Dec. 29, 1970 G. W. RIDER 3,550,239

TERMINAL APPLICATOR HAVING MEANS FOR SEPARATING DIES

Filed Sept. 13, 1968 6 Sheets-Sheet 1

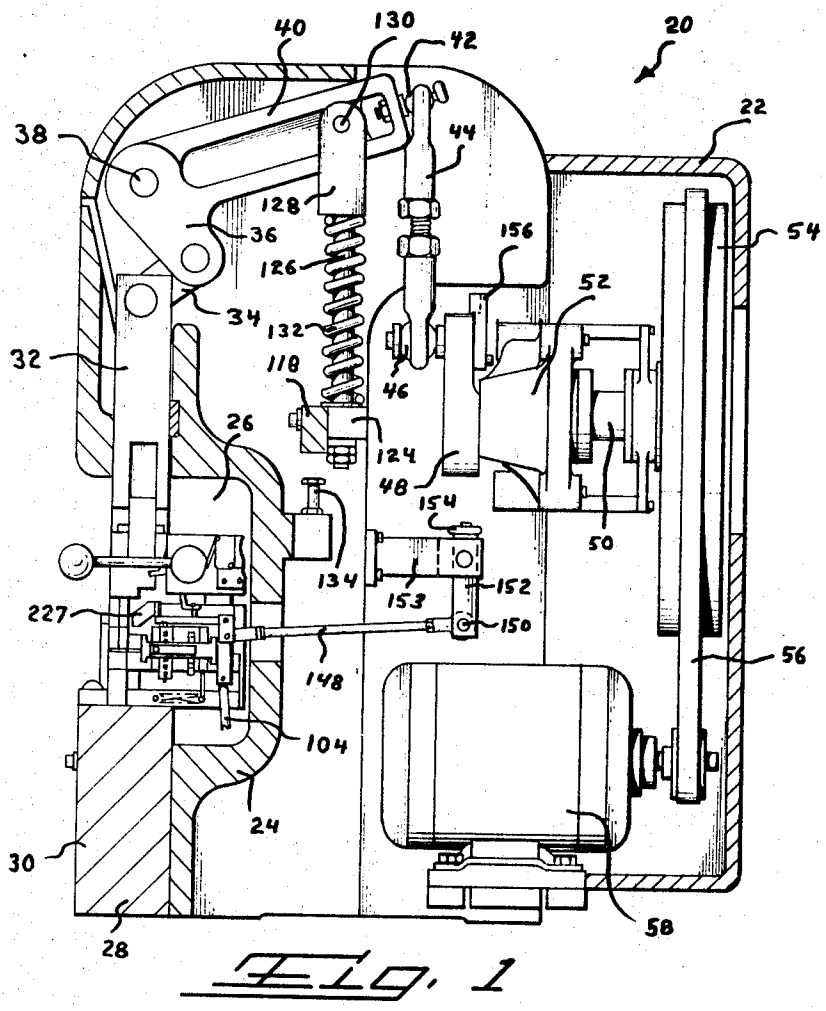


FIG. 1

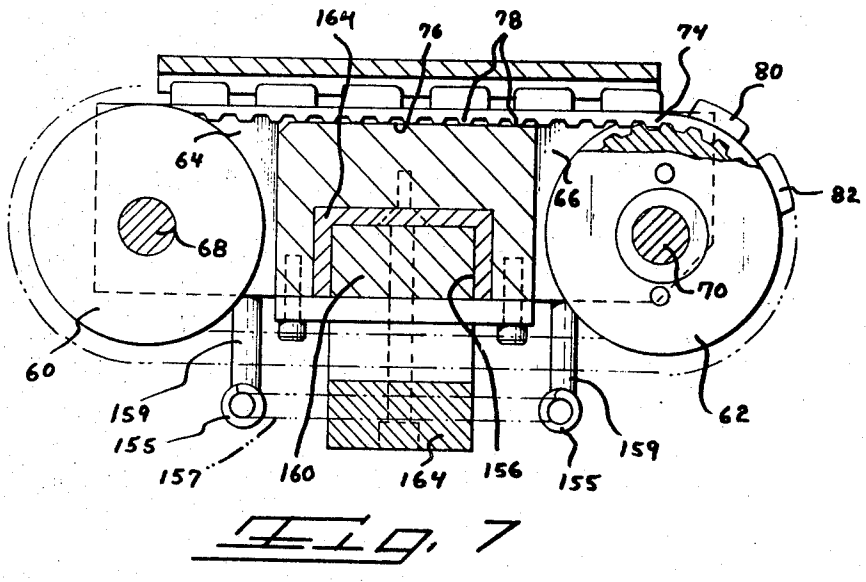
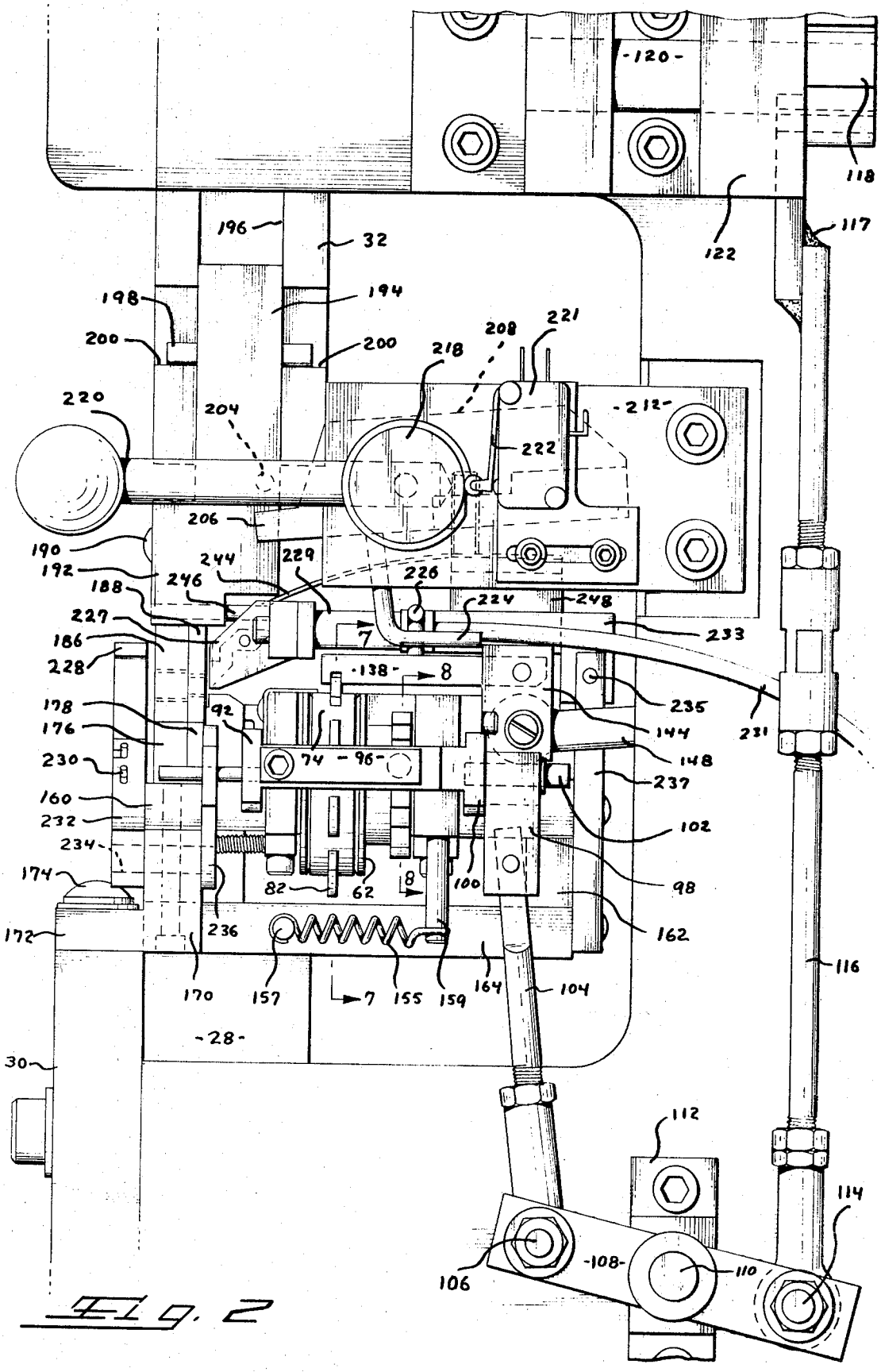


FIG. 7

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TERMINAL APPLICATOR HAVING MEANS FOR SEPARATING DIES

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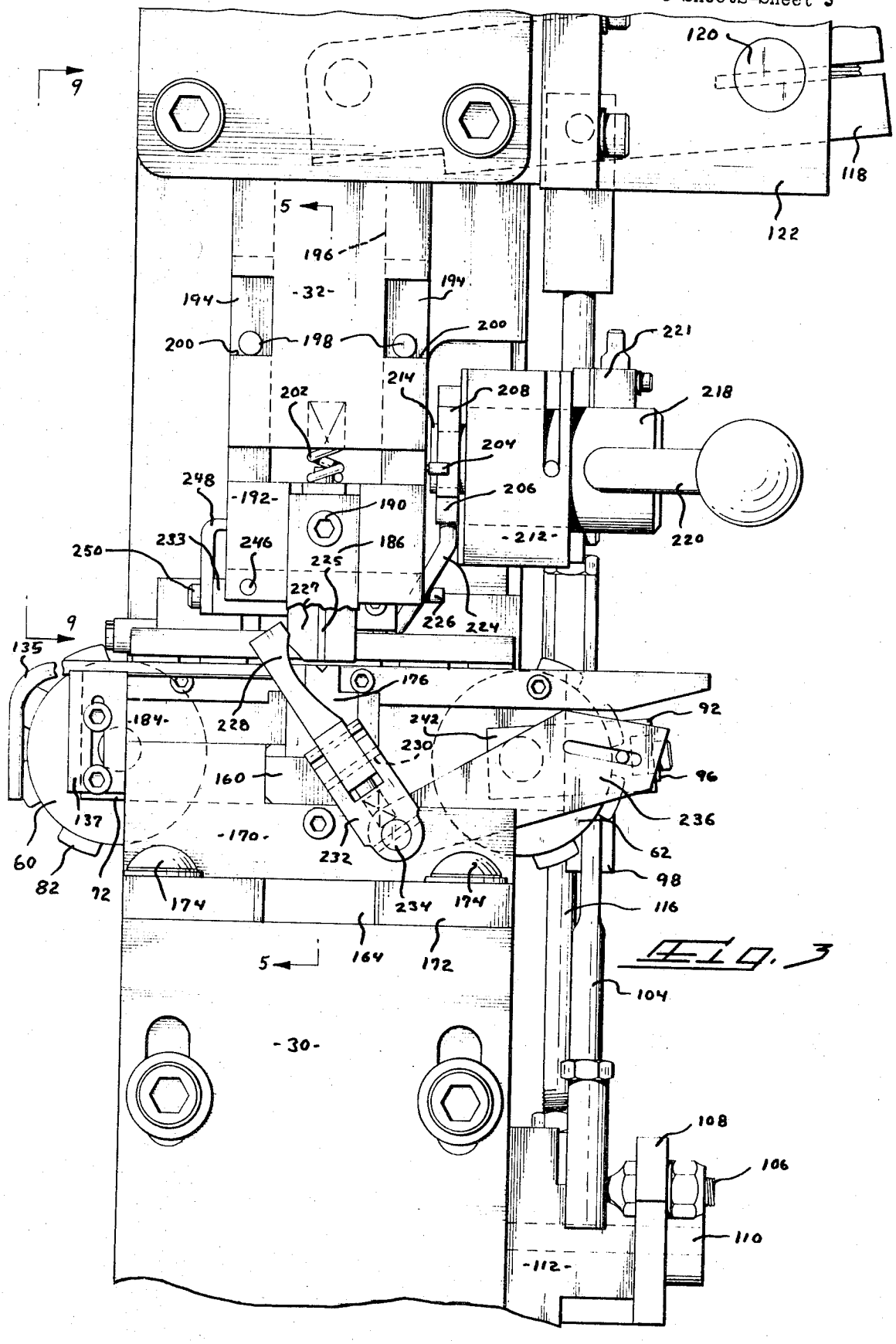


FIG. 3

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TERMINAL APPLICATOR HAVING MEANS FOR SEPARATING DIES

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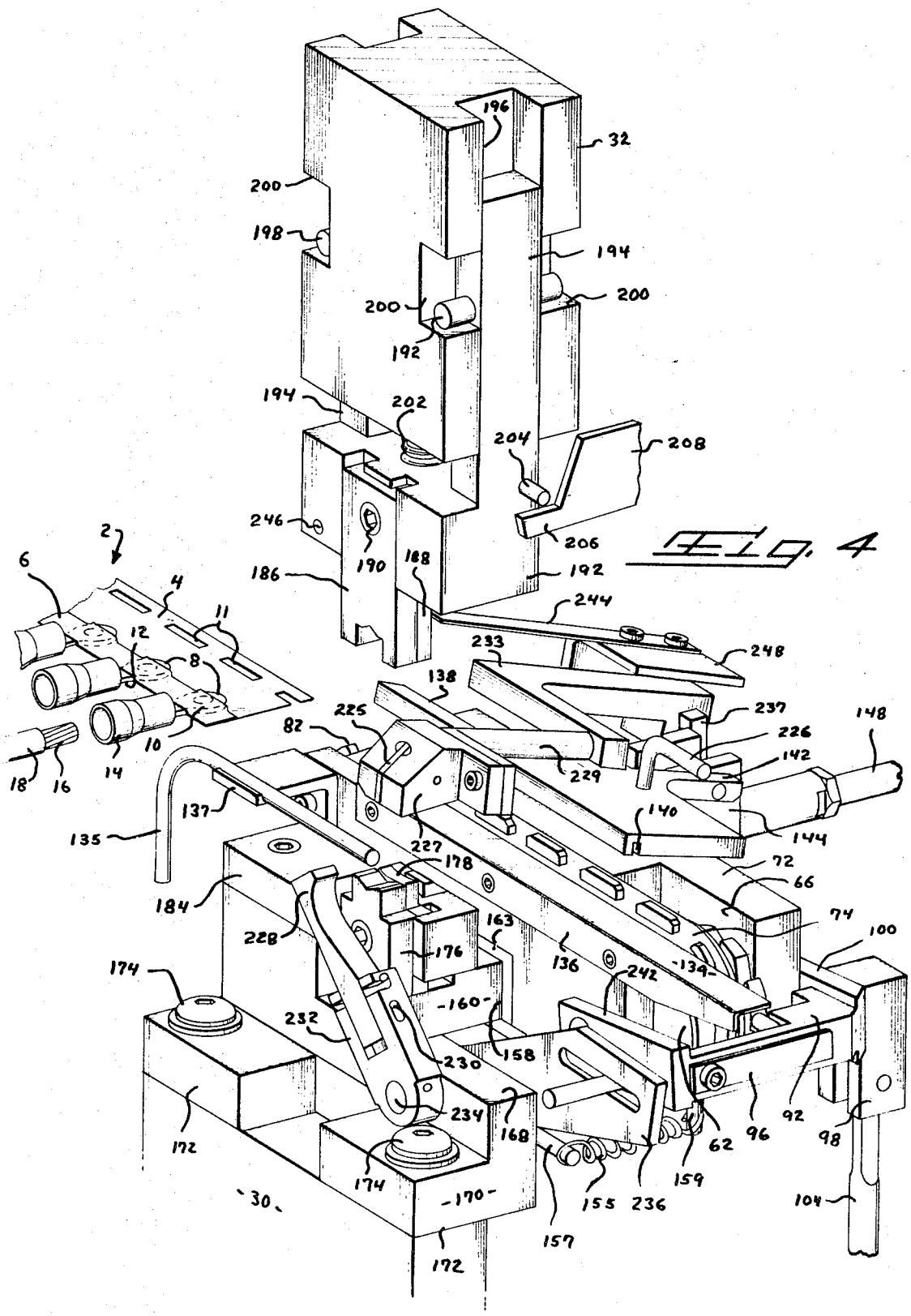


Fig. 4

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TERMINAL APPLICATOR HAVING MEANS FOR SEPARATING DIES

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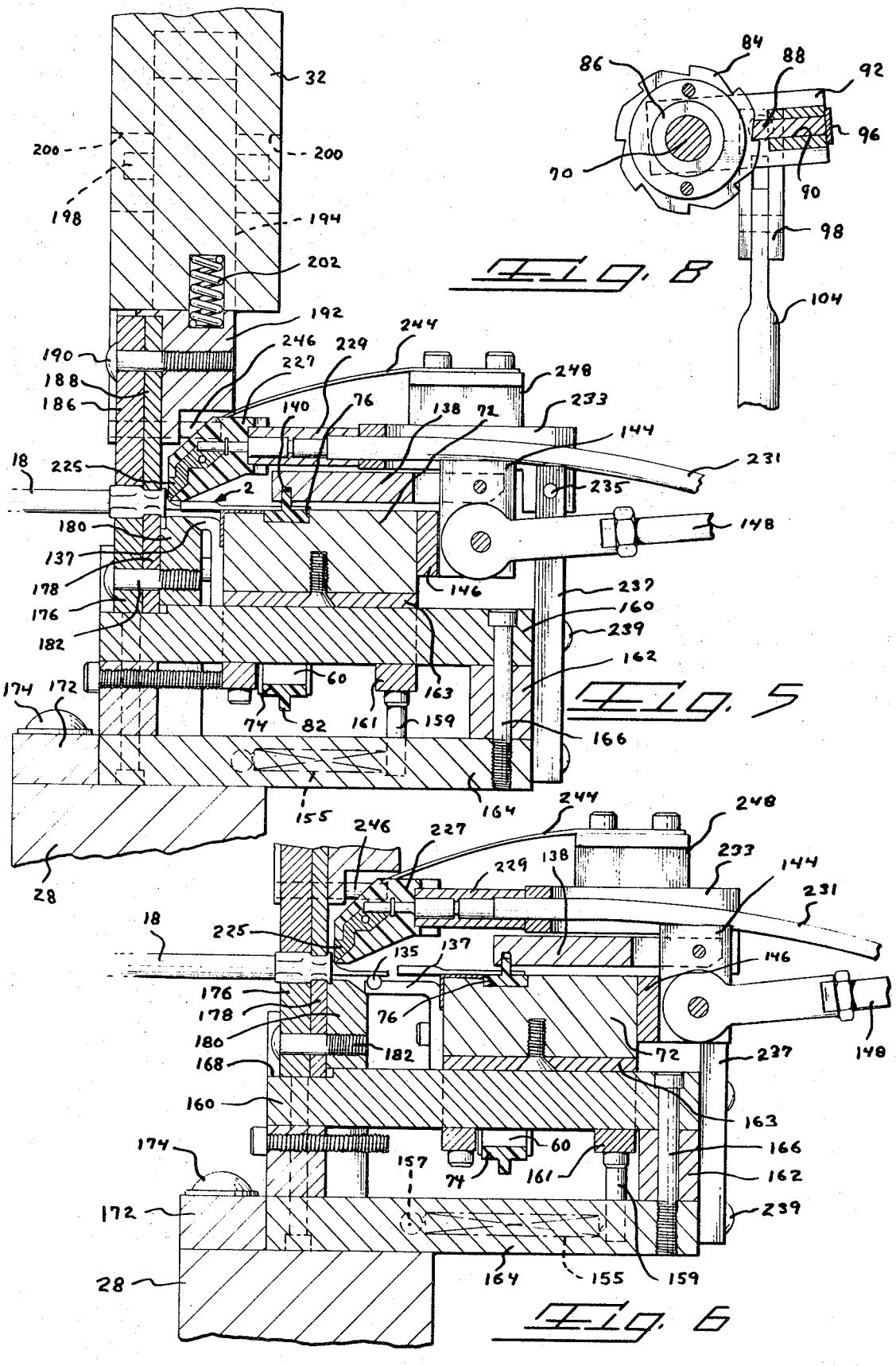


Fig. 8

Fig. 5

Fig. 6

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TERMINAL APPLICATOR HAVING MEANS FOR SEPARATING DIES

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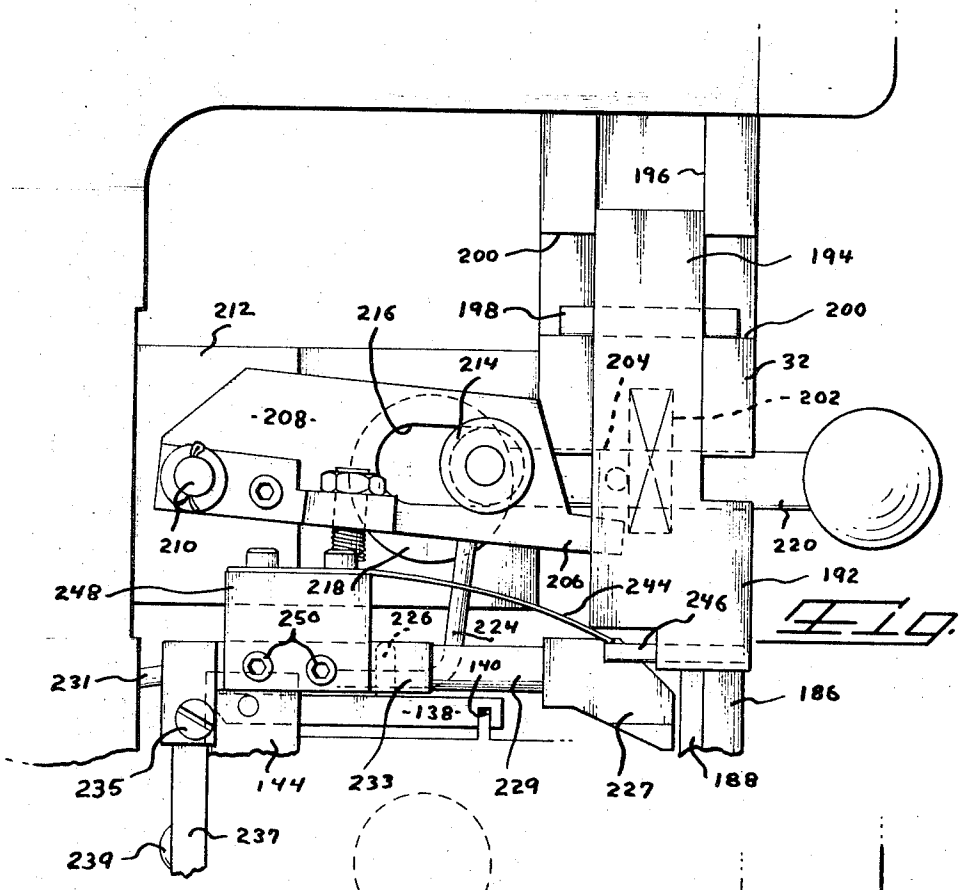


Fig. 9

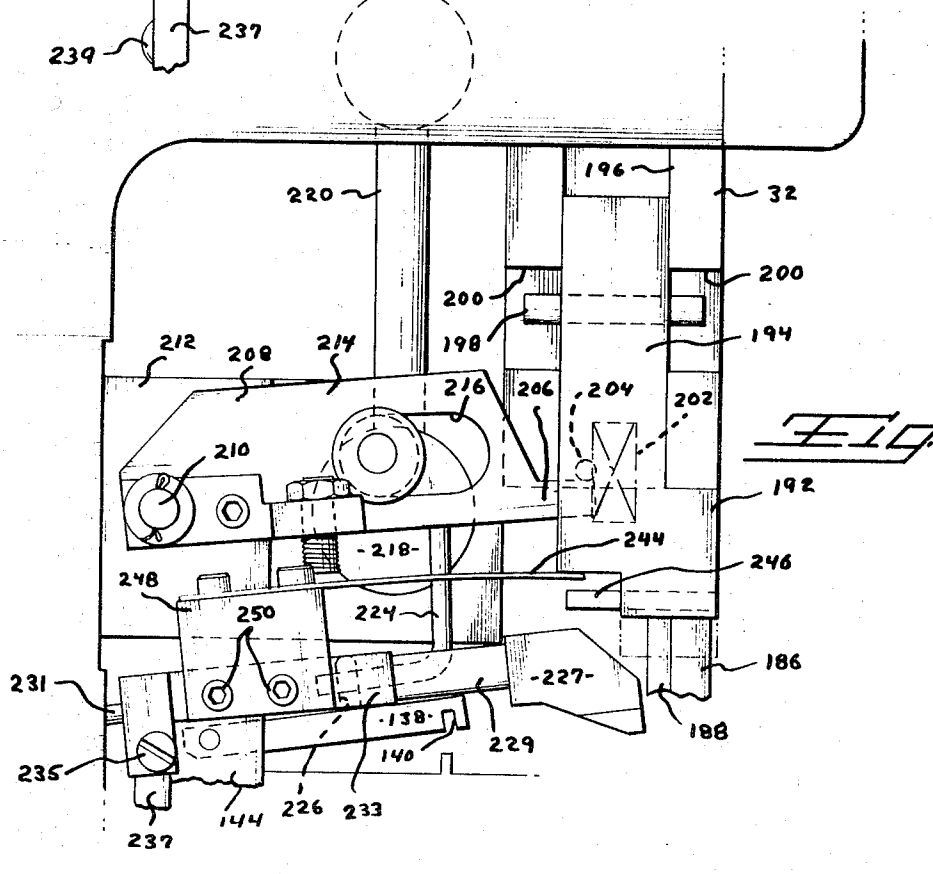


Fig. 10

United States Patent Office 3,550,239 Patented Dec. 29, 1970

3,550,239

TERMINAL APPLICATOR HAVING MEANS FOR SEPARATING DIES

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Filed Sept. 13, 1968, Ser. No. 759,578
Int. Cl. H01r 43/04; B21d 11/04, 31/02
U.S. Cl. 29—203 6 Claims

ABSTRACT OF THE DISCLOSURE

Terminal applicator for applying terminals to wires has fixed crimping die and movable crimping die. Movable die is connected by a lost motion coupling to the ram of a press and is resiliently biased, with respect to the ram, towards the fixed die. Means are provided for manually raising the movable die, when the movable die is at the upper limit of its stroke, against the force of the biasing spring in the lost motion connection thereby to permit servicing or changing of the terminal strip or belt in the applicator. Raising of the movable die also has the effect of raising a guide plate which extends over the terminal strip and opening a switch to de-energize the control circuitry for the press.

BACKGROUND OF THE INVENTION

This invention relates to apparatus for crimping electrical connectors onto the ends of wires and is related to my copending application Ser. No. 738,326 filed June 19, 1968.

It is now common practice in the electrical terminal art to crimp terminals onto wires by means of automatic or semi-automatic applicators which have feeding means for feeding a terminal strip or belt towards the operating zone of the machine and crimping dies for crimping the leading terminal of the strip or belt onto an inserted wire. The term "strip" as used above is intended to refer to a length of connected terminals which were manufactured by stamping from a continuous length of strip metal so that the adjacent terminals of the strip are connected by integral metal slugs or by an integral carrier strip. At the time of crimping, the individual terminals are removed from the strip, usually by shearing, and the connecting portions of the strip (the slugs or the carrier strip) are discarded as scrap. The term "belt" as used above is intended to refer to a continuous length of plastic film having individual terminals mounted thereon at spaced intervals. At the time of crimping, the individual terminals are removed from the belt and the plastic belt is usually discarded as scrap. The technique of mounting individual terminals on a belt is used for those types of terminals which can not be conveniently manufactured as a continuous strip, for example, high quality terminals which must have their entire surfaces plated with tin or gold. A strip terminal, even if plated, will inevitably have an unplated surface portion which is exposed when the terminal is sheared from the strip.

The present invention is addressed generally to the achievement of an improved applicator for terminals in the form of a continuous strip or belt which permits changing of the strip or belt in a short time by an unskilled operator, which can be easily and quickly serviced, and which has improved safety features.

A preferred embodiment of the invention comprises a terminal applicator having fixed and movable crimping dies and belt feeding means for feeding a belt having terminals thereon towards the dies. The movable crimping die has a lost motion coupling to a press ram and is resiliently biased towards the fixed die. Means are provided for manually raising the movable die, when it is

in its remote position with respect to the fixed die, against the biasing force of the spring in the lost motion connection and for simultaneously opening an electrical switch which prevents actuation of the press ram. At the same time, a guide plate, which normally extends over the belt, is raised. The arrangement is such that the operator need only shift the position of a lever to raise the movable crimping die, de-energize the press motor, and raise the guide plate so that one belt may be removed from the applicator and another belt installed.

In the drawings:

FIG. 1 is a sectional side view of a preferred form of terminal applicator mounted in a crimping press in accordance with the invention, this view showing the positions of the parts at the beginning of the operating cycle;

FIG. 2 is a side view, on an enlarged scale, of the applicator portion of the apparatus;

FIG. 3 is a front view of the applicator portion of the apparatus showing the positions of the parts at the beginning of the operating cycle;

FIG. 4 is a fragmentary perspective view of the applicator showing the terminal belt feed mechanism and the crimping dies, the upper crimping dies being elevated from their normal positions in the interest of clarity;

FIG. 5 is a sectional side view taken along the lines **5—5** of FIG. 3 but showing the positions of the parts immediately after the leading terminal of the belt has been crimped onto a wire and prior to removal of the crimped terminal from the belt;

FIG. 6 is a view similar to FIG. 5 but showing the positions of the parts after the belt has been moved away from the crimping zone to break the crimped termination away from the belt;

FIGS. 7 and 8 are views taken along the lines **7—7** and **8—8** of FIG. 2 and showing respectively the drive sprockets for the belt feed mechanism and the actuating means for these drive sprockets;

FIG. 9 is a view taken along the lines **9—9** of FIG. 3 showing details of a lifting mechanism for raising the upper or movable crimping dies away from the lower or fixed dies for servicing or threading purposes, this view showing the positions of the parts when the dies are in their lowered or normal positions; and

FIG. 10 is a view similar to FIG. 9 showing the positions of the parts when the movable crimping dies are in their raised positions.

Referring first to FIG. 4, a typical form of terminal belt **2** comprises a relatively wide strip **4** of suitable plastic such as Mylar (polyethylene terephthalate) and a relatively narrow strip of the same material **6** which extends along one edge of the wide strip. The ring tongue portions **8** of the terminals are held against the surface of the wide plastic strip **4** by the narrow strip **6** which is bonded as by welding at discrete locations surrounding the terminal tongues **10**. The neck portions **12** of the terminals extend laterally beyond the plastic strip **4** and merge with the barrel portions **14** of the terminals. The wide strip **4** of plastic has spaced-apart perforations **11** along its one side which are adapted to be engaged by suitable teeth of the feeding mechanism when the strip or belt is placed in an applicator. The barrel portions of the terminals are adapted to be crimped onto the exposed core **16** and the insulation **18** of a wire during the crimping operation. During the interval between crimping operations, the belt is fed towards the crimping zone of the applicator to locate an uncrimped terminal between the crimping dies. It will be understood that a wide variety of types of terminal devices (including splices) are commercially available in belt form although the details of the different types of terminals will differ from those shown in the drawing. The term "terminals" is used as a matter of convenience

herein and is intended to include all types of connecting devices.

Referring now to FIG. 1, the disclosed embodiment of the invention comprises a press **20** having a suitable housing **22** with a channel-shaped casting **24** mounted against one side thereof and defining a gap **26** within which the applicator for crimping the terminals onto the wires is mounted. The applicator is supported on an additional frame member **28** having a face portion **30**. The press ram **32** is slidably mounted in a guide means above the gap **26** and is coupled by means of a link **34** to one arm **36** of a bell crank. This bell crank is pivoted at its elbow **38** in the press housing and has a rearwardly extending arm **40** which is coupled by means of a ball-joint **42** to a connecting rod **44**. The lower end of this connecting rod is coupled by means of a bell-joint **46** to a plate **48** which is eccentrically mounted on a shaft **50**, a conventional electrically activated single revolution clutch **52** being provided on the shaft to drive it through a single revolution when a suitable switch is energized. The shaft **50** has a flywheel **54** on its end which is coupled by means of a belt **56** to electric motor **58**. It will thus be apparent that the motor and the flywheel rotate continuously and that during each operating cycle, the technician causes the clutch **52** to be engaged thereby to rotate the plate **48** and move the connecting rod **44** downwardly as viewed in the drawing, then upwardly. It should be mentioned at this point, that at the beginning of the operating cycle, the ram **32** is in a partially lowered position rather than in its raised position for reasons which will be explained as this description proceeds.

The terminal belt **2** is fed through the gap **26** of the apparatus by means of a pair of spaced-apart sprocket wheels **60**, **62** (FIG. 3 and 7) mounted on parallel spaced-apart shafts **68**, **70** in recesses **64**, **66** of a mounting block **72**, this mounting block being rearwardly movable as will be described below. The right hand sprocket as viewed in FIG. 7, **62** is driven in a manner which will be described below and the two sprockets are coupled by means of a feed belt **74** which passes through a recess **76** on the upper side of the block **72**. Feed belt **74** has internal teeth **78** on its underside which are engaged with the sprocket teeth **80** of the two sprocket wheels. Belt **74** also has relatively large spaced-apart teeth **82** on its external surface which are adapted to enter the spaced-apart perforations **11** of the terminal belt **2** and pull the belt through the crimping zone during operation. As will be apparent from FIG. 7, a relatively large number of the teeth **82** are in engagement with the terminal belt **2** at all times so that the danger of a break-down as a result of tearing or an imperfection in the terminal belt **2** is minimized.

The sprocket **62** is mounted on the shaft **70** by means of a one-way clutch **86** (FIG. 8) and the shaft **70** has a drive sprocket **84** mounted on this clutch immediately behind the driven sprocket **62**. The drive sprocket is intermittently indexed by means of a detent **88** mounted in a recess **90**. This recess is provided in the cross-member of a yoke **92** (FIG. 4), the detent **88** being resiliently biased towards the drive sprocket by means of a suitable leaf spring **96** on the external surface of the yoke **92**. The yoke **92** has an arm **100** which extends behind the rearwardly facing surface of the block **72** and a pin **102** mounted in this block extends through an opening in the arm **100**, the arrangement being such as to permit rearward motion of the block **72** in a manner which will be described below.

As shown best in FIG. 2, a pin **102** is mounted in, and extends from, the arm **100** of yoke **92** and a clevis block **98** is pivotally mounted on this pin. A connecting rod **104** is pivoted to the block **98** and extends downwardly towards the base of the press. The lower end of this connecting rod is pivotally connected at **106** to a lever **108**, this lever being pivoted intermediate its ends at **110** to a bracket **112** secured to the side of the press housing. The rearwardly extending arm of the lever **108** is pivoted at **114** to an upwardly extending connecting rod **116** and the upper end of this rod, in turn, is connected by a weldment **117** to a feed actuator arm **118** (FIGS. 1, 2 and 3). The feed actuating arm **118** is pivoted at **120** to a bracket **122** secured to the side of the press housing. This arm, **118**, extends leftwardly as viewed in FIG. 3 through the press housing and has a bearing block **124** secured to its inner end. A rod **126** extends slidably downwardly through an opening in block **124** and has a clevis **128** on its upper end by means of which it is pivotally connected at **130** to the arm **40** of the previously identified bell crank. A spring **132** surrounds the rod **126** and bears against the clevis **128** and against the surface of the block **124** to permit overtravel of the rod **126** when the arm **118** moves against an adjustable stop **134** mounted on the frame casting **24**.

At the beginning of the operating cycle, the bell crank arm **40** will have swung through a clockwise arc from its upper limit of travel, the upper crimping dies will be partially lowered, and the arm **118**, will be against the stop **134**. During the crimping cycle, the arm **40** moves further downwardly and the rod **126** is moved downwardly through the block **124**, the spring **132** being compressed during this portion of the cycle. When the bell crank arm **40** subsequently moves upwardly as viewed in FIG. 1, after the terminal has been crimped, the spring **132** returns to its normal position and the arm **118** is then swung through a slight arc about its pivotal axis **120**. Connecting rod **116** is moved upwardly as a result of such upward movement of arm **118** and the arm **104** is moved downwardly (see FIG. 2) thereby to index the drive sprocket **84** and the feed sprocket **62**. As will be explained more fully below, after the arm **40** reaches the upper limit of its travel and then moves downwardly until the feed arm **118** is again located against the stop **134**. Feeding of the belt thus takes place during the final portion of the operating cycle but before the cycle is completed.

During each operating cycle, the terminal belt **2** is advanced over the upper surface of the block **72** by an amount equal to the spacing between the individual terminals on the belt. Advantageously, an apron **136** is provided on the front edge of the block **72** and this apron extends rightwardly and laterally in FIG. 4 beyond the edge of the block as indicated at **139** so that the belt, from which the terminals have been removed, will be led away from the operating or crimping zone of the apparatus. It will also be noted from FIG. 4 that a guide means for guiding the belt towards the operating zone is provided in the form of a bent rod **135** secured to a bracket **137** which is fixed to the front face of block **72**.

The terminal belt **2** is held against the upper surface of the apron **136** by means of a retaining plate or guide plate **138** having a groove **140** on its underside which is adapted to receive the upper edges of the teeth **82** of the feed belt. The retainer plate **138** normally occupies the position shown in FIG. 5 but is pivotally mounted at its right-hand end as viewed in FIG. 5 by means of arms **142** which extend on each side of the upstanding ears **144** of a bracket **146**. When the applicator is deactivated for servicing purposes, or to thread a new section of terminal tape through the feed mechanism, this plate is raised in a manner which will be described below.

The block **72** has a rearwardly extending recess **158** on its underside which is lined with a suitable wear-resistant material **163** as shown in FIG. 4 and which straddles a fixed support or guide block **160**. The rearward end of this support block is, in turn, supported on a block **162** and secured and positioned by a fastener **166** which extends through the blocks **160**, **162** and into an applicator base block **164**. The applicator base block, in turn, is mounted on the upper surface of the frame section **28**. The left-hand end of the support block **160** is supported on the upper surface **168** of a support block

170 which is mounted on the frame member 28 and has forwardly extending feet 172 which are secured to the plate 30 by means of suitable fasteners 174. The lower or fixed crimping die 176 for crimping the barrel portion of a terminal onto the insulation of a wire and the wire barrel crimping die 178 are secured on the upper surface of the support block 160 and fixed by means of a fastener 182 to a rightwardly extending arm 180 of an additional tooling support block 184, this block being mounted on and secured to the previously identified support block 170.

The feed support block 72 is slidably mounted on the fixed block 160 and moved rightwardly as viewed in FIGS. 5 and 6, during each operating cycle, to separate a crimped terminal from the terminal tape. Such rightward movement of the block 72 is achieved by means of a connecting rod 148 which is pivotally mounted between ears on the bracket 146 and which extends through an opening in the frame section 24 as shown in FIG. 1. The right-hand end of the connecting rod 148 is pivotally connected at 150 to a lever 152 which extends upwardly as viewed in FIG. 1 and is pivoted to a bracket 153 fixed to the frame. The upper end of the lever 152 has a cam roller 154 thereon which is adapted to be engaged by a cam plate 156 mounted on the periphery of the plate 48, which, as noted above, is secured to the shaft 50. It will be apparent from FIG. 1 that during each complete revolution of the shaft 50, the cam plate 156 will cause the lever 152 to swing through a slight counterclockwise arc about its pivotal axis thereby moving the connecting rod 148 rightwardly and moving the feed mechanism support block 72 from the position of FIG. 5 to the position of FIG. 6. Since the guide plate 138 is mounted on the support block 72 by means of a bracket 146, it also moves rightwardly during this interval.

As also shown in FIG. 5, the feed mechanism support block 72 is normally biased leftwardly, that is, to its forward position relative to the front of the applicator, by means of a spring 155 having one end secured to a pin 157 mounted in the base plate 164 and having its other end secured to a pin 159 which extends downwardly from a bracket 161, this bracket being integral with the block 72 and extending downwardly besides the fixed support block 160. As will be explained more fully below, rightward movement of the feed mechanism support block 72 takes place while the dies are in their closed positions and the crimped terminal is being held between the fixed and movable dies so that the terminal will be broken away from the rightwardly moving (as viewed in FIG. 5) belt.

The upper or movable crimping dies 186, 188 are mounted by means of a fastener 190 on the face of a die mounting block 192 which has a lost motion connection with the press ram 32. This lost motion connection comprises a pair of upwardly extending arms 194 on each side of the die mounting block which are slidably received in vertical slots 196 on the sides of the ram 32. Transversely extending slots 200 are provided on the ram sides intermediate the ends of the slots 196 and pins 198 extend through the arms 194 and into these slots thereby to permit a limited amount of lost motion between the die mounting block and the press ram. The die mounting block is normally biased downwardly to the position shown in FIG. 4 by means of a coil spring 202 which extends into aligned recesses on the lower surface and upper surface respectively of the press ram of the die mounting block. During downward movement of the ram, this spring is compressed as shown in FIG. 5 and the pins 198 move relatively upwardly in the slots 200 until the lost motion has been taken up.

As previously noted, FIG. 3 shows the positions of the parts at the beginning of the operating cycle at which time an uncrimped terminal will be contained between the fixed and movable crimping dies and the ram 32 will be in a partially lowered position. During the operating cycle, the ram 32 will move relatively downwardly from the position shown in FIG. 2 until the spring 202 is compressed as explained above, and the pins 198 are at the upper limit of their relative motion within the slots 200. It is desirable, however, to be able to move the die mounting block 192 upwardly independently of the ram thereby to raise the movable crimping dies when it is necessary to thread a new terminal tape into the apparatus or for other servicing purposes. This is accomplished by means of a pin 204 extending laterally from the side of the die mounting block 192 above a reduced end 206 of an arm 208. Referring to FIG. 9, the arm 208 extends rearwardly and is pivotally mounted at 210 on a bracket 212 secured to the right hand (as viewed in FIG. 3) side of the press frame. Arm 208 is raised by means of a roller or bearing 214 which extends through a horizontally extending slot 216 in the arm 208 and which is eccentrically mounted on a short shaft 218. The shaft 218 is rotatably mounted in the bracket 212 and is provided with a forwardly extending handle 220. It will be apparent that when the handle is moved upwardly from the position of FIG. 9 to the position of FIG. 10, the reduced end 206 of the arm 208 will engage the pin 204 and raise the tool mounting block relative to the press ram.

In the disclosed embodiment, a depending hook 224 is provided on the arm 208 and is interengaged with a similar hook 226 on the upper surface of the belt guide plate 138. It will thus be apparent that when the tool mounting block 192 is raised, the retaining plate 138 will also be raised so the operator can thread a new belt through the apparatus by merely laying its surface against the upper surface of the block 72.

The disclosed embodiment is also provided with a safety feature in the form of a switch 221 (FIG. 2) mounted on the previously identified bracket 212 and having a switch arm 222 in engagement with the surface of the shaft 218. In the immediate vicinity of the switch arm, the surface of the shaft is ground flat so that the switch arm occupies its normal position when the handle 220 is in the position of FIG. 2, that is, when the applicator is being operated. When the handle 220 is raised, however, switch arm 222 is swung inwardly by the shaft 218 to open the switch 221 which is suitably wired in with the control circuits for the applicator in a manner such that the motor is de-energized when the handle 220 is raised.

The single revolution clutch 52, which is engaged for each operating cycle of the apparatus, can be actuated by a suitable foot switch if desired, however, it is preferable to provide a switch device which is energized immediately when the wire end is inserted and properly located between the crimping dies. In the disclosed embodiment, a switch device of the type fully described in U.S. Pat. 3,289,445 is provided comprising a metallic wire end detector 225 which is contained in an insulating block 227. This block is secured to an arm 229 which, in turn, is mounted on a transversely extending arm of an L-shaped bracket 233. The bracket 233 extends rearwardly, as viewed in FIG. 5, beyond and above the ears 144 of the bracket 146 and is pivotally connected at 235 to a vertically extending plate 237, this plate being fixed to the right hand ends, as viewed in FIG. 5, of the blocks 160, 164 by fasteners 239. An electrical cable 231 is contained in the arm 229 and has its end connected to the sensing conductor 225. This cable extends rightwardly as viewed in FIG. 5 to the circuitry described in U.S. Pat. 3,289,445. The arrangement is thus such that when a wire end is located between the upper and lower crimping dies with its end contacting the sensing conductor 225, the single revolution clutch 52 will be energized to operate the apparatus for a single cycle.

The wire end detecting means is raised, when the handle 220 is raised, by virtue of the fact that the arm 229 extends above the guide plate 138. When the guide plate is swung upwardly about its pivotal axis, it moves against the underside of the arm 229 and raises this arm, and the bracket 233 about the pivotal axis 235.

It is desirable to provide a resilient biasing means

for holding the wire end detecting means in its lowered position to insure that the metallic sensing means **225** will be precisely located behind the dies when the parts are in their normal positions. In the disclosed embodiment, a leaf spring **244** is provided for this purpose which is mounted on a plate **248** secured by fasteners **250** to the bracket **233**. The free end of the leaf spring extends into a recess on the underside of the tooling block **192** and is held in this recess by a pin **246**. When the ram and the tooling block are in their normal positions at the beginning of an operating cycle, this spring is resiliently flexed downwardly so that it biases the pivoted bracket **233** to the limit of its counterclockwise travel as viewed in FIG. 5. When the bracket is so located, the metallic sensing means **225** will be located accurately with respect to the crimping dies. When the ram and the tooling block move to their lowermost positions, during crimping of a terminal onto a wire, the leaf spring **244** will be flexed downwardly by an additional amount but the wire end detecting assembly will not move.

After the leading terminal of the belt has been crimped onto the wire, and after the upper or movable dies have been raised from the position of FIGS. 5 and 6, the crimped termination is ejected laterally by means of an ejector arm **228** pivotally connected by pin **230** between the ears of an arm **232** which is secured to a pivot pin **234**. The pivotal mounting of the arm **228** on the boss **232** permits the arm itself to be moved laterally or forwardly away from the crimping zone, again for purposes of servicing or repair. The pin **234** extends through the tool mounting block **170** and has a plate **236** secured to its rearward end. This plate extends past an arm **242** of the previously identified yoke member and has an elongated slot which receives the pin extending from the arm **242**, the arrangement being such that during downward movement of the connecting rod **104**, the ejector arm **228** is moved along an arcuate path in a clockwise direction as viewed in FIG. 3 to push the completed termination laterally away from the crimping zone. The convenience and importance of this feature will be apparent from a description of the operating cycle which follows.

At the beginning of the operating cycle, the parts will be in the position of FIGS. 2 and 3 with an uncrimped terminal located between the partially closed dies. The die holder **192** will be in its lowered position relative to the press ram **32** as, indicated by positions of the pins **198** in FIG. 3 and by the fact that the spring **202** is in its extended condition. The operator first inserts the stripped end **16** of a wire **18** into the terminal. The wire end detector is energized by the wire thereby to engage the clutch **52** and drive the eccentric plate **48** through a single revolution. During the initial portion of the stroke, the ram moves relatively downwardly until the lost motion between the ram and the die holding block **192** is taken out. Thereafter, the ram moves a further portion of its downward stroke to crimp the ferrule of the terminal onto the wire. During this interval, and while the crimped termination is being held between the fixed and movable dies (FIGS. 5 and 6), the connecting rod **148** is moved rightwardly under the influence of the cam plate **156** thereby to move the belt feed support block **72** from the position of FIG. 5 to the position of FIG. 6. Since the terminal is being held firmly between the dies **176**, **178**, and **186**, **188**, the belt is pulled away from the terminal so that the tongue portion of the terminal is broken away from the belt. The block **72** then returns to its starting position and, in fact, the terminal may be reinserted into the belt between the strips **4**, **6** although it will not be gripped tightly since the weldments **10** will have been broken. Thereafter, as the ram **32** moves upwardly, the arm **228** moves through a clockwise arc to eject the completed termination from the crimping zone and the belt feed mechanism is actuated by the connecting rod **104** to advance the belt and position an uncrimped terminal between the crimping dies. During the final portion of the cycle, the ram descends partially until the dies surround the uncrimped terminal and the parts return to the positions of FIG. 3.

Whenever it is necessary to change the belt **2**, or when it is desired to change the type of terminal being applied, it is merely necessary to raise the handle **220**, remove the one belt from the applicator and locate the new belt on the plate **139** with its perforation **11** on the teeth **82**. These operations can be carried out quickly by an unskilled operator so that the "down time" of the applicator is kept to an absolute minimum.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only.

I claim:

1. Apparatus for crimping electrical terminals onto wires comprising:

first and second crimping members disposed in an operating zone,

a reciprocable actuator ram, said first crimping member being fixed, said second crimping member having a lost motion connection to said actuator ram,

resilient means effective between said actuator ram and said second crimping member biasing said second crimping member towards said first crimping member, and

means for manually moving said second crimping member relatively away from said first crimping member against the force of said resilient means and holding said second crimping member in a remote position with respect to said first crimping member thereby to clear said operating zone for servicing purposes.

2. Apparatus for crimping electrical terminals onto wires comprising:

first and second crimping members, disposed in an operating zone,

a reciprocable ram, motor means for actuating said ram, switch means for controlling said motor means,

said first crimping member being fixed, said second crimping member having a lost motion connection to said ram,

resilient means interposed between said second crimping member and said ram, said resilient means biasing said second crimping member relatively towards said first crimping member with respect to said ram, and

deactivating means for manually moving said second crimping member away from said first crimping member against the force of said resilient means and for concomitantly opening said switch means thereby to clear said operating zone for servicing and prevent activation of said ram during servicing.

3. Apparatus as set forth in claim **2** wherein said deactivating means comprises a pivotally mounted lever having a free end which is engageable with said second crimping member, and including means for moving said lever along an arcuate path to move said second crimping member away from said first crimping member.

4. Apparatus as set forth in claim **2** wherein deactivating means comprises a lever pivoted at one end and having a free end in engagement with said second crimping member, eccentric means for swinging said lever in a direction to move said second crimping member away from said first crimping member, said switch means being disposed adjacent to said eccentric means, said eccentric means being adapted to open said switch means when said second crimping member is moved away from said first crimping member by said lever.

5. Apparatus as set forth in claim **4** including wire sensing means, for energizing said motor means, on one

side of, and in alignment with, said dies, and means connecting said lever and said wire sensing means whereby said wire sensing means is moved from said operating zone by said lever.

6. Apparatus as set forth in claim 4 including guide means for guiding a strip of terminals through said operating zone, and means connecting said lever and said guide means whereby said guide means is moved from said operating zone by said lever.

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