

May 27, 1969

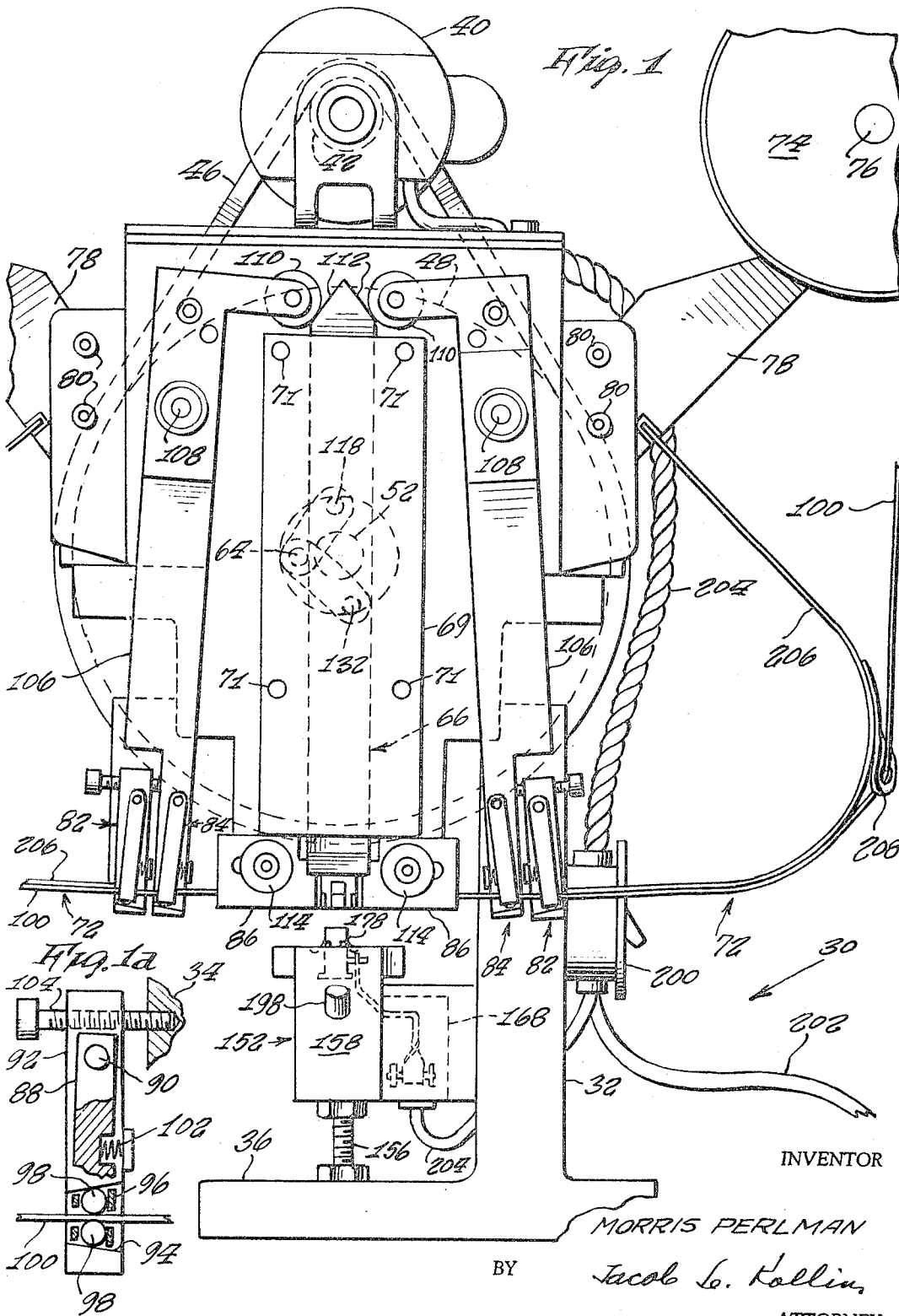
M. PERLMAN

3,445,912

SEMI-AUTOMATIC WIRE-FED DUAL TOP STOP PRODUCTION AND
SECUREMENT MACHINE FOR SLIDE FASTENERS

Filed May 17, 1966

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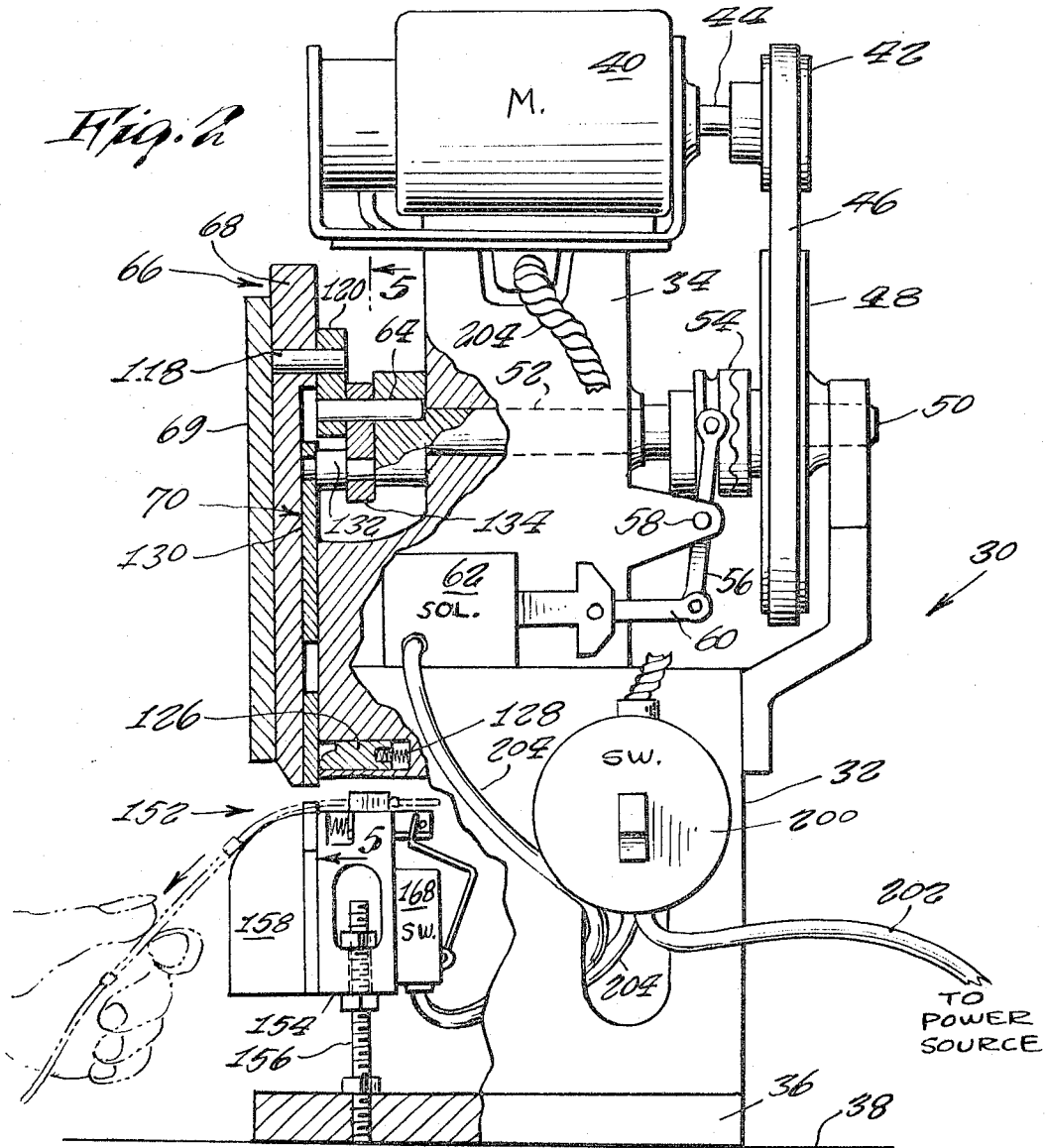
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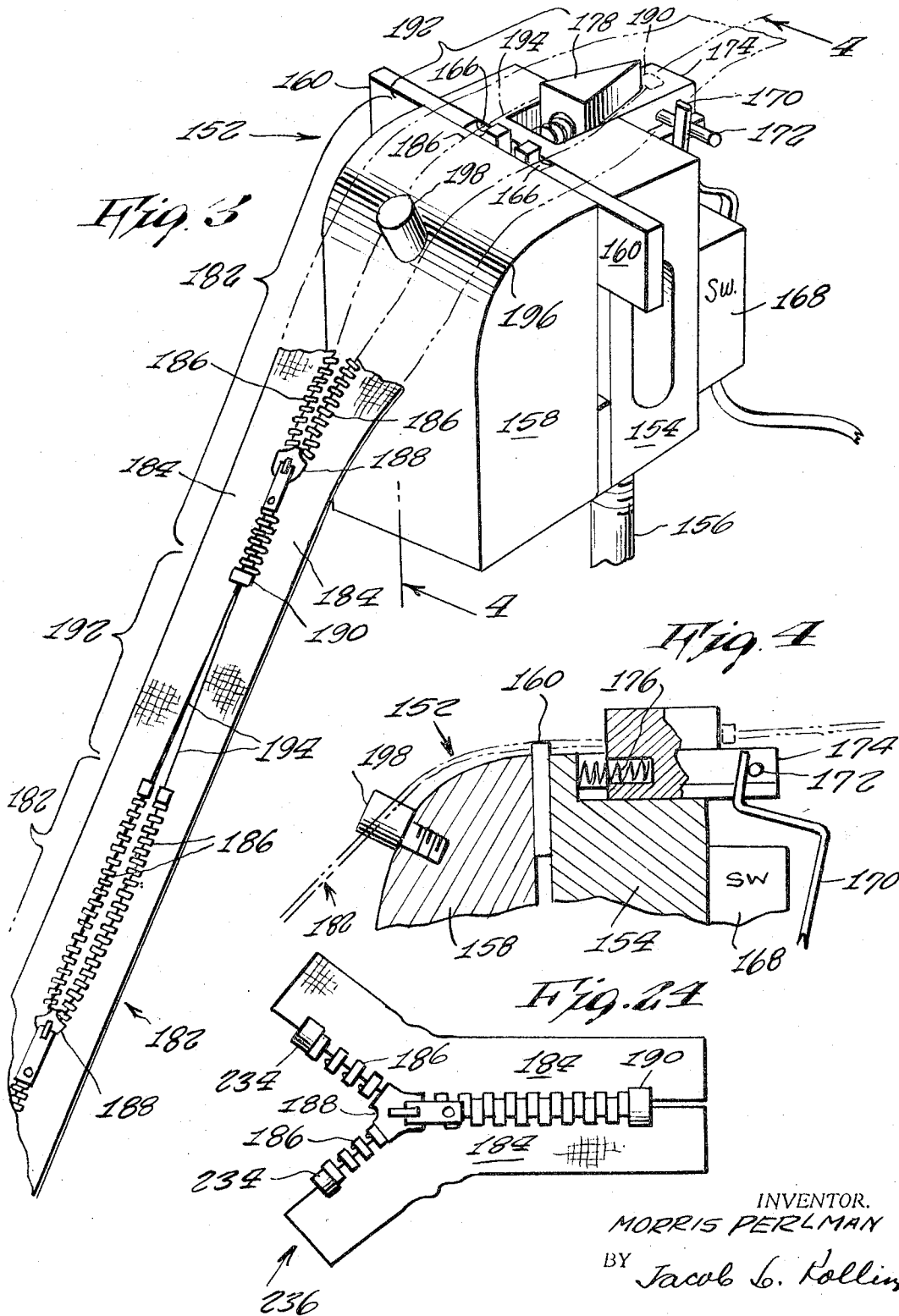
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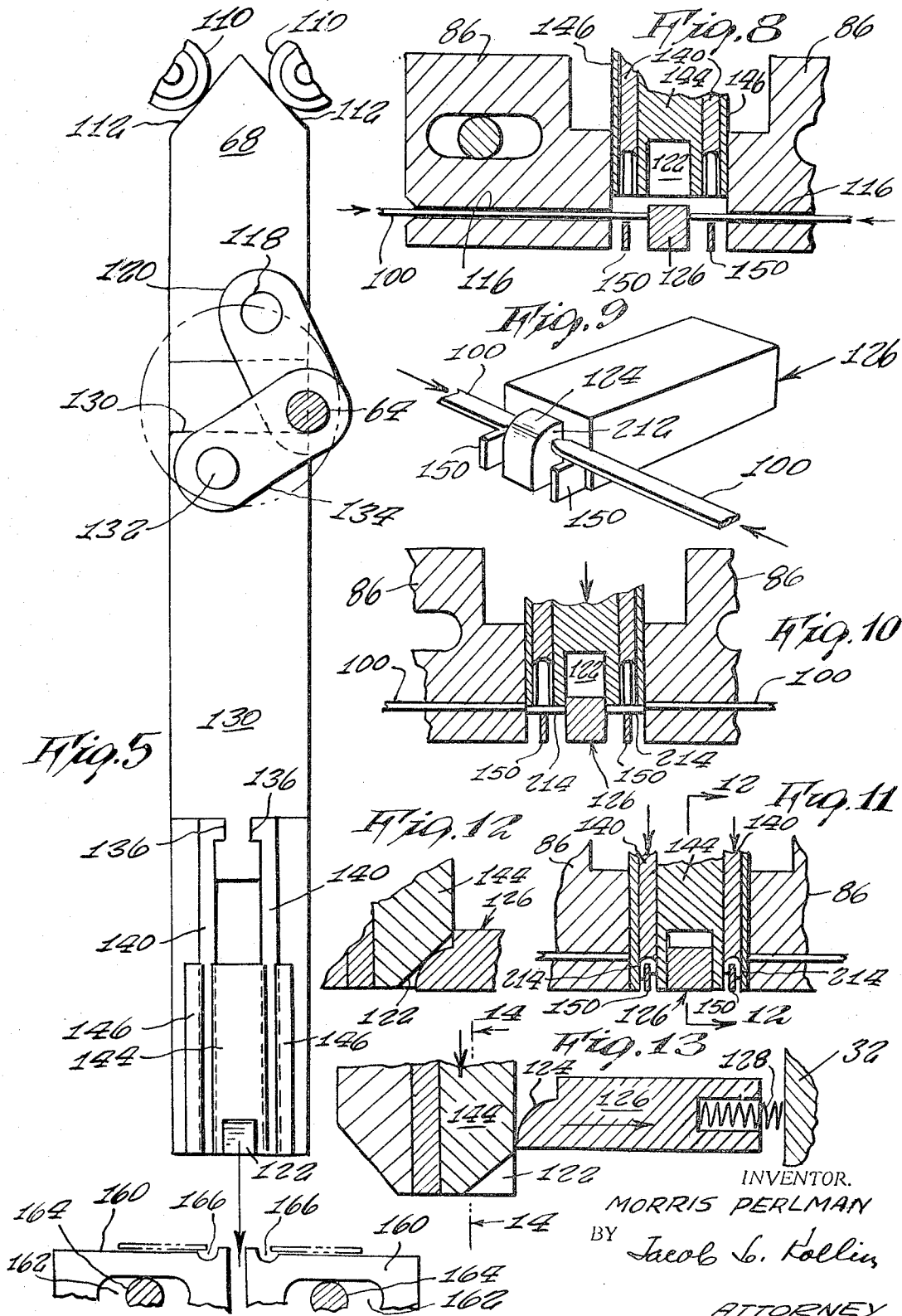
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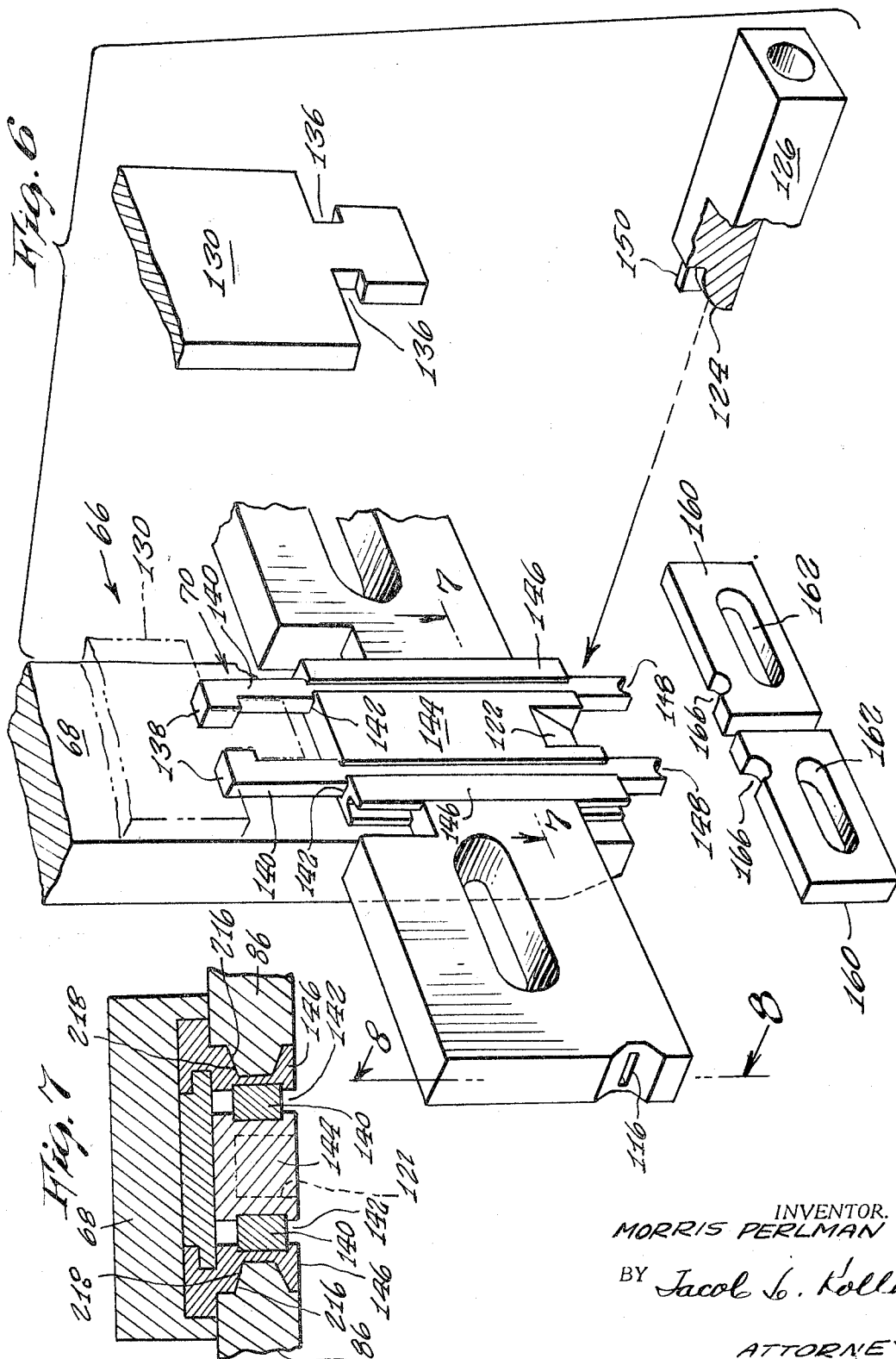
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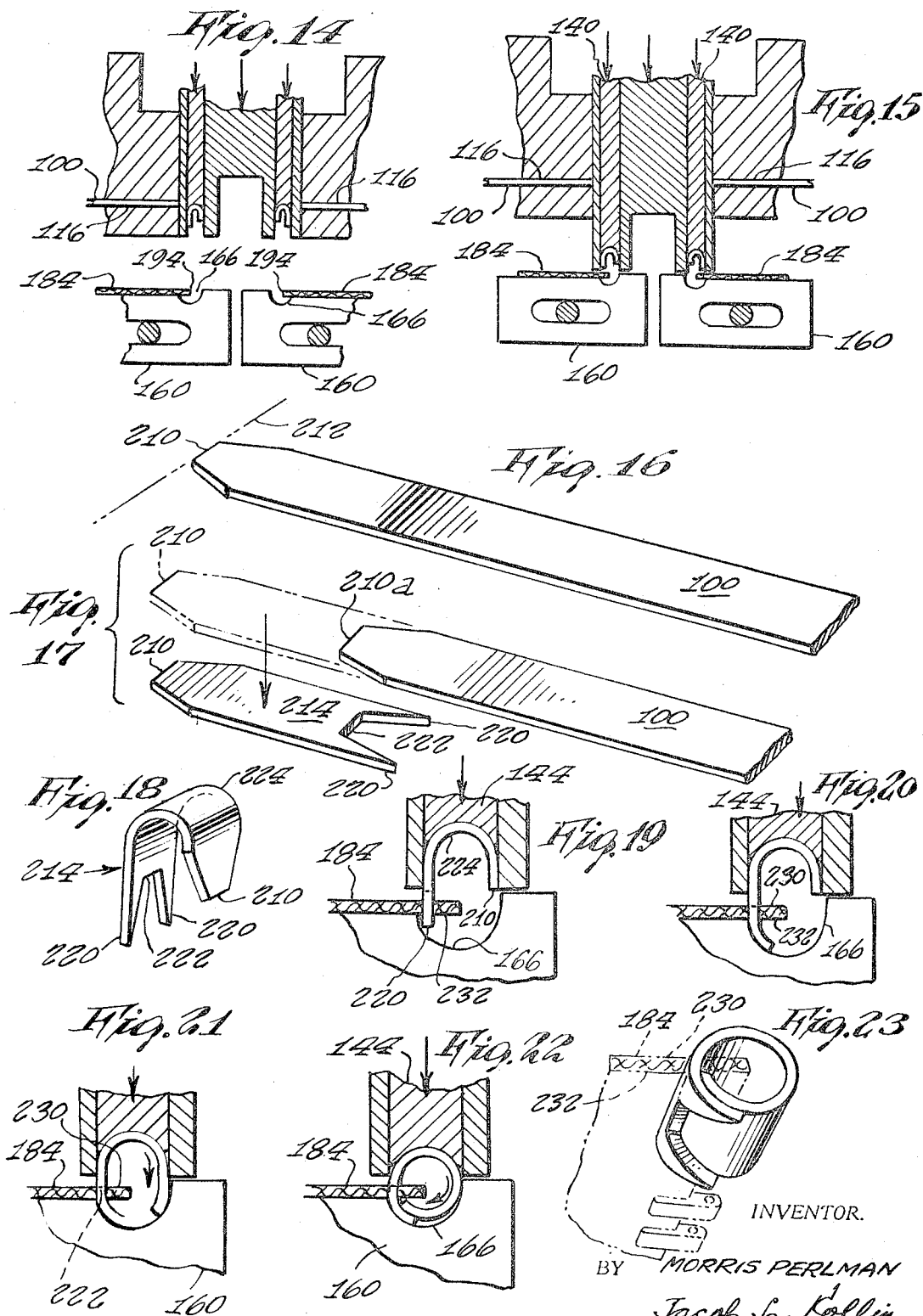
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Sheet 6 of 6



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3,445,912

SEMI-AUTOMATIC WIRE-FED DUAL TOP STOP PRODUCTION AND SECUREMENT MACHINE FOR SLIDE FASTENERS

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U.S. Cl. 29—207.5

4 Claims

ABSTRACT OF THE DISCLOSURE

A semiautomatic wire-fed dual top stop production and securement machine for slide fasteners comprising a flat wire feed unit adjacent each side of a hammer unit comprised of a ram and driver assembly comprising movable parts for cutting simultaneously staples with spaced apart pointed ends and bending the staples to form U-shaped top stops, means for piercing the tapes simultaneously, and then bending the staples simultaneously to overlap their ends to secure them to slide fastener stringers supported on portions of the clincher dies.

This invention relates generally to machines for the manufacture of slide fasteners. More specifically it relates to machines for the production and securement of top stops on slide fasteners.

The present machine is an improvement of applicant's construction disclosed in his U.S. patent application Ser. No. 173,524, filed Feb. 15, 1962, now abandoned.

A principal object of the present invention is to provide a machine for the manufacture of top stops, and securement thereof upon slide fasteners during production of the latter, and wherein a dual pair of top stops are produced simultaneously and are secured simultaneously to one end of each of a pair of stringers that together comprise a complete slide fastener assembly, thereby increasing the production and securement to double quantity over any method heretofore employed wherein only one top stop was made at a time and secured to one stringer at a time.

Another object of the present invention is to provide a machine for the manufacture of top stops and securement thereof upon slide fasteners which is actuated simply by an operator depressing a push-button switch, preferably depressed by the operator's foot or by a switch operated by the bottom stop, so that the operator has his or her hands free for properly inserting a pair of stringers into my new and improved dual top stop machine.

A further object of the present invention is the provision of a dual top stop machine which is comparatively small in size and simple in construction, but which also is highly efficient, time-saving, reliable in operation, sturdy, durable and well adapted for being operated by unskilled workers and for withstanding the rough usage to which devices of this type ordinarily are subjected.

Other objects are to provide a dual top stop production and securement machine for slide fasteners which is simple in design, inexpensive to manufacture, rugged in construction, easy to use and efficient in operation.

These and other objects will be readily evident upon a study of the following specification and the accompanying drawings wherein:

FIGURE 1 is a front elevation view of the present invention,

FIGURE 1a is an enlarged detail front view of one of the wire feed jaws shown partly in cross section,

FIGURE 2 is a side elevation view thereof shown partly in cross section,

FIGURE 3 is a perspective view of the slide fastener clincher die unit,

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FIGURE 4 is a cross sectional view taken on line 4—4 of FIGURE 3,

FIGURE 5 is a cross sectional view of the ram and driver assembly as viewed on line 5—5 taken on FIGURE 2,

FIGURE 6 is a fragmentary perspective view of the driver assembly shown in relation to the stationary die blocks, clincher dies and sliding arbor,

FIGURE 7 is an enlarged cross sectional view taken on line 7—7 of FIGURE 6,

FIGURES 8 through 24 show generally subsequent steps in the production and securement of top stops on a slide fastener, wherein

FIGURE 8 is a cross sectional view taken on line 8—8 of FIGURE 6,

FIGURE 9 is a perspective view of the sliding arbor, FIGURE 10 is a cross sectional view similar to FIGURE 8, showing a subsequent step of operation,

FIGURE 11 is a cross sectional view similar to FIGURE 10, showing a next subsequent step of operation,

FIGURE 12 is a cross sectional view taken on line 12—12 of FIGURE 11,

FIGURE 13 is a cross sectional view similar to FIGURE 13 showing a next subsequent step of operation,

FIGURE 14 is a cross sectional view taken on line 14—14 of FIGURE 13,

FIGURE 15 is a cross sectional view similar to FIGURE 14 showing a subsequent step of operation,

FIGURE 16 is a perspective view of the leading end of the wire shown in FIGURE 9, and here shown per se,

FIGURE 17 is a perspective view thereof after being die cut in the operation shown in FIGURE 10,

FIGURE 18 is a perspective view of the wire staple after being formed in the operation shown in FIGURE 11,

FIGURE 19 is an enlarged detail cross sectional view of a portion of the structure shown in FIGURE 15, and showing a subsequent step of operation,

FIGURE 20 is a similar view showing a next subsequent step of operation,

FIGURE 21 is a similar view to FIGURE 20 showing a next subsequent step of operation,

FIGURE 22 is a similar view to FIGURE 21 showing a final step of operation,

FIGURE 23 is a perspective view of one of the top stops shown secured to the stringer of a slide fastener, and

FIGURE 24 is a plan view of a slide fastener shown completed and incorporating the top stops on each stringer thereof.

Referring now to the drawings in detail, the numeral 30 represents a semiautomatic wire-fed dual top stop production and securement machine, according to the present invention wherein there is a machine frame 32 having a crank case 34 that is integrally formed with a base 36 which may be supported upon any supporting surface 38 where the machine can be comfortably operated by a workman.

An electric motor 40 is mounted on the top of the crank case 34, the motor driving a pulley 42 on the motor power shaft 44; the pulley 42 by means of an endless belt 46 through a pulley 48 secured on a drive shaft 50. A mainshaft 52 journaled within the crank case is selectively engaged with the drive shaft 50 by means of a slide clutch 54 powered through a rocking linkage 56 centrally pivoted on a pin 58 secured in the crank case; one end of the linkage engaging the clutch and the other end being connected to an arm 60 of a solenoid 62.

An eccentric pin 64, mounted on the end of the mainshaft 52, provides vertical movement to a hammer unit 66 comprised of a ram 68 and a driver assembly 70 at the front of the machine; the ram and driver assembly

comprising the movable parts for cutting and forming the top stops and then securing the same to slide fastener stringers. A cover plate 69 secured by screws 71 to the crank case encloses the hammer unit.

Adjacent each side of the hammer unit there is a wire feed unit 72 comprised of a reel 74 mounted on a spindle 76 carried on a bracket 78, secured to the machine frame by means of screws 80. Each wire feed unit 72 includes a stationary wire feed jaw 82, a movable wire feed jaw 84 and a stationary die block 86 from which each wire is fed under the hammer unit 66.

Each wire feed jaw is comprised of an arm 88 pivoted at one end on a pin 90 affixed in a block 92; the block having a V-shaped recess 94 containing a cage 96 formed on the end of arm 88, the cage having a pair of rollers 98 therein between which the wire 100 passes. A compression spring 102 normally urges the arm so that the rollers are pushed into the narrow portion of the V-shaped slot, thereby forcing them together and thus clamp the wire therebetween. The stationary wire feed jaw 82 is secured by means of screw 104 to the crank case. The movable wire feed jaw is secured to an end of each of a pair of rocker arms 106 centrally pivoted on pins 108, the opposite ends of the rocker arms having rollers 110 that engage cam faces 112 on the upper end of the ram 68.

Each stationary die block 86 is secured to the machine frame by means of screws 114, each stationary die block having an opening 116 for admitting wire 100 therethrough and under the hammer unit.

The ram 68 comprises an elongated member having the cam faces 112 at its upper end. At an intermediate point between the opposite ends of the ram, a pin 118 is mounted for holding pivotally free one end of a link 120, the other end of the link being held pivotally free on the eccentric pin 64 as shown in FIGURES 2 and 5. The lower end of the ram has an inclined cam face 122 which is engageable with a corresponding arcuate cam 124 on a sliding arbor 126 to cause the sliding arbor to move horizontally against a compression coil spring 128 located between the sliding arbor and the machine frame 32, shown in FIGURES 2 and 6.

The driver assembly 70 includes a driver plate 130 adjacent the rear side of the ram, the driver plate having a stud 132 secured thereto. One end of a link 134 is mounted pivotally free on the stud, the other end of the link being mounted pivotally free on the eccentric pin 64 adjacent the link 120, as shown in FIGURES 2 and 5. The lower end of the driver plate is provided with notches 136 into which the enlarged upper ends 138 of a pair of elongated drivers 140 are engaged. The drivers 140 are retained vertically slidable within grooves 142 formed by intermediate block 144 and side blocks 146 secured to the rear side of the ram. The lower ends of the drivers are arcuately concave as shown at 148 in FIGURE 6 for a purpose of forming the top stop, as will be shown hereinafter.

As shown in FIGURES 6 and 9, the sliding arbor is provided with a pair of anvils 150 which, in an operative use, project into the lowermost ends of grooves 142 for a purpose of forming the top stop, as will be hereinafter shown.

Below the hammer unit and in spaced apart relation therefrom, there is a clincher die unit 152 shown in FIGURES 1, 2, 3 and 4. The die unit 152 includes a support block 154 mounted vertically adjustable on a bolt 156 adjustably mounted in the base 36. A front block 158 is secured to the support block and a pair of clincher die blocks 160 are secured therebetween. Slots 162 in the clincher die blocks for receiving holding screws 164 permit lateral adjustment of the clincher die blocks, so that arcuately notched clincher die 166 on block 160 is precisely positioned below each driver 140. An operating micro-switch 168 is mounted on the rear of the support block 154, the switch having an actuating arm 170 that is actuated by a pin 172 attached to a sliding block 174 that moves against the action of a compression coil spring

176 that normally urges the sliding block 174 rearwardly. It will be noted, as shown in FIGURES 3 and 4, that the spring 176 is located below the upper surface of the clincher die unit so as not to become entangled with a slide fastener placed across the top of the clincher die unit during operation of the machine. The sliding block 174 has an upwardly extending portion 178 of triangular configuration that is rearwardly tapered; the portion 178 providing a means for hooking a slide fastener tape 180 thereupon for the purpose of actuating the switch 168.

As shown in FIGURE 3, slide fastener portions 182 are made at intermittently spaced apart positions along the length of a pair of tape elements 184 that together form the tape 180. Prior to introduction of the tape 180 into the present machine, each slide fastener includes engaging teeth 186 on corresponding edges of the tape and a slide 188 to engage the teeth. A bottom stop 190 is already secured at one end of the toothed edges, the bottom stop permanently securing the tape elements together. In the tape portion 192, between the slide fastener portions 182, the edges 194 are cleared of teeth. The lengths of the cleared edges 194 are all equal and this uniform dimension is utilized in the construction of the present machine to properly position the top stop adjacent the upper ends, the rows of teeth.

The forward upper corner of the front block 158 is gently rounded, as shown at 196, so that the tapes 180 can be rolled therearound and an upstanding stud 198 is affixed thereto for the purpose of maintaining the edges 194 at proper distances apart so that each edge 194 is in alignment directly over each of the die notches 166, as shown in FIGURES 3 and 14. It is of course understood that the width of the upstanding portion 178 of the block 174 and the diameter of the stud 198 must be of correct dimension to produce the above desired result.

The machine is electrically wired so that the various electrical components may be powered to drive the mechanical elements thereof. A main switch 200 is mounted on the side of the machine frame and a cable 202 connected at one end thereto has a plug (not shown) at its opposite end for plugging into an electrical source outlet. As shown in FIGURES 1 and 2 appropriate wiring 204 leads from the main switch to the motor 40 and to the micro-switch 168 connected to the solenoid 62.

Operation of the machine

The machine is designed for semiautomatic operation, wherein the operator needs only to align the tape 182 in proper position on the machine and then activate a switch to allow the machine to go through one cycle of operation after which it automatically stops so that the operator can reset the tape for a subsequent cycle of operation. During one cycle the machine will affix a pair of top stops to a tape 182 and also manufacture another pair of top stops for affixing to a tape in a next cycle of operation.

Prior to operation two reels 74 of wire 100 are mounted on the machine. Each wire is fed from the reel, around a lower flat spring guide 206 supporting an eyelet 208 through which the wire is threaded. The leading end of each wire is inserted first through the stationary wire feed jaw 82, then through the movable wire feed jaw 84 and into the opening 116 in each stationary die block 86.

To start the machine, the operator flips the button of switch 200 to an "on" position which starts up the motor 40, thus causing the drive shaft 50 to rotate. The operator then inserts a tape 182 upon the clincher die unit, as shown in FIGURE 3, with one of bottom stops at the rear of the slide block portion 178 thus allowing the tape elements 184 to extend around the sides of slide block portion 178 and forwardly therefrom in spaced apart relation over the rounded upper corner of front block 158. The tape elements are passed around the stud 198 which aids to maintain edges 194 between the stud and portion 178 in properly spaced apart position so that the edges pass directly over the notched dies 166. The operator then simply gives the forward end of the tape a slight tug to cause

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the sliding block 174 to move forwardly to activate switch 168 which closes an electrical circuit to the solenoid thereby causing the clutch 54 to engage and transmit rotation from the drive shaft 50 to the main shaft 52. The mainshaft will now turn one complete revolution, after which the clutch will automatically disengage. During this one rotation of the mainshaft, one full cycle of operation will occur.

Although in a typical cycle a top stop manufactured in a previous cycle is secured first to a tape before a subsequent top stop is manufactured, it will be here necessary, for the purpose of clarity, to first describe that position of the cycle wherein a top stop is manufactured, so that the securement thereof can be better understood.

To readily describe how the position of the movable hammer elements are altered from one step to another during the cycle, it will be necessary to use the positions of the eccentric pin 64 as a reference point. By comparing the position of the eccentric pin relative to the mainshaft as we do the hour hand of a clock, we can visually recognize the relative positions of various elements to each other.

Accordingly when the eccentric pin 64 is at the one o'clock position, the terminal ends 210 of the wires 100 are below the hammer unit and in abutment with the side walls 212 of cam 124 as shown in FIGURES 9 and 16. When the eccentric pin moves, 2 o'clock, the ram 68 is moved downwardly causing the side blocks 146, secured thereto, to shear off the ends 214 of the wires, to form staples 214, as shown in FIGURES 10 and 17. It will be noted that the side blocks 146 are channeled as shown at 216, so as to receive therein the side edge 218 of each stationary die block 86, the edge 218 serving as a track on which side block 146 travels. It will be further noted that the channel 216 and the side edges 218 have diagonally configured corresponding side walls when viewed in cross section (as shown in FIGURE 7). Accordingly, when the ram is moved downwardly, the staples 214 are cut off, having a generally U-shaped edge, whereby there are formed a pair of spaced apart pointed ends 220 separated by a straight transverse edge 222 therebetween.

At approximately a 4 o'clock position of the eccentric, the staples 214 are bent into a U-shaped position as shown in FIGURES 11 and 18. This is accomplished by downward movement of the ram and drivers, the latter forcing the staples 214 against the projecting anvils 150 which are located immediately below the drivers and in the path of the driver travel at this time. Due to the fact that the lower ends of the drivers are arcuate, the drivers therefore force downward the longitudinal ends of the staples 214 after the midportions thereof are resting on the tops of the projecting dies. It is to be noted that the pointed ends 220 of the staples are made to extend farther downwardly than the end 210, as shown in the figures. This is accomplished by the anvils 150 which are slightly offset to one side relative to the center of the drivers, thus causing the bend 224 to be positioned off the center of the staple.

At approximately the 5 o'clock position of the eccentric, the angular cam face 122 on the lower end of the ram comes into contact with the arcuate cam 124 on the sliding arbor 126; the continuing downward movement of the ram causing the sliding arbor to be pushed horizontally against spring 128 and move the anvils 150 out of the paths of the drivers, thereby allowing the staples below the drivers to be pushed downward.

For the purpose of a better understanding of the relative vertical movements of the ram and drivers, it is to be here noted that between 12 o'clock and 3 o'clock positions of the eccentric that the drivers are in a gradual upward movement, whereas between a 3 o'clock and 6 o'clock position the drivers are in a gradually downward movement. The ram, which has been moving downward since 1 o'clock, has at about 5 o'clock reached its extreme down position.

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Thus, between 5 and 6 o'clock the drivers alone move downward, causing the staples to be pushed out of the lower ends of grooves 142. This movement of the drivers from 5 to 6 o'clock is illustrated in steps shown in FIGURES 19, 20, 21 and 22.

At the 5 o'clock position the ram has halted travel relatively close to the clincher die blocks 160. The pointed ends 220 of the staple (which project downward farther than the end 210) are the first to contact the slide fastener stringers 184, and pierce their way through the fabric, as shown in FIGURE 19. It is to be noted that the upper edge of the clincher die block 160 has a relatively higher side 226 against which the ram approaches, and a relatively lower side 228 upon which the stringer rests with the edge 194 thereof being over the center of the arcuate clincher die 166. The lower side provides a relief between the die block and the rams, so as to accommodate the stringer therebetween.

As the driver descends further, the ends 220 start to bend inward (shown in FIGURE 20). The pointed ends are now halted from further downward movement due to their full length having been pierced through the material and the transverse edge 222 coming into abutment with the upper side 230 of the fabric. Therefore the downward moving driver now causes the other end 210 of the staple to move downward (shown in FIGURE 21), this movement having a generally rolling appearance since the end 210 now engaging the arcuate clincher die is caused to also bend inward. At the 6 o'clock position the driver is halted from further downward descent, the end 210 having been rolled to a position immediately adjacent the underside 232 of the fabric stringer (shown in FIGURES 22 and 23).

After 6 o'clock, the ram and drivers move upwardly, the drivers gradually accelerating to ascend faster than the ram. Part of this travel speed variation is accomplished by the change of a circular motion to a linear motion and also by the lateral offset of the pins 118 and 132 relative to each other, as is clearly shown in FIGURE 5.

At the upper end of its vertical travel, the ram cam faces 112 contact the rollers 110 causing the rocker arms 106 to pivot about pins 108; the lower ends of the arms moving toward the stationary die blocks 86, thus causing the both wires 100 to be fed under the hammer unit with the newly formed terminal end 210a (shown in FIGURE 17) being presented to the side wall 212 of cam 124, so as to repeat the operation cycle as above described.

Thus the staple is now secured to the stringer at a position adjacent the last tooth of the slide fastener portion, the staple now being termed a top stop 234 (shown in FIGURE 24). In a subsequent operation, the tape 182 is cut across tape portions 192 to form finished individual slide fasteners 236, which are now ready for commercial sale and use.

Obviously, the machine may be modified in construction and yet maintain the same principles. The operating switch 168 may be replaced by a manually foot operated switch if preferred. Likewise, the manual placement of each slide fastener portion of the tape across the clincher die unit may be substituted by a mechanism so that the same can be accomplished automatically without continuous attention of the operator if so preferred. Other modifications may be likewise made.

While various changes may be made in the details of construction, it is understood that such changes will be in the spirit and scope of the present invention as defined by the appended claims.

I claim:

1. In a semiautomatic, wire fed dual top stop production and securement machine for slide fasteners, the combination of a machine frame having a base, a crank case on said machine frame, a motor mounted on said crank case, a first pulley secured on a motor shaft of said motor, a drive shaft supported on said frame, a second pulley

secured on said drive shaft, an endless belt around said pulleys, a mainshaft supported on said crank case, a clutch between said mainshaft and said driveshaft, a solenoid mechanically connected to said clutch, an eccentric pin at one end of said main shaft, a hammer unit connected to said eccentric pin, a clincher die unit below said hammer unit, a pair of flat wire feed units secured on said frame adjacent each side of said hammer unit, each of said wire feed units delivering one of a pair of wires to said hammer unit, support means for a slide fastener tape between said hammer unit and said clincher unit, a sliding arbor cooperating with said hammer unit to form staples from said wires, an operating switch for activating said solenoid, and a main switch for providing electrical power between an electric source and said operating switch and motor, said hammer unit being carried on said crank case, said hammer unit comprising a vertically movable ram, linkage between said ram and said eccentric pin, a drive assembly, a linkage between said driver assembly and said eccentric pin, said driver assembly comprising a vertically movable plate carrying a pair of vertically movable drivers to cut and then bend a pair of wires simultaneously, the lower ends of said drivers being arcuately concave, said ram comprising a bar having groove means on one side of said bar for supporting therein said vertically movable drivers, said clincher unit comprising a vertically adjustable block, and a front block, a pair of clincher die blocks between said adjustable block and said front block, said clincher die blocks each having a generally semicircular notched die formed on an upper edge of said die block, and each of said notched dies being in alignment below one of said arcuately concave lower ends of said drivers, each of said wire feed units comprising a bracket on each side of said frame, a spindle on each of said brackets for supporting a reel of said wire, a stationary wire feed jaw, mounted on said crank case, a movable wire feed jaw, on the lower end of a centrally pivoted rocker arm, the upper end of said rocker arm being in the upper end of the path of travel of the upper end of said ram, a bowed flat spring guide supported on said frame for guiding said wire therearound from said reel to said stationary wire feed jaw and a stationary die block affixed on said crank case having a horizontal opening therethrough, for delivering said wire below said hammer unit, said stationary die block forming one member of a shearing means and said ram forming the other member of said shearing means for shear-

ing off the end of said wire to form a staple to become a top stop of a slide fastener, said sliding arbor comprising a block horizontally slidable against a spring on said crank case, said block having an arcuate cam and a pair of anvils on one end, said anvils adapted to hold the mid-portion of the cut wires against said driver, said anvils extending into said grooves of said ram at a position below said drivers and said staples, when said arcuate cam of said sliding arbor is below an inclined cam on the lower end of said ram, said arcuate cam being engageable by said inclined cam during downward travel of said ram to cause said anvils to be horizontally moved out of said grooves, said operating switch being mounted on said clincher die unit, said switch having an operating arm in the path of a sliding block slidably mounted on said vertically adjustable block, said sliding block having an upward extending portion higher than the remainder of said clincher die unit for being engaged by a slide fastener tape, whereby a tug on said tape activates said sliding block against a return spring between said sliding block and said vertically adjustable block.

2. The machine as set forth in claim 1, wherein an intermediate block is located adjacent and between said drivers, said block having legs adapted to bend said wires.

3. The machine as set forth in claim 1, wherein side blocks are located adjacent the exterior of said drivers, said side blocks being adapted to bend said wires.

4. The machine as set forth in claim 2, wherein side blocks are located adjacent the exterior of said drivers, said side blocks being adapted to bend said wires.

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U.S. Cl. X.R.

29—208; 227—88