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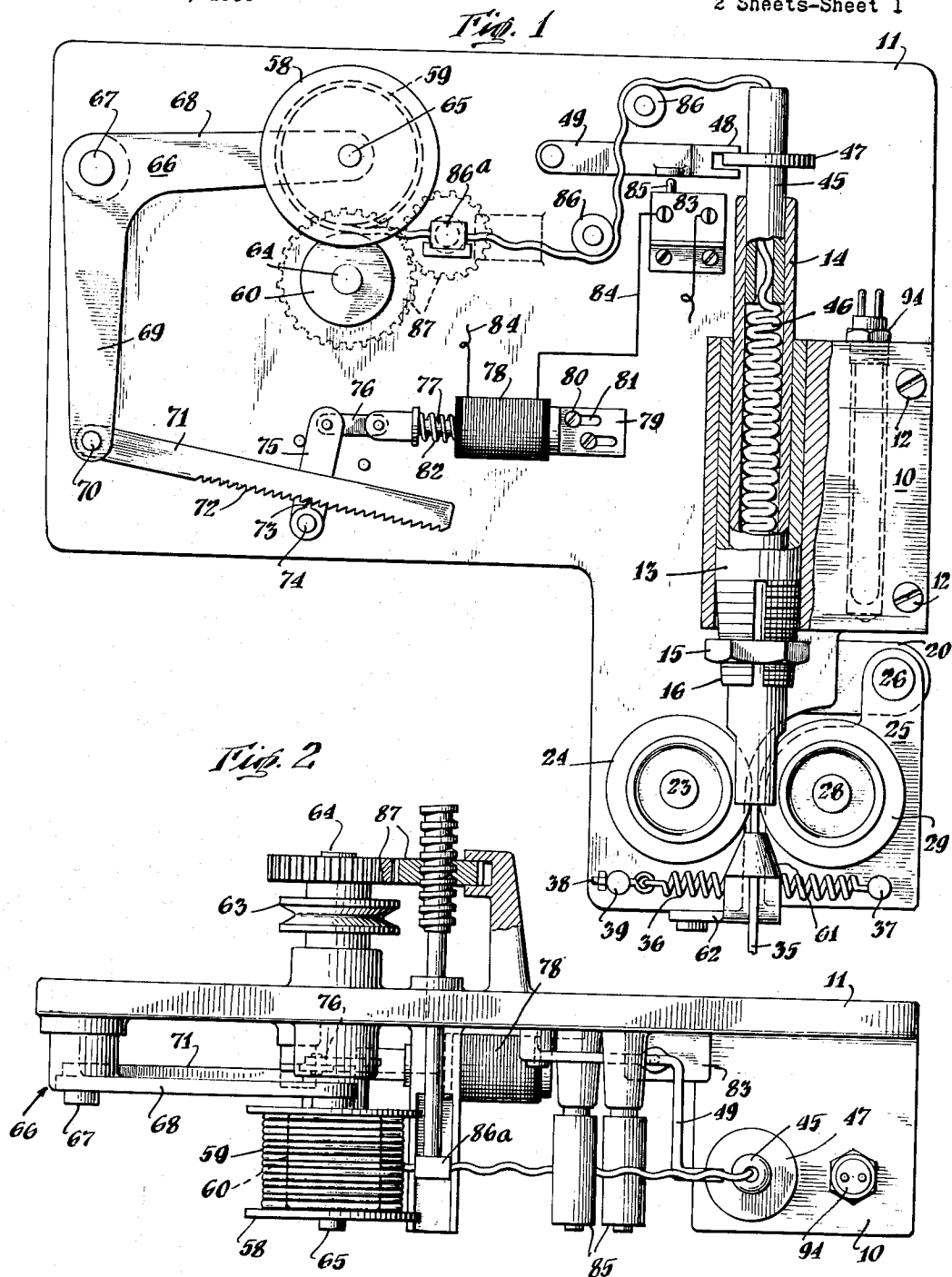
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CRIMPING AND WINDING APPARATUS

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2 Sheets-Sheet 1



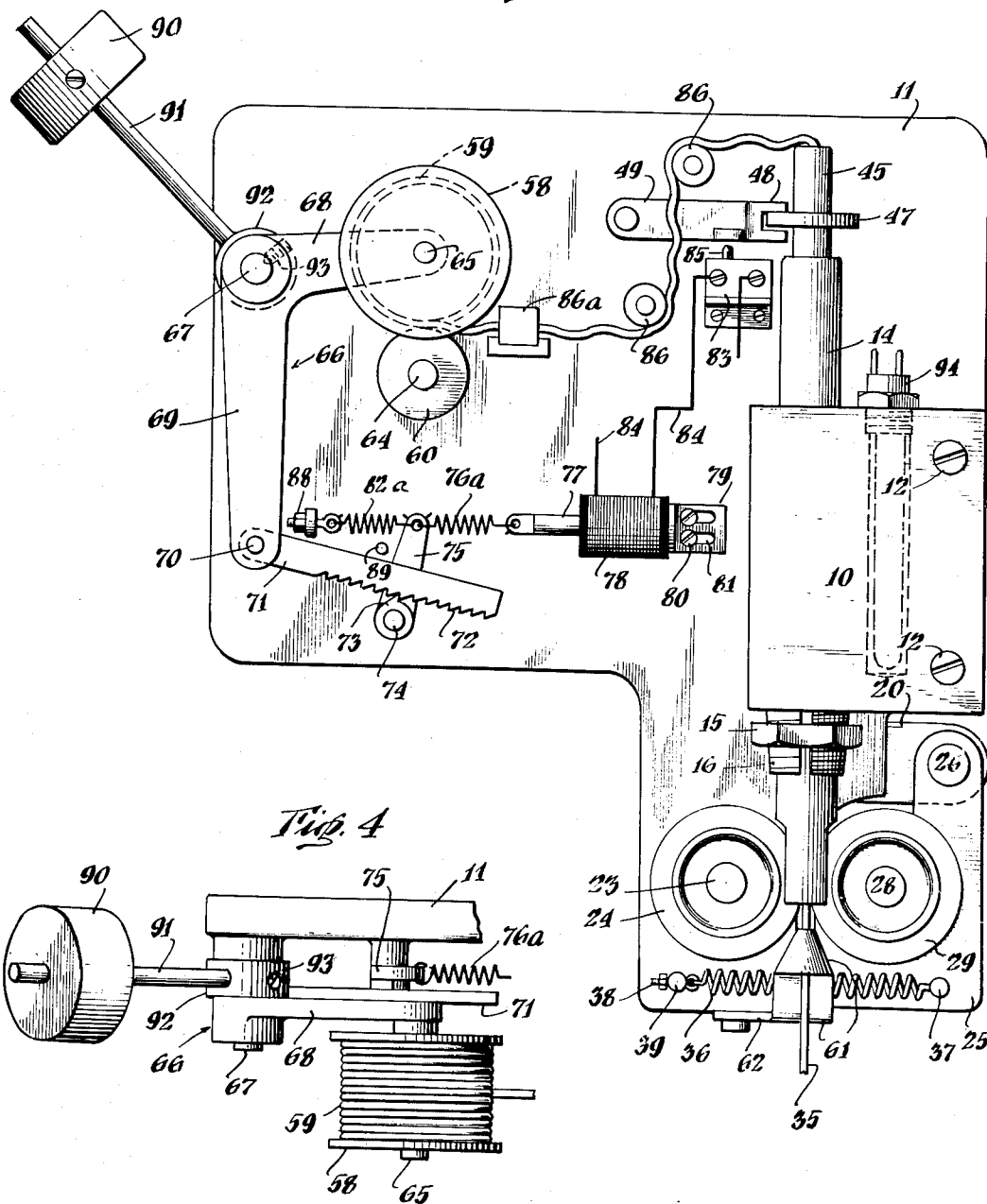
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2 Sheets-Sheet 2

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*Tip. 3*



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## CRIMPING AND WINDING APPARATUS

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8 Claims. (Cl. 19—66)

This invention relates to apparatus for crimping continuous filament yarn and tow and has for an object to provide an apparatus of the above type having novel and improved characteristics.

Another object is to provide in a stuffer crimper novel and improved means for regulating the rate of withdrawal from the crimping chamber.

Another object is to provide mechanism for controlling the rate of withdrawal of the crimped filament from the crimping apparatus by a winder of the constant speed type.

Other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

The nature of the invention will be better understood from the following description, taken in connection with the accompanying drawings in which specific embodiments of the invention have been set forth for purposes of illustration.

In the drawings:

Fig. 1 is a front elevation of a stuffer crimper embodying the invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is a side elevation similar to Fig. 1 illustrating a further embodiment of the invention; and

Fig. 4 is a top plan view of a portion of the apparatus of Fig. 3.

Referring to Figs. 1 and 2 more in detail a crimping chamber block 10 is attached to a supporting plate 11 by screws 12. The block 10 is formed with a vertical bore in which a sleeve 13 is fixed as by a press fit. A tube 14 forming a crimping chamber fits loosely in the sleeve 13 and is secured by a clamping nut 15 threaded onto the tapered split end 16 of the sleeve 13.

The plate 11 carries a bearing in which is journaled a shaft 23 carrying a feed roll 24. An arm 25 is pivoted by a pin 26 to a bracket 20 attached to the plate 11. The arm 25 carries a bearing in which is journaled a shaft 28 carrying a second feed roll 29. The shaft 23 is driven by a motor, not shown. The shaft 28 is driven in unison therewith by meshing gears carried by the respective shafts.

The lower end of the tube 14 is slotted to receive the rolls 24 and 29 and extends below the bite of the rolls to form therewith a substantially closed chamber to receive the yarn 35 for crimping.

The feed rolls are held in adjustable pressure engagement with the yarn 35 by a spring 36 which is attached at one end to a post 37 on the arm 25 and at its other end to an adjustable pin 38 secured in a post 39 on the plate 11. The yarn 35 is guided to the feed rolls by a guide 61 secured by an arm 62 to the plate 11.

The tube 14 projects above the block 10. A tubular plunger 45 rests on the crimped yarn 46 in the tube 14 and carries a collar 47 which is engaged by the forked end 48 of a pivoted lever 49 and also serves as a weight to determine the back pressure on the material 46 in the crimping chamber.

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The crimped yarn 46 is withdrawn from the crimping chamber through the plunger 45 by a winder of the constant speed type having a spool 58 on which the yarn is wound, the winding 59 resting on and being driven by a driven roll 60. The yarn is guided to the spool 59 by guide rolls 86 and a traversing guide 86a driven by gears 87. The roll 60 is driven at constant speed through pulleys 63 from a source of power not shown. The pulley 63 and roll 60 are mounted on a shaft 64 journaled in plate 11.

The spool 58 is mounted on a shaft 65 journaled in one arm 68 of a bell crank lever 66 which is pivoted on shaft 67 and has its other arm 69 pivoted at 70 to a link 71 having a saw tooth ratchet 72 on its lower edge.

The ratchet 72 is engaged by a pawl 73 mounted on a shaft 74 carrying an arm 75. The arm 75 is connected by a pivoted link 76 to the movable core 77 of a solenoid 78 which is adjustably mounted on the plate 11 by a bracket 79 having screws 80 extending through elongated slots 81. A spring 82 holds the core 77 advanced when the solenoid is deenergized.

The solenoid coil is connected by leads 84 to a microswitch 83 having an actuating plunger 85 positioned to be actuated by downward movement of the lever 49.

The winding 59 rests upon and is driven by the roll 60. The spool 59 rises as the thickness of the winding increases, thereby causing the bell crank lever to pivot about its pivot 69 and the link 71 to slide to the right over the pawl 73. The ratchet teeth 72 are inclined in a direction to allow this shifting of the link 71 to the right but to engage the pawl 73 when the pawl is shifted in a clockwise direction. Hence clockwise movement of the pawl serves to pull the link 71 further to the right and lifts the winding 59 slightly from the roll 60. This lifting of the winding increases the slippage of the winding with respect to the roll 60 and thereby reduces the rate of withdrawal of the yarn 46 from the crimping chamber.

In operation the feed rolls 24 and 29 are driven at constant speed by a driving means (not shown) and feed the yarn 35 into the crimping chamber against the pressure exerted by the mass of crimped yarn in said chamber. The mass of crimped yarn is advanced along the chamber by the pressure of the incoming yarn and is withdrawn under tension from the top of the chamber by the winder.

The plunger 45 rests upon the mass of yarn in the chamber and rises or falls according to the quantity of crimped yarn therein. The winder is normally driven at a winding speed slightly higher than that required to maintain a constant level of yarn in the crimping chamber. The lever 49 is out of contact with the microswitch 83 when the plunger 45 is at a predetermined level. When the plunger 45 falls due to withdrawal of the yarn at too rapid a rate the lever 49 falls and actuates the microswitch 83, thus energizing the solenoid 78 to turn the pawl 73 and lift the winding 59 from the crimping roll 60 an amount to increase the slippage of the winding and thus reduce the rate of withdrawal of the yarn by the winder. When the level of the yarn rises due to the continued feed into the chamber the plunger 45 again raises the lever 49 and opens the microswitch 83 to deenergize the solenoid 78 and allow the winding 59 to again rest on the driving roll 60 and be driven thereby at an increased rate. This action is repeated at a rate to maintain the plunger 45 within a limited range of movement suited to maintain a substantially constant quantity of yarn in the crimping chamber. The solenoid may be adjusted by screws 80 to control the amount of movement of the pawl 73. While a solenoid control has been shown it is to be understood that other linkage having a suitable power amplitude may be used if desired. The chamber may be heated by suit-

able means such as by an electrical heating unit 94.

In the embodiment shown in Figs. 3 and 4 similar parts have been given the same reference characters. This embodiment differs from that of Figs. 1 and 2 in that the pressure of the winding 59 on the driving roll 60 is reduced to increase slippage without actually lifting the winding. Also a counterweight is provided to maintain a substantially constant pressure regardless of the thickness of the winding.

In Figs. 3 and 4 a counterweight 90 is adjustably mounted on a rod 91 which is secured in a collar 92 adjustably secured by set screw 93 to the shaft 67 which carries and turns with the bell crank lever. The angle of the rod 91 and the position of the weight 90 can be adjusted to maintain a predetermined substantially constant pressure on the driving roll 60 as the thickness and weight of the winding 59 increases.

As the arm 66 rises the angle of the rod 91 with the horizontal decreases and the leverage of the weight 90 which corresponds to the cosine of this angle also increases. This can be made to compensate for increase in weight of the winding 59 as the winding operation progresses.

This compensation can also be used in the embodiment of Figs. 1 and 2 if desired.

In Figs. 3 and 4 the parts are otherwise identical with those of Figs. 1 and 2 except that the link 76 of Fig. 1 is replaced in Fig. 3 by a tension spring 76a. The arm 75 is returned by a spring 82a which is adjusted by nut 88. A stop 89 limits the movement of the arm 75. The spring 76a has sufficient strength to exert a pull on the arm 75 which opposes the downward pressure of the winding 59 and the pull of the spring 82a, but is not sufficient to raise the winding from the drive roll 60.

In the embodiment of Figs. 3 and 4 when the plunger 45 falls and closes the microswitch 83, the solenoid 73 is energized and exerts a pull to reduce the pressure of the winding 59 on the drive roll 60. This increases the slippage and reduces the rate of yarn withdrawal until the yarn level in the crimping chamber rises sufficiently to open the microswitch 83 and deenergize the solenoid. As this action is repeated the variation in level of the yarn in the crimping chamber is limited to the amount required to close or open the microswitch.

It is to be understood that the invention is capable of various uses and that changes and adaptations may be made therein as will be apparent to a person skilled in the art.

What is claimed is:

1. Apparatus for crimping yarn or the like comprising a member having a bore forming a crimping chamber, a pair of feed rolls to feed said yarn into one end of said chamber for crimping, a member bearing against the mass of crimped yarn at the other end of said chamber and movable in accordance with changes in the quantity of said yarn therein, a constant speed winder to withdraw crimped yarn under tension from said other end of said chamber, and control means responsive to movement of said member and acting on said winder to vary the yarn slippage in a sense to maintain a constant quantity of yarn in said chamber.

2. Apparatus for crimping yarn or the like comprising

a member having a bore forming a crimping chamber, a pair of feed rolls to feed said yarn into one end of said chamber for crimping, a plunger in said chamber bearing against the mass of crimped yarn therein and movable in accordance with changes in quantity of yarn in said chamber, a winder having a spool carrying a winding and a constant speed driving roll engaging said winding to drive said spool, and control means responsive to movement of said plunger to vary the pressure of said driven roll on said winding to control the yarn slippage in a sense to maintain a constant quantity of yarn in said chamber.

3. Apparatus for crimping yarn or the like comprising a member having a bore forming a crimping chamber, a pair of feed rolls to feed said yarn into one end of said chamber for crimping, a plunger in said chamber bearing against the mass of crimped yarn therein and movable in accordance with changes in quantity of yarn in said chamber, a winder having a spool carrying a winding and a constant speed driving roll engaging said winding to drive said spool, and control means responsive to movement of said plunger to vary the clearance between said winding and said driving roll to control the yarn slippage in a sense to maintain a constant quantity of yarn in said chamber.

4. Apparatus as set forth in claim 2 in which the spool is mounted on a movable support, a microswitch is actuated by movement of said member and a solenoid is actuated thereby, said solenoid having connecting means to shift said support so as to lift said winding from said driving roll and thereby increase the yarn slippage.

5. Apparatus as set forth in claim 2 in which the spool is mounted on a movable support, a microswitch is actuated by movement of said member and a solenoid is actuated thereby said solenoid having connecting means to exert a force on said support adapted to reduce the pressure of said winding on said driving roll so as to increase the yarn slippage.

6. Apparatus as set forth in claim 5 in which the spool is mounted on a pivoted support, a ratchet is connected to shift with the normal movement of said support as the thickness of the winding increases, and a pawl is actuated by said solenoid to shift said ratchet in a direction to raise said winding from said driving roll.

7. Apparatus as set forth in claim 6 in which spring means connects said solenoid to said pawl for opposing the pressure of the winding on said driving roll.

8. Apparatus as set forth in claim 2 in which said spool is carried on a pivoted lever and an inclined rod carries a counterweight in a sense to compensate for the increased weight of winding as the winding thickness increases.

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