 and 122 with the lines 123, 124 and 125 running to the pilot motor lines 126, 127 and 128, respectively.

When the contacts of the switch 95 are thus closed, a holding circuit is formed through the lowest switch blade 95^d of the switch 95, from the power line 112, through the line 121, the contact 114, the intermittent contactor switch blade 103, the contact 115, the lowest switch blade 95^d, the line 129, the contact 130 and switch blade 131 of the upper limit switch 15, the contact 132, the line 133, the operating coil 97 of the contactor switch 95, the power line 120 to the power line 111. Thus the operating coil 97 is maintained energized and the contactor switch 95 kept closed, even though the engagement of the rotary contactor contact 81 with the contact bar 74 should be broken. This action prevents arcing at the contact points in the rotary contactor 14. The contactor switch 95, therefore, holds its switch blades 95^a to 95^d in engagement with their contacts, energizing the pilot motor lines 126, 127 and 128 and causing the pilot motor 58 to rotate until the intermittent contactor 100, through its star cam 102, permits the switch blade 103 to open the circuit between the contacts 114 and 115 thereof, thereby deenergizing the contactor switch 95 and stopping the pilot motor 58. While the pilot motor 58 is rotating, however, it rotates the adjusting shaft 53 of the second variable speed transmission 12 so as to vary the speed of the output shaft 47 and correspondingly vary the speed of the wire-receiving spool shaft 52. This is accomplished by shifting the discs 45 and 46 of the second variable speed transmission 12 so as to reduce the speed of the wire-receiving spool shaft 52.

If the contact 81 and the bar 74 continue in engagement, by reason of the fact that this first speed adjustment of the variable speed transmission 12 is not sufficient to correct the out-of-speed condition of the wire-receiving spool shaft 52, the next closing of the intermittent contactor contacts 114 and 115, through the switch blade 103, will make another speed correction of the variable speed transmission 12 and will continue in this manner until the rotary contactor shafts 59 and 60 are brought into synchronism. When this synchronism occurs the rotary contactor contact 81 and the contact bar 74 will move out of engagement, breaking the previously described control circuit, deenergizing the operating coil 97 of the contactor switch 95, opening the switch blades thereof and halting the pilot motor 58 and discontinuing the speed corrections of the second variable speed transmission 12. In the event that an excessive out-of-speed condition of the shafts 52 and 59 exists relatively to the shafts 60 and 41, the disc 70 will halt with its contact 81 in engagement with the contact bar 74, while the spring 61 permits the disc 69 and shaft 59 to continue to move so as to bring the contact 84 into engagement with the contact bar 74 (Figure 5). When this occurs a control circuit will be completed from the power line 112, through the line 134, the contact arm or brush 88, the band 82, the contact 84, the contact bar 74, the connection 75, the band 73, the contact arm or brush 85, the line 119, the operating coil 97 of the contactor switch 95 and the line 120 to the power line 111, energizing and closing the contactor switch 95 if it is not already closed. This action bridges the intermittently acting

switch blade 103 of the intermittent contactor 100 and causes the pilot motor 58 to be energized from the contactor switch 95, through the lines 123 to 128, whereupon the pilot motor 58 rotates continuously to rotate the speed-adjusting shaft 53 until the second variable speed transmission 12 has altered the speed of the wire-receiving spool shaft 52 until the rotary contactor shafts 59 and 60 come into synchronism. When synchronism occurs the contacts 84 and 81 become disengaged from the contact bar 74, in the manner previously described, and the pilot motor 58 halts. In this manner any slight out-of-synchronism condition between the shafts 52 and 59 and the shafts 41 and 60 is corrected by slight intermittent movements of the pilot motor 58 and adjusting shaft 53 of the second variable speed transmission 12, whereas any excessive out-of-speed synchronism condition is corrected by a continuous movement of the same parts of the second variable speed transmission 12.

If, however, the speed of the wire 17 being wound upon the wire-receiving spool 11 should be such as to rotate the drum 9 and rotary contactor shaft 59 at a slightly slower speed than the rotary contactor shaft 60, the contact 80 of the rotary contactor disc 70 will move into engagement with the contact bar 76 (Figure 6). In that case, when the intermittent contactor switch blade 103 closes upon its contacts 114 and 115, a circuit is completed from the power line 112, by way of the line 121, the contact 114, the switch blade 103, the contact 115, the line 135, the contact arm or brush 87, the band 73 on the disc 70, the contact 80, the contact bar 76, the connection 78, the band 77, the contact arm or brush 86, the line 136, the operating coil 96 of the contactor switch 94 and the line 120 to the power line 111, thus energizing the coil 96 and closing the switch blades 94^a to 94^d of the contactor switch 94 upon their contacts. When this occurs a holding circuit is completed from the power line 112, by way of the line 121, the contact 114, the switch blade 103, the contact 115, the switch blade 94^d, the line 137, the contact 138, the switch blade 139 and contact 140 of the lower limit switch 16, the line 141, the operating coil 96 and the line 120 to the power line 111, continuing the energization of the coil 96 and holding the contactor switch 94 closed until the switch blade 103 is released by the star cam 102. This likewise prevents arcing at the rotary contactor contact points.

While the contactor switch 94 is closed the pilot motor 58 is energized to rotate in a reverse direction from the rotation previously described, by way of the power line 111, the line 120, the switch blade 94^a, the line 142 and the line 126 to the motor 58. Another circuit is also completed from the power line 112, through the line 121, switch blade 94^b and the lines 143 and 127, to the motor 58. The third circuit is completed from the power line 113, through the line 122, the switch blade 94^c and the lines 144 and 128, to the motor 58. Thus the pilot motor 58 rotates to rotate the adjusting shaft 53 of the variable speed transmission 12 in a reverse direction to increase the speeds of the output shaft 47, the wire-receiving spool shaft 52 and the rotary contactor shaft 59 relatively to the rotary contactor shaft 60.

In case of an excessive and continued reduction in the speeds of the shafts 47, 52 and 59 relatively to the shaft 60 of the rotary contactor 14, the contact 80 remains in engagement with the con-

tact bar 76, but the spring 61 (Figure 3) permits the disc 69 to rotate until the contact 83 thereon also engages the contact bar 76 (Figure 7). A circuit is then completed from the power line 112, line 134, contact arm or brush 88, band 82, the contact 83, the contact bar 76, the connection 78, band 77, the contact arm or brush 86, line 136, operating coil 96 and line 120 to the power line 111, energizing the operating coil 96 and closing or holding closed the contactor switch 94. This action bridges the contacts 114 and 115, the switch blade 103 of the intermittent contactor 100 and causes the pilot motor 58 to be energized and rotate continuously to adjust the speed-adjusting shaft 53 of the second variable speed transmission 12 until the shafts 52, 68 and 59 are brought into synchronism again with the shafts 60 and 41, whereupon the contacts 83 and 80 will disengage themselves from the contact bar 76.

During the drawing operation the increasing diameter of the outer layer of wire on the wire-receiving spool 11 will increase the speed of the wire 17 as it is wound on the spool, and will also increase the speed of the drum shaft 68. The drums 9 and 10 are used to provide an amount of accumulated wire in loops between the capstan 7 and the wire-receiving spool 11. During the different synchronizing operations described above, this amount of accumulated wire may increase or decrease and raise or lower the drum 10. To prevent the drum 10 from moving too high or too low in the guide slot 92, the limit switches 15 and 16 are provided. These are limit switches of the snap type, which are normally closed upon the contacts 132 and 130 of the upper switch 15 or 140 and 138 of the lower switch 16, as shown in Figure 2. When the rollers 145 and 146 on these switches have moved a predetermined amount by their engagement with the arm 91 on the bearing block 90 of the lower drum 10, the switch blade 131 or 139 of the upper switch 15 or lower switch 16 is moved to engage the opposite contact 147 or 148, depending upon whether the drum 10 has reached the upper or lower limit of its travel. The spring in each switch 15 or 16 holds the switch blade normally in the position indicated in Figure 2, and returns it to this position after the arm 91 has released the roller 145 or 146.

Assuming that the loops of accumulated wire 17 are decreasing in length so that the drum 10 is moved upward, then when the arm 91 engages the roller 145 so as to shift the switch blade 131 from contact 130 to contact 147, a circuit is completed from the power line 111, by way of the line 120, the coil 97, the line 133, the contact 132 of the upper limit switch 15, the switch blade 131, the contact 147, the line 149 and the line 121 to the power line 112, energizing the operating coil 97 and closing the switch blades 95^a to 95^d of the contactor switch 95 upon their contacts, thus energizing the pilot motor 58 to move the speed-adjusting shaft 53 of the second variable speed transmission 12 in a direction to reduce the speed of the wire-receiving spool shaft 52 and the speed of the wire 17, thus allowing the loops thereof to increase in length and lowering the drum 10 in the guide slot 92. As this drum is lowered the switch roller 145 is moved by the spring in the switch in the opposite direction until it reaches the point where the switch blade 131 interconnects the contacts 132 and 130. The circuits previously described are then set to automatically synchronize the speeds through the

contacts of the rotary contactor 14, and the control circuits operate in the previously described manner to again synchronize the speeds of the rotary contactor shafts 59 and 60. During the time the pilot motor 58 has been energized through the engagement of the contacts 132 and 147 of the upper limit switch 15, however, additional wire has accumulated in the loops between the drums 9 and 10 and the drum 10 will therefore be in a lower position in the guide slot 92.

A similar action takes place in the event that the drum 10 moves to the lower end of the slot 92 upon an abnormal lengthening of the loops of wire between the drums 9 and 10. In that event the roller 146 is engaged by the arm 91 shifting the switch blade 139 of the lower contactor switch 16 to interconnect the contacts 140 and 148 thereof. In this event a circuit is completed from the power line 112, by way of the line 121, the line 149, the contact 147, the line 150, the contact 148, the switch blade 139 of the lower limit switch 16, the contact 140, the line 141, the operating coil 96 and the line 120, to the power line 111, energizing and closing the contactor switch 94. This action energizes and reverses the rotary movement of the pilot motor 58 so that it rotates the speed-adjusting shaft 53 in a direction to increase the speed of the output shaft 47 of the variable speed transmission 12 and likewise to increase the speed of the wire-receiving spool shaft 52 and accordingly increase the speed of the wire 17 being wound upon the wire-receiving spool 11. This action decreases the amount of wire in the loops extending between the drums 9 and 10 and raises the drum 10 to a higher point in the guide slot 92. The arm 91 then releases the roller 146 and the switch blade 139 of the lower limit switch 16 returns to its engagement with the contact 138, after which time the contacts in the rotary contactor 14 will again synchronize the speeds of the rotary contactor shafts 59 and 60.

It will be understood that we desire to comprehend within our invention such modifications as come within the scope of the claims and the invention.

Having thus fully described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In spooling mechanism adapted to be used with a wire-drawing apparatus, a winding spool, constant speed means for feeding wire towards said spool, variable speed driving means for driving the winding spool at different speeds, a first electrical control means operatively driving at a constant speed by said feeding means a second electrical control means operatively driven by the speed of the wire, said control means being arranged for asynchronous operation for adjustably varying the output speed of said variable speed driving means whereby to increase or decrease the speed of the winding spool to compensate for the varying layer diameter and positions of the wire as it is wound on the spool.

2. In spooling mechanism adapted to be used with a wire-drawing apparatus, a winding spool, means for feeding wire towards said spool, and means directly responsive to the linear speed of said wire for maintaining a predetermined length of wire loop between said feeding means and said winding spool.

3. In spooling mechanism adapted to be used with a wire-drawing apparatus, a winding spool, means for feeding wire towards said spool, means

for maintaining a predetermined length of wire loop between said feeding means and said winding spool within predetermined limits, and means directly responsive to the linear speed of said wire for regulating the speed of said winding spool whereby to compensate for a change in length of said predetermined length of wire loop.

4. In spooling mechanism adapted to be used with a wire processing system, a wire-receiving spool, means for feeding wire towards said wire-receiving spool, variable speed driving mechanism connected to drive said wire-receiving spool and having a speed varying member, a pilot motor for moving said speed-varying member, and speed-synchronizing switch mechanism electrically connected to said pilot motor and operatively connected to said wire-feeding means and responsive to the speed of the wire entering said wire-receiving spool to alter the energization of said pilot motor to increase or decrease the speed of said wire-receiving spool.

5. In spooling mechanism adapted to be used with a wire processing system, a wire-receiving spool, means for feeding wire towards said wire-receiving spool, variable speed driving mechanism connected to drive said wire-receiving spool and having a speed-varying member, a pilot motor for moving said speed-varying member, a rotatable element engaging said wire for rotation thereby, and speed-synchronizing switch mechanism electrically connected to said pilot motor and operatively connected to said wire-feeding means and to said rotatable element for altering the energization of said pilot motor to increase or decrease the speed of said wire-receiving spool in response to the speed of the wire being wound upon said wire-receiving spool.

6. In spooling mechanism adapted to be used with a wire processing system, a wire-receiving spool, means for feeding wire towards said wire-receiving spool, variable speed driving mechanism connected to drive said wire-receiving spool and having a speed-varying member, a pilot motor for moving said speed-varying member, a rotatable element engaging said wire for rotation thereby, speed-synchronizing switch mechanism electrically connected to said pilot motor and operatively connected to said wire-feeding means and to said rotatable element for altering the energization of said pilot motor to increase or decrease the speed of said wire-receiving spool in response to the speed of the wire being wound upon said wire-receiving spool, means for forming a loop of wire between said wire-moving means and said wire-receiving spool, and means responsive to the length of said loop for varying the adjustment of said speed-varying member.

7. In spooling mechanism adapted to be used with a wire processing system, a wire-receiving spool, means for feeding wire towards said wire-receiving spool, variable speed driving mechanism connected to drive said wire-receiving spool and having a speed-varying member, a pilot motor for moving said speed-varying member, a rotatable means supported by the wire between said wire receiving spool and said wire feeding means the wire passing around the rotatable means under tension, said rotatable means being responsive to changes in the length of wire between said wire feeding means and said wire receiving spool for altering the energization of said pilot motor to increase or decrease the speed of said wire-receiving spool.

8. In spooling mechanism adapted to be used

with a wire processing system, a wire-receiving spool, means for feeding wire towards said wire-receiving spool, variable speed driving mechanism connected to drive said wire-receiving spool and having a speed-varying member, a pilot motor for moving said speed-varying member, means for forming a loop of wire between said wire-drawing means and said wire-receiving spool and having a rotatable member engaging the wire for rotation thereby, synchronizing switch mechanism electrically connected to said pilot motor and rotatably connected to said wire-feeding means and to said rotatable member for altering the energization of said pilot motor to increase or decrease the speed of said wire-receiving spool, and means responsive to the length of said loop for additionally regulating the actuation of said pilot motor.

9. In spooling mechanism adapted to be used with a wire processing system, wire-receiving means, variable speed driving mechanism connected to drive said receiving means and having a speed-adjusting member, means for feeding wire towards said wire-receiving means, an electric motor connected to said speed-adjusting member for reversibly rotating the same, and a synchronizing switch connected to regulate the supply of electricity to said motor, said synchronizing switch having one portion movably connected to said wire-feeding means and another portion movable in response to the speed of the wire entering said wire-receiving means.

10. In spooling mechanism adapted to be used with a wire processing system, wire-receiving means, variable speed driving mechanism connected to drive said receiving means and having a speed-adjusting member, means for feeding wire towards said wire-receiving means, an electric motor connected to said speed-adjusting member for reversibly rotating the same, and a synchronizing switch connected to regulate the supply of electricity to said motor, said synchronizing switch having one portion movably connected to said wire-feeding means and another portion movable in response to the speed of the wire entering said wire-receiving means, said switch portions having contacts mounted thereon and engageable in response to an asynchronous speed relationship between the wire emerging from said feeding means and the wire entering said wire-receiving means.

11. In spooling mechanism adapted to be used with a wire processing system, wire-receiving means, variable speed driving mechanism connected to drive said receiving means and

having a speed-adjusting member, means for feeding wire towards said wire-receiving means, an electric motor connected to said speed-adjusting member for reversibly rotating the same, and a synchronizing switch connected to regulate the supply of electricity to said motor, said synchronizing switch having one portion movably connected to said wire-feeding means and another portion movable in response to the speed of the wire entering said wire-receiving means, said switch portions having contacts mounted thereon and engageable in response to an asynchronous speed relationship between the wire emerging from said feeding means and the wire entering said wire-receiving means, said contacts upon engagement being adapted to transmit electricity to said electric motor.

12. In spooling mechanism adapted to be used with a wire processing system, wire-receiving means, variable speed driving mechanism connected to drive said receiving means and having a speed-adjusting member, means for feeding wire towards said wire-receiving means, an electric motor connected to said speed-adjusting member for reversibly rotating the same, a synchronizing switch connected to regulate the supply of electricity to said motor, and an element rotatably engaged by the wire entering said wire-receiving means, said switch having a rotatable member with contacts rotatably connected to said wire-feeding means and a second rotatable member with contacts rotatably connected to said rotatable element, said contacts being engageable upon the arising of asynchronism between the speed of the wire emerging from said feeding means and the speed of the wire entering said wire-receiving means.

13. In spooling mechanism adapted to be used with a wire drawing apparatus, a winding spool, means for feeding wire toward said spool, variable speed driving means for driving the spool at different speeds, means responsive to the linear speed of the wire for regulating the speed of said winding spool, means around which the wire passes under tension for regulating the length of a wire loop between said wire feeding means and said spool, said means including means movable in response to changes in the length of said loop, and means responsive to the changing position of said last mentioned means for augmenting control of the speed regulation of said variable speed driving means.

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