G. E. HARCKE.

SAFETY PIN MACHINE.

APPLICATION FILED MAY 27, 1913.

1,126,202.

Patented Jan. 26, 1915.

12 SHEETS—SHEET 1.

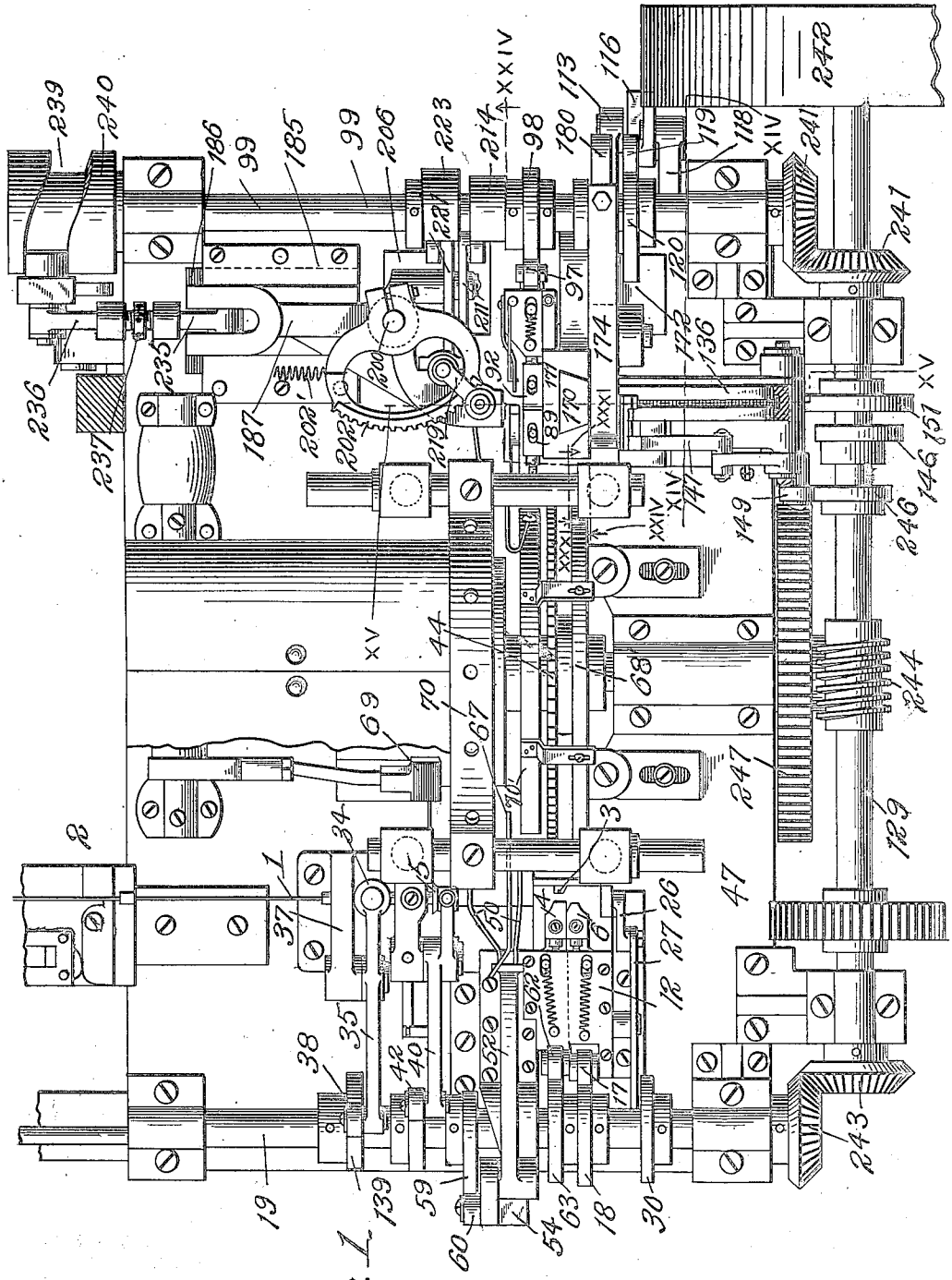


Fig. 1.

Witnesses:
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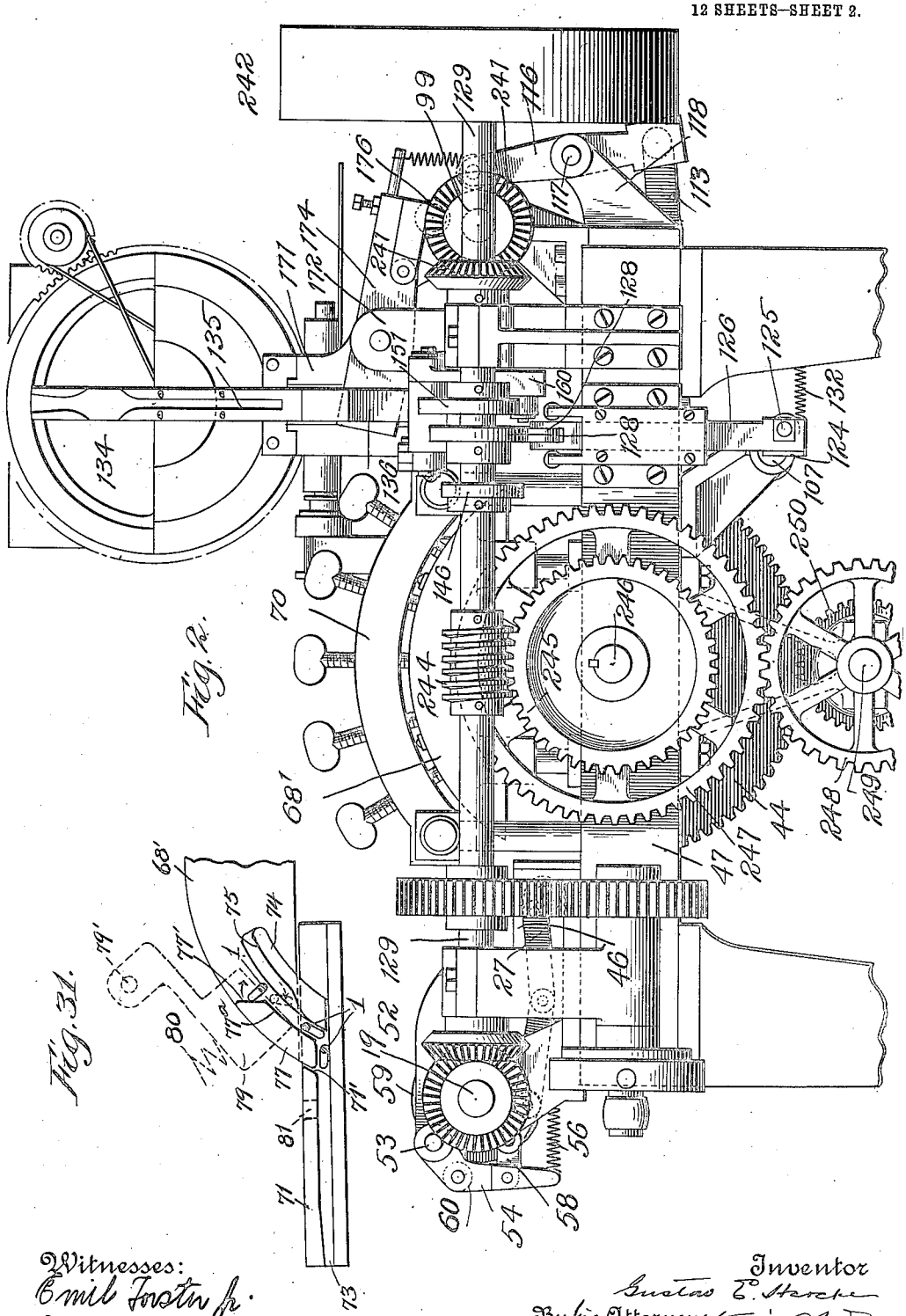
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12 SHEETS—SHEET 2.



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12 SHEETS—SHEET 3.

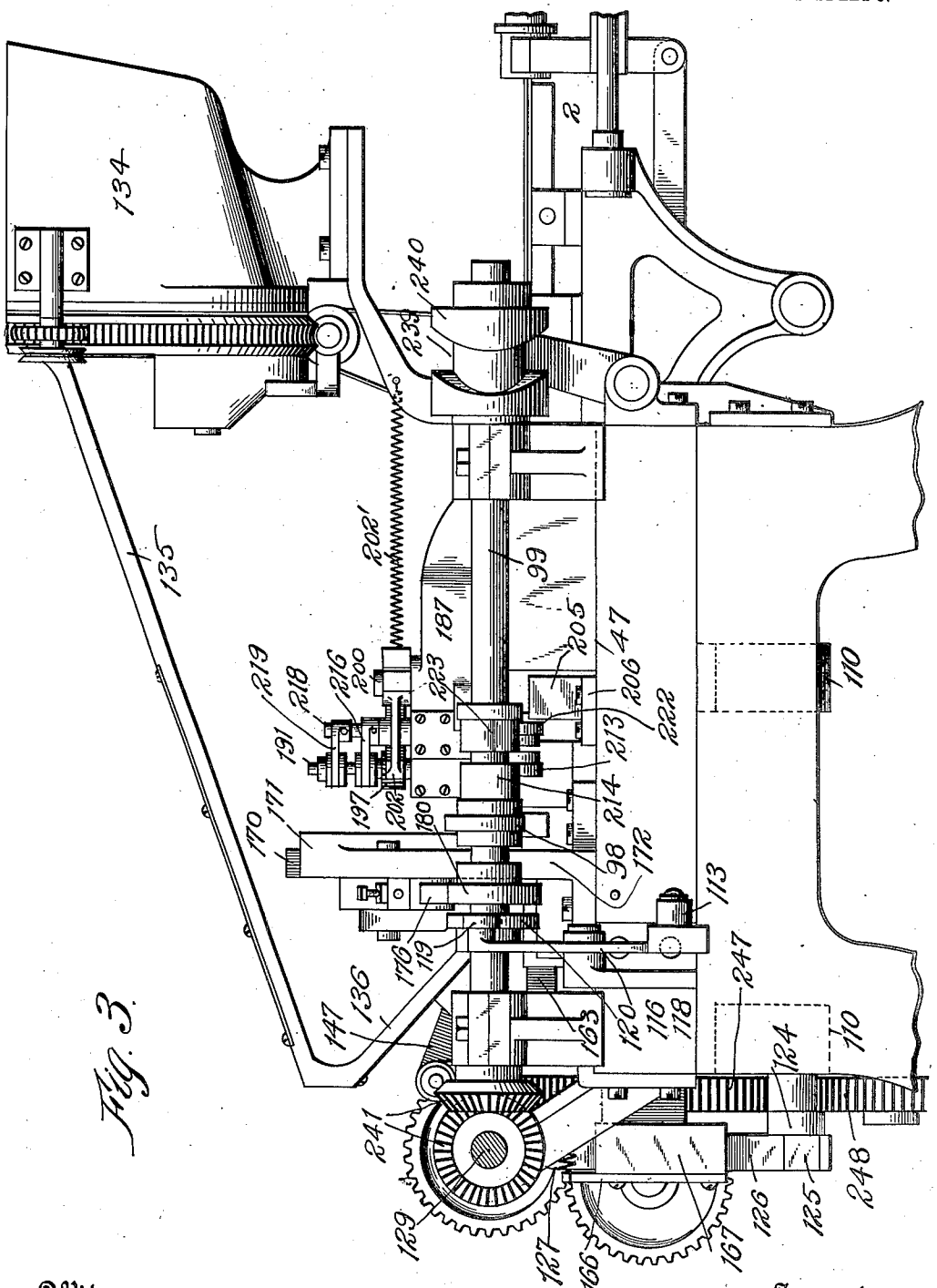


Fig. 3.

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SAFETY PIN MACHINE.

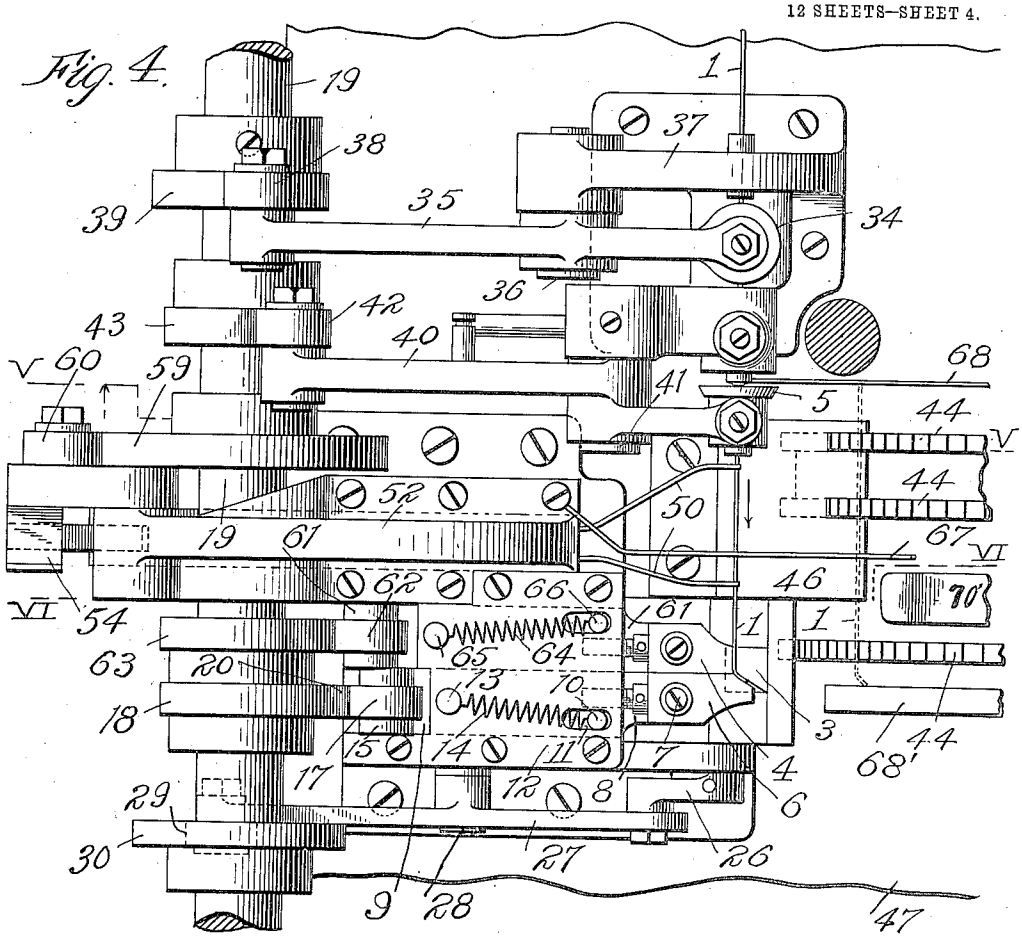
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12 SHEETS—SHEET 4.

Fig. 4.



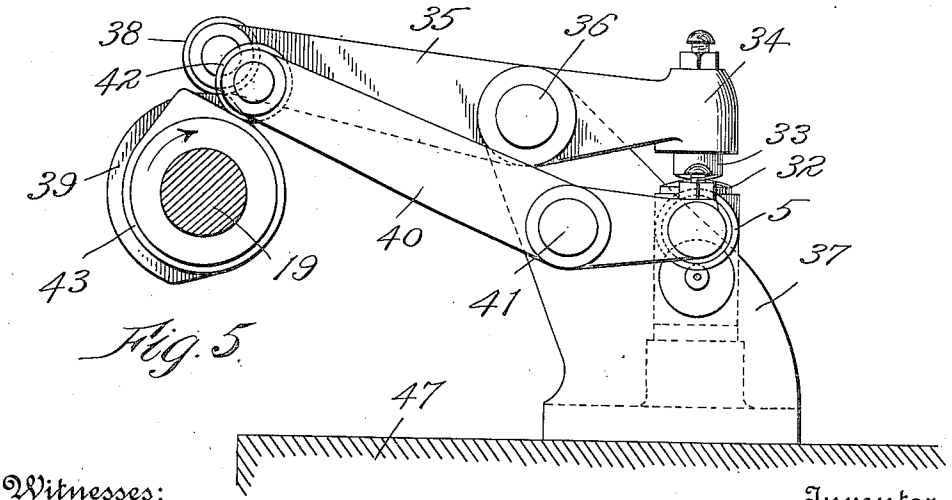


Fig. 5.

Witnesses:
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12 SHEETS—SHEET 5.

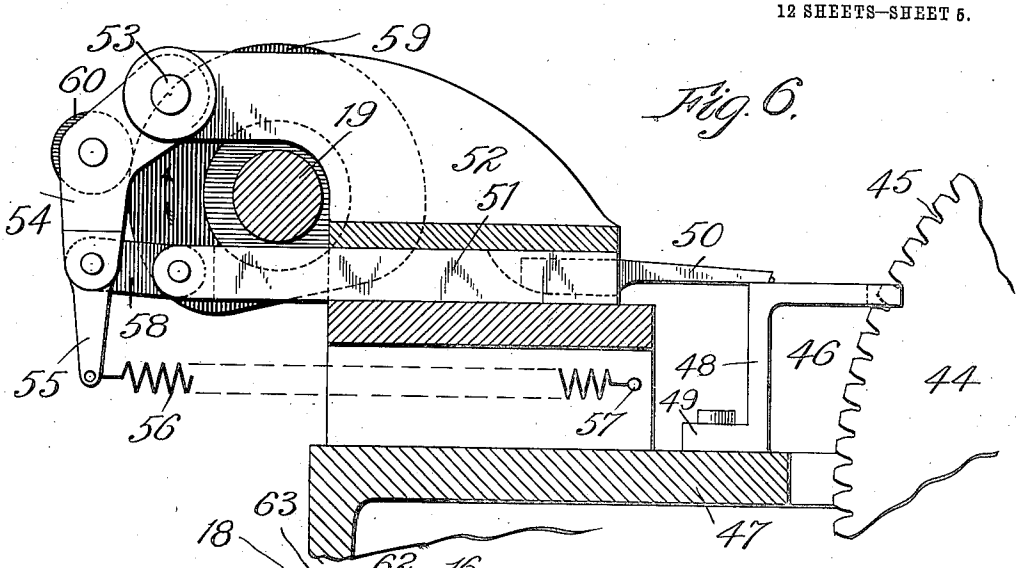


Fig. 6.

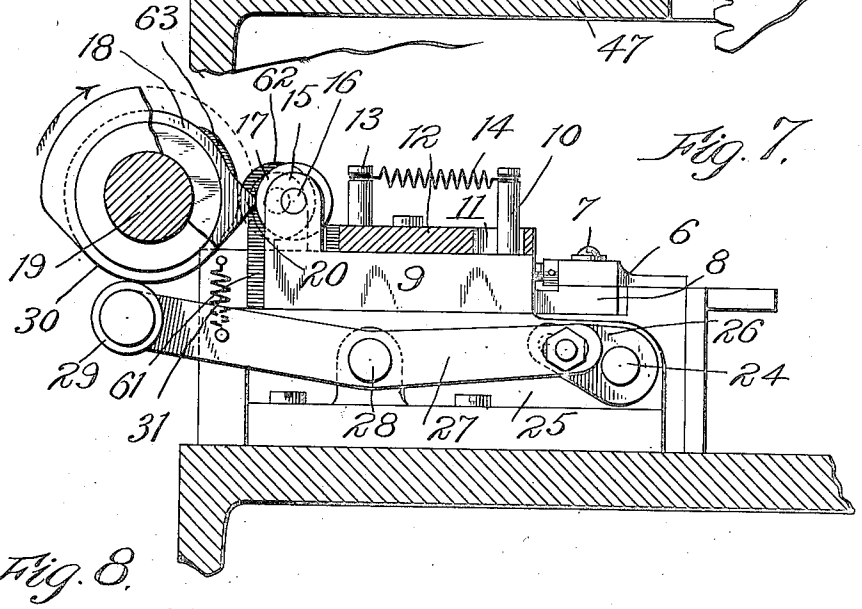
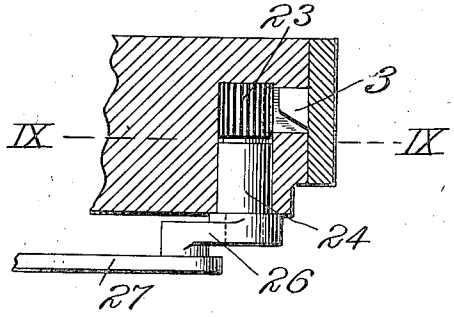


Fig. 7.

Fig. 8.



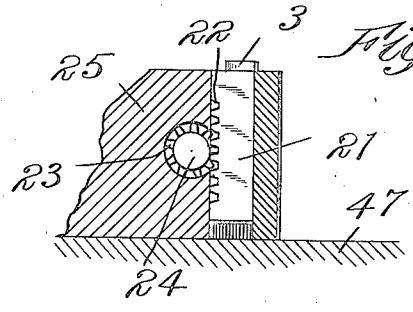


Fig. 9.

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SAFETY PIN MACHINE.

APPLICATION FILED MAY 27, 1913.

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12 SHEETS—SHEET 6.

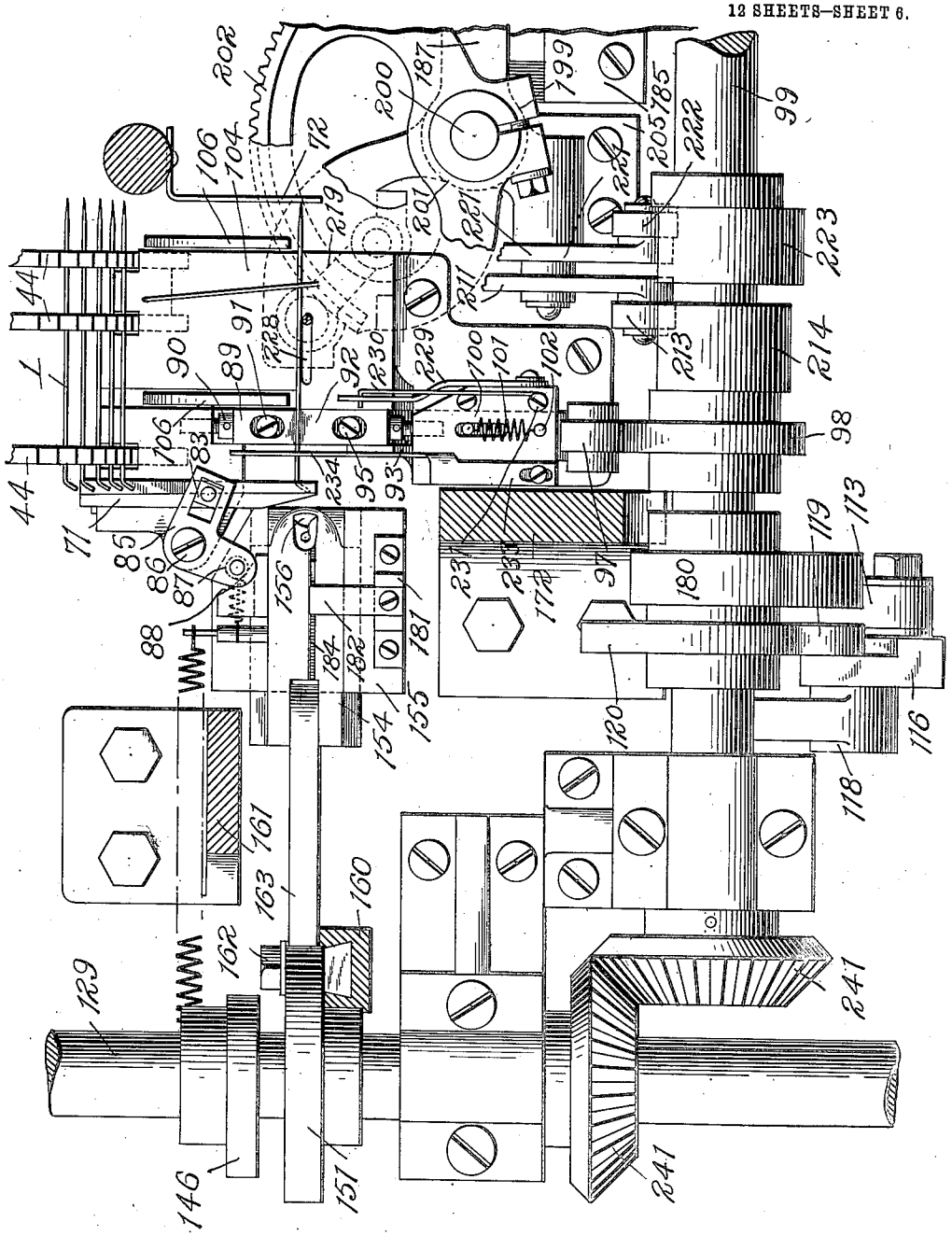


Fig. 10.

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SAFETY PIN MACHINE.

APPLICATION FILED MAY 27, 1913.

1,126,202.

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12 SHEETS—SHEET 7.

Fig. 11.

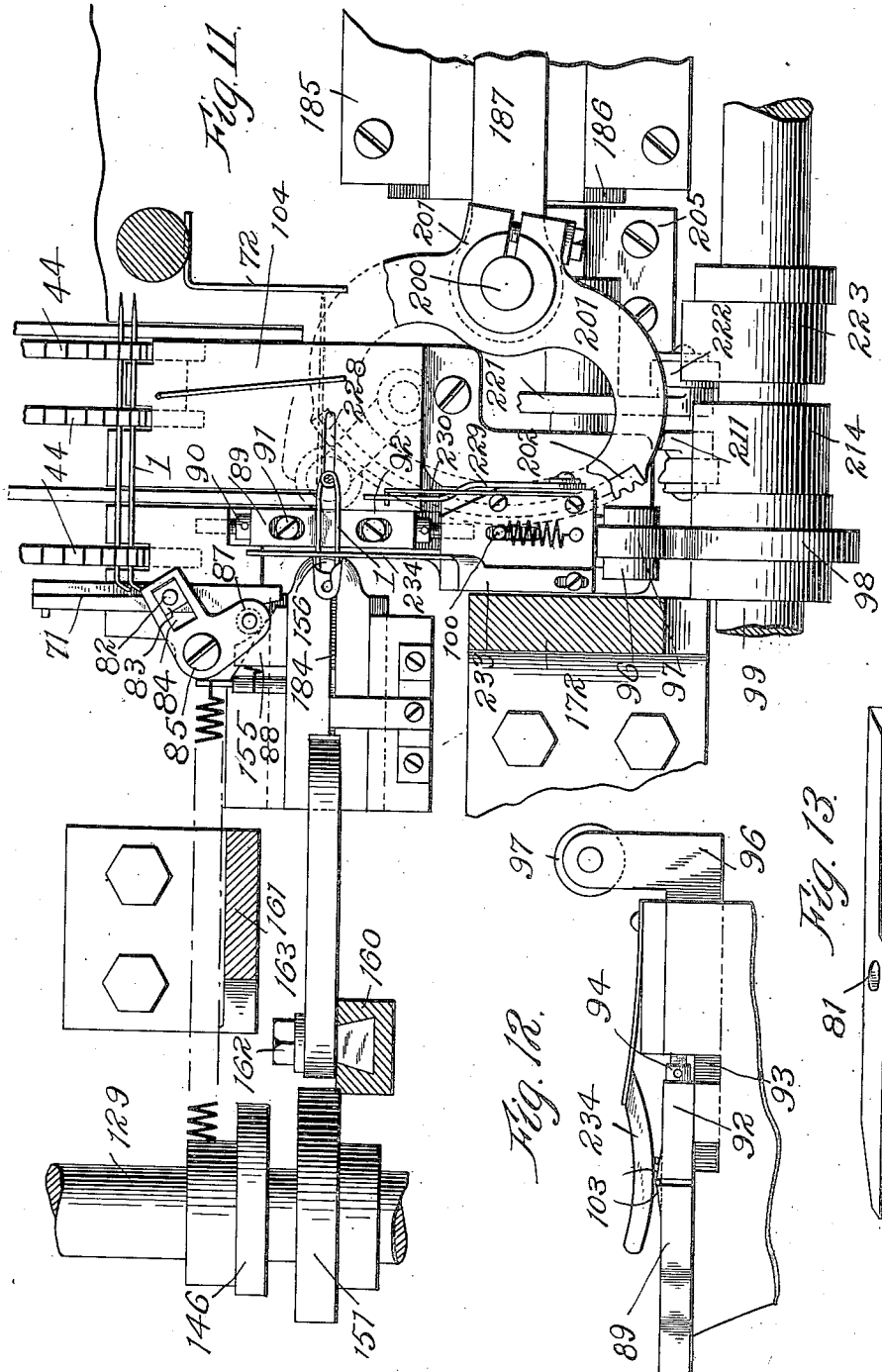
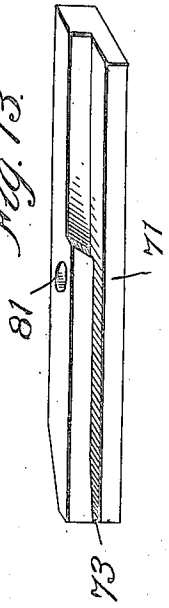


Fig. 12.

Fig. 13.



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SAFETY PIN MACHINE.

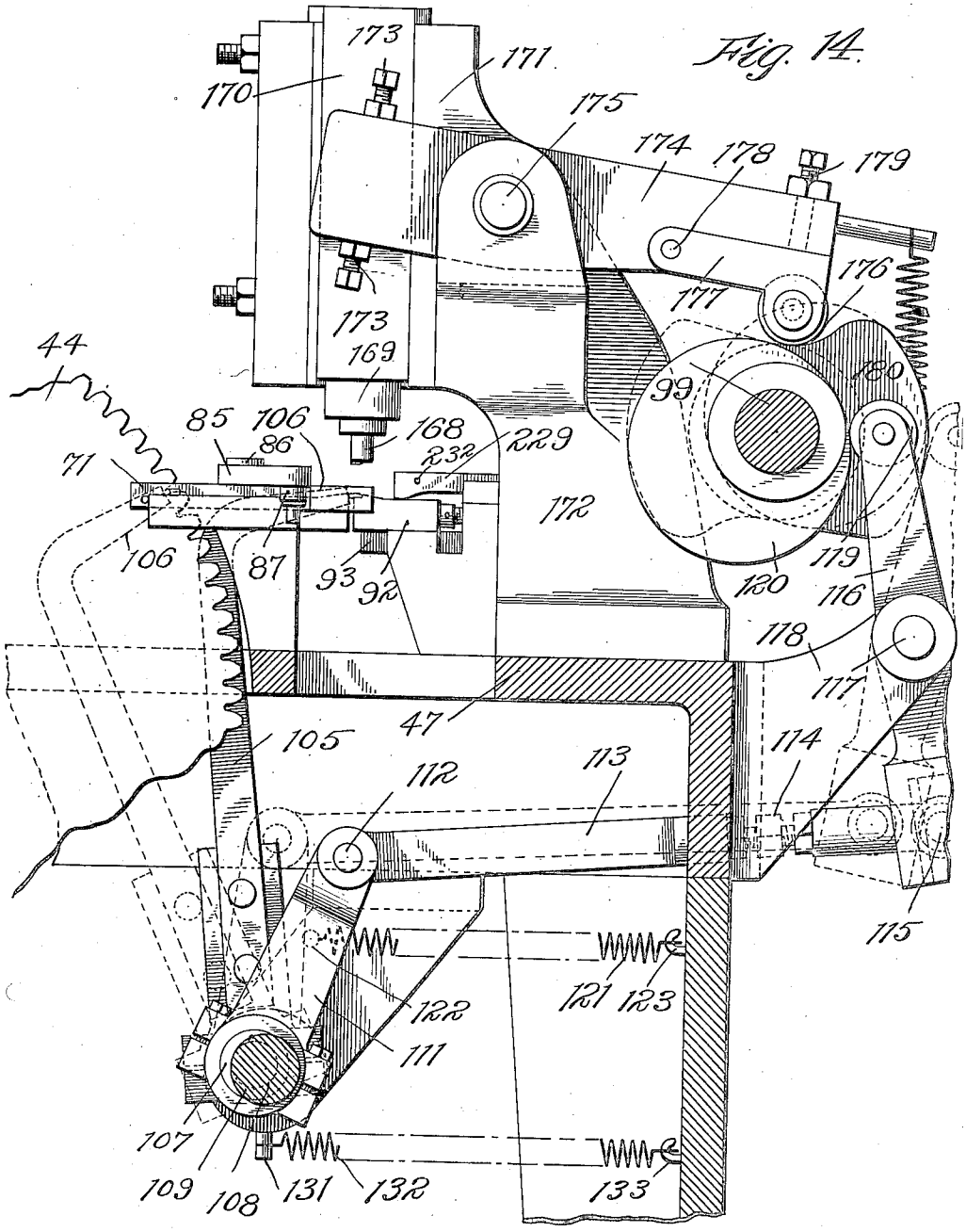
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Patented Jan. 26, 1915.

12 SHEETS—SHEET 8.

Fig. 14.



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SAFETY PIN MACHINE.

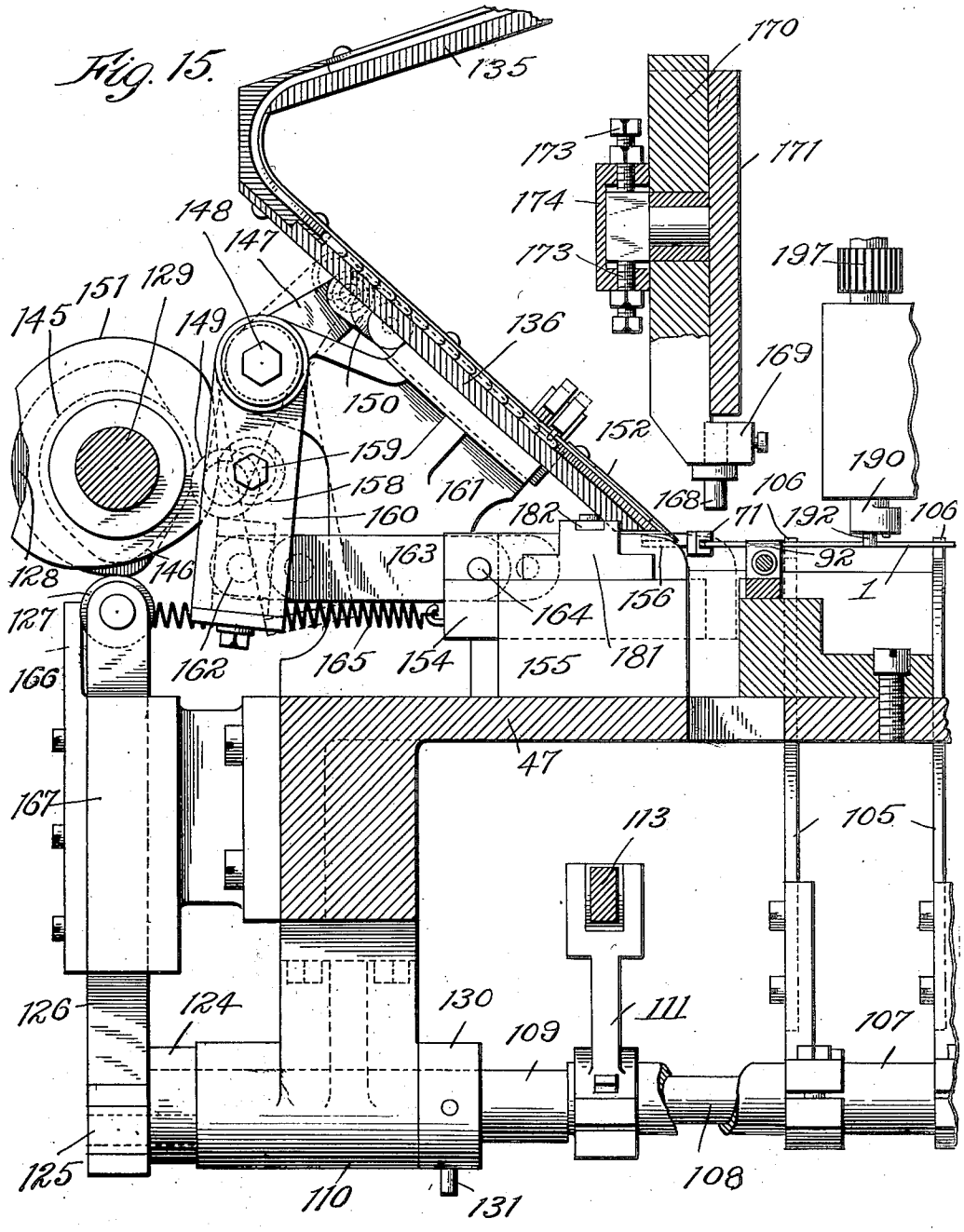
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12 SHEETS—SHEET 9.

Fig. 15.



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SAFETY PIN MACHINE.

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12 SHEETS—SHEET 10.

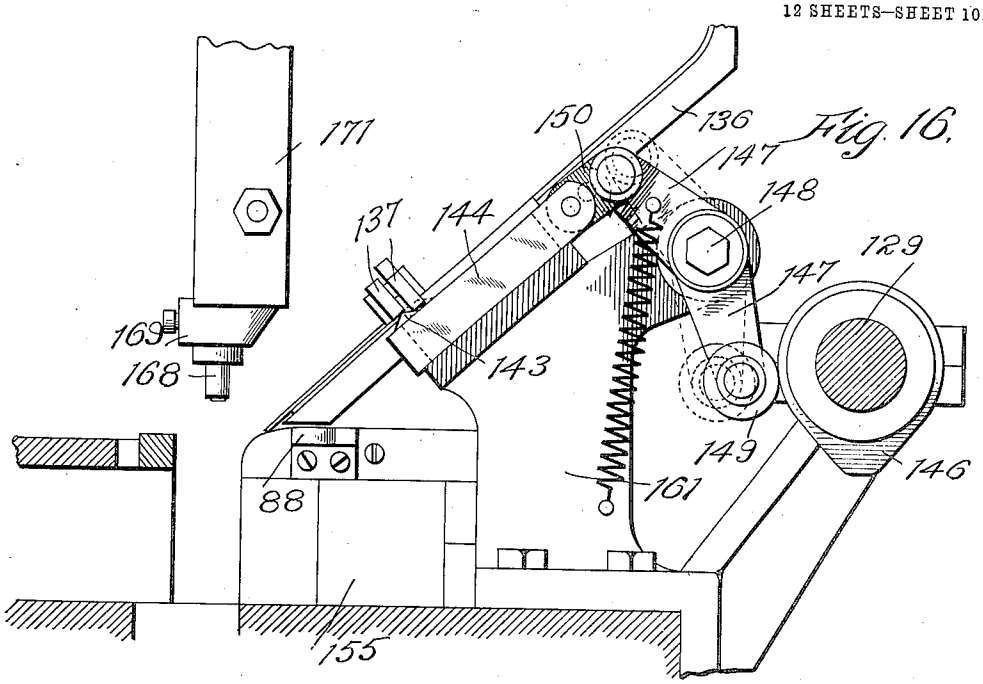


Fig. 16.

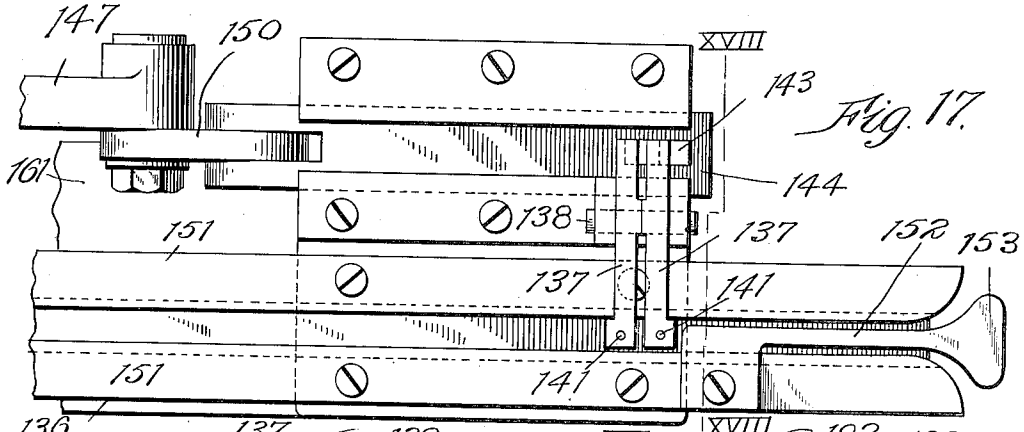


Fig. 17.

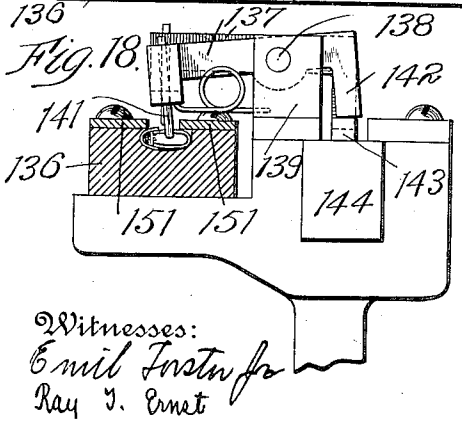


Fig. 18.

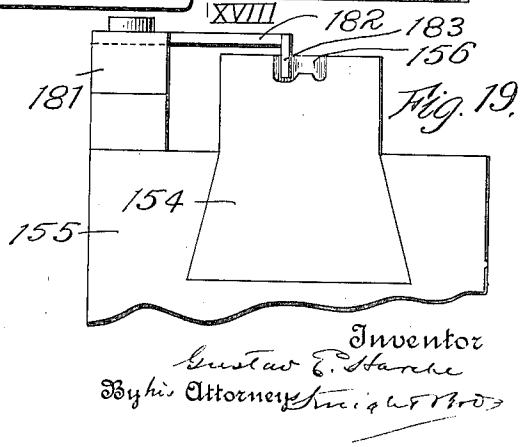


Fig. 19.

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SAFETY PIN MACHINE.

APPLICATION FILED MAY 27, 1913.

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12 SHEETS—SHEET 11.

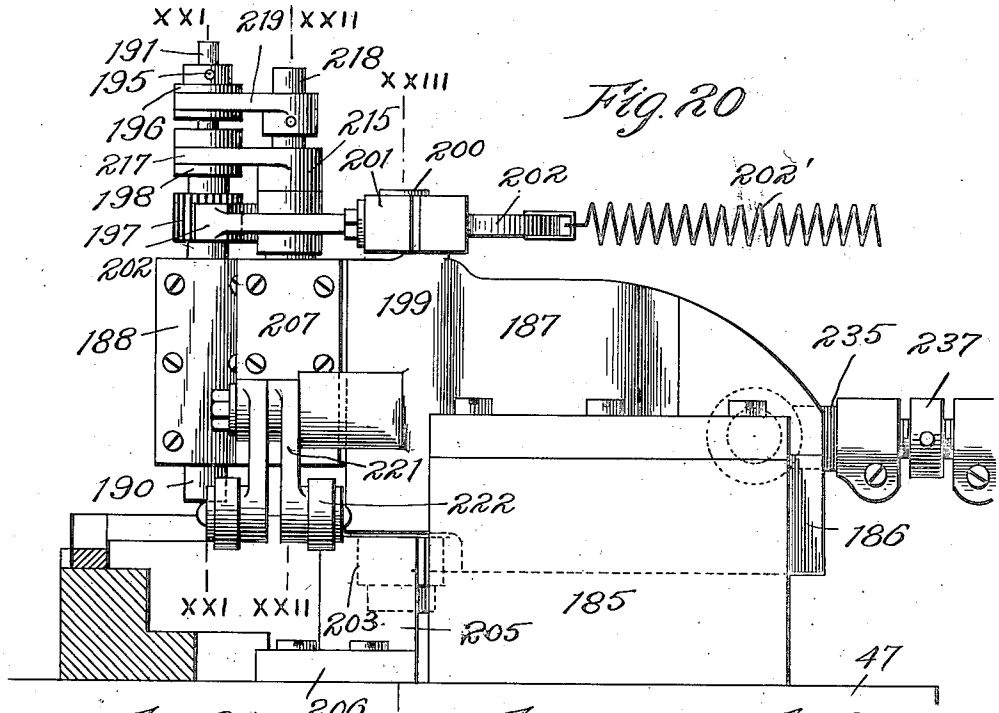
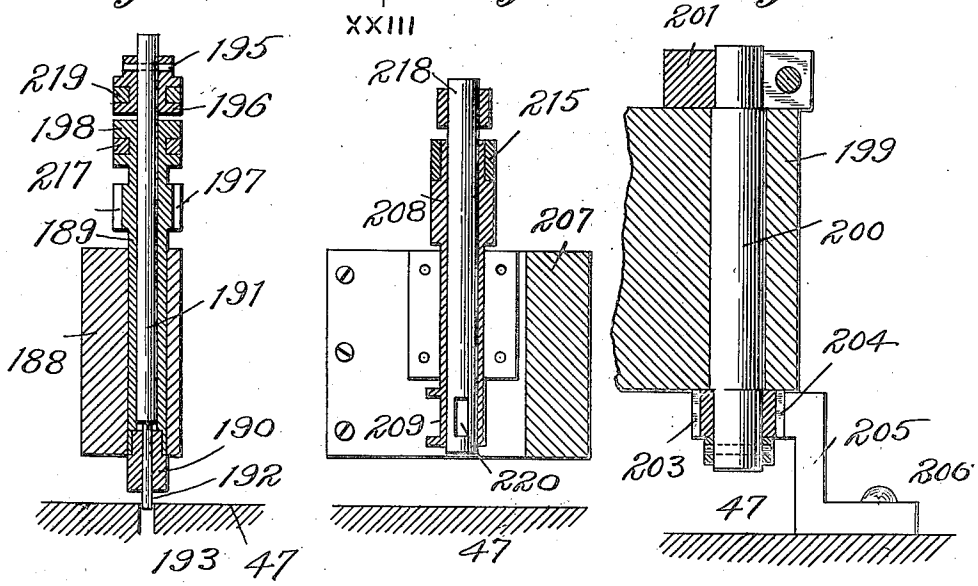


Fig. 20.

Fig. 21.

Fig. 22.

Fig. 23.



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SAFETY PIN MACHINE.

APPLICATION FILED MAY 27, 1913.

1,126,202.

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12 SHEETS—SHEET 12.

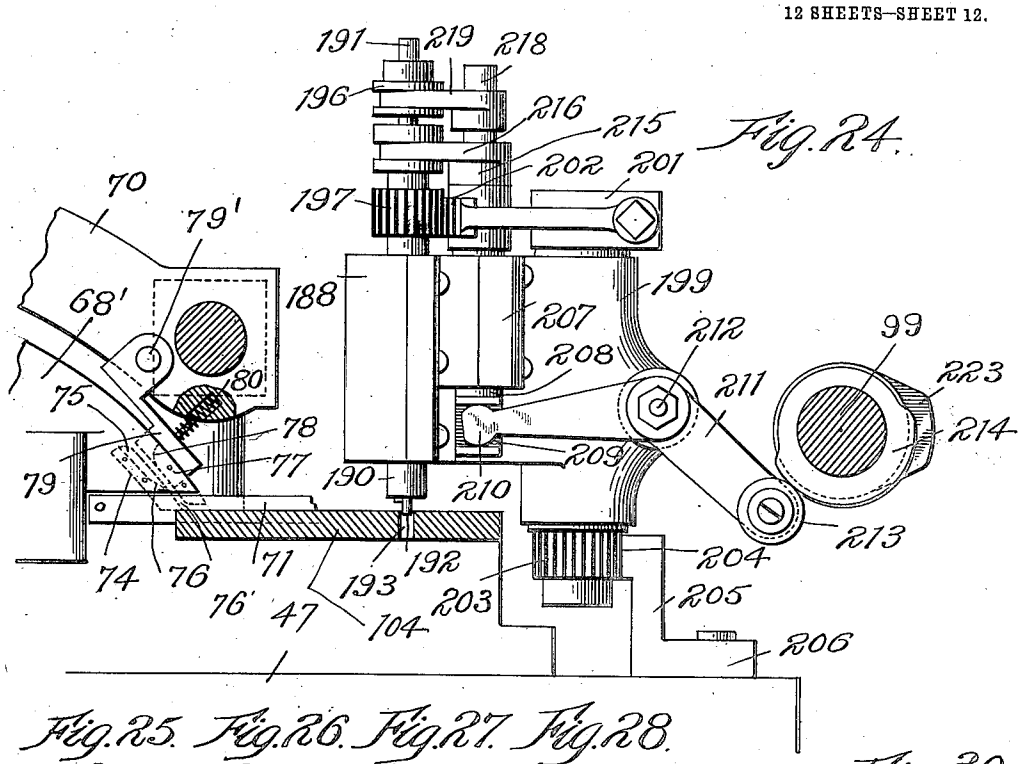


Fig. 24.

Fig. 25. Fig. 26. Fig. 27. Fig. 28.

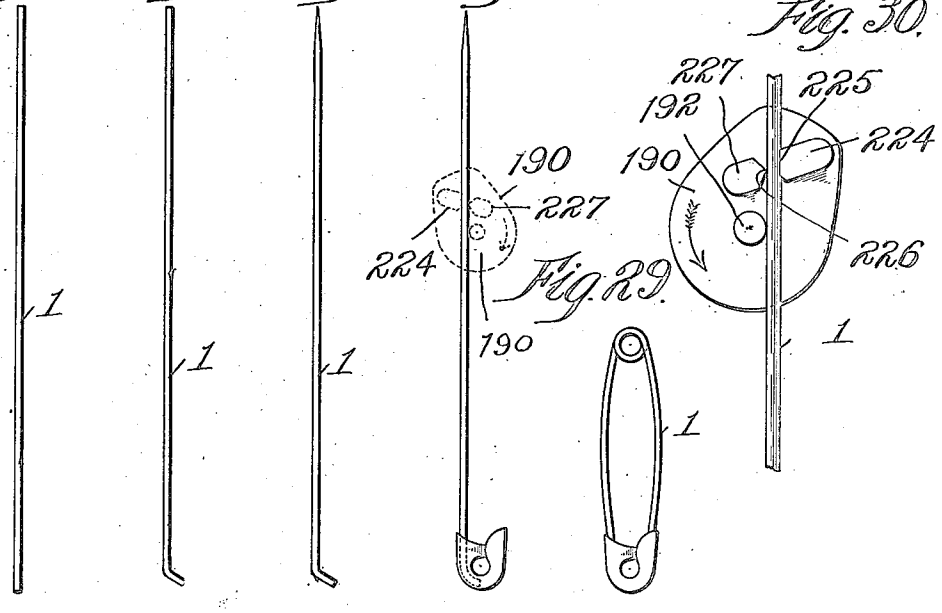


Fig. 29.

Fig. 30.

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Gustav E. Harcke
By his Attorney

UNITED STATES PATENT OFFICE.

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SAFETY-PIN MACHINE.

1,126,202. Specification of Letters Patent. Patented Jan. 26, 1915.

Application filed May 27, 1913. Serial No. 770,180.

To all whom it may concern:

Be it known that I, GUSTAV E. HARCKE, a citizen of the United States, and a resident of Waterbury, county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Safety-Pin Machines, of which the following is a full and clear specification.

The primary object of this invention is to provide an improved construction, combination and arrangement of mechanisms for performing the various operations involved in the manufacture of safety pins, said mechanisms being adapted to coöperate in the most effective manner.

Some of the objects of the present invention are to provide improved mechanisms for forming the blank, for feeding said blank, for arranging and positioning said blank, for applying a shield thereto, for twisting the blank, and for expelling the completed pin from the machine.

Other objects will appear in the following description and be pointed out in the appended claims, reference being had to the accompanying drawings in which the preferred embodiment of my invention is shown.

In the drawings,—Figure 1 is a plan view of the complete machine, the hopper for holding the shields being removed for the sake of clearness. This view shows the twisting mechanism, shield feeding mechanism and the mechanism for applying the shield to the blank in initial position. Fig. 2 is a front elevation of the machine including the hopper which holds the shields, parts being in the same position as shown in Fig. 1; Fig. 3 is a side elevation of the machine, parts being in the same position as shown in Fig. 1; Fig. 4 is a plan view of the mechanism for holding, cutting and forming the neck on the blank and shows these mechanisms in the initial position, or after the blank has been cut and the neck formed, the push fingers being about to thrust the blank forward in position to be sharpened; Fig. 5 is a vertical section on the line V—V, Fig. 4, and shows the mechanism for holding and cutting the blank; Fig. 6 is a section on the line VI—VI, Fig. 4, and shows the means for operating the push fingers for removing the blank from the neck forming position to the conveyer; Fig. 7 is a side elevation of Fig. 4, parts being broken away; Fig. 8 is a detail horizontal sectional view showing how the anvil is lowered to allow the blank to be moved by the push fingers to the conveyer; Fig. 9 is a detail vertical section on the line IX—IX, Fig. 8; Fig. 10 is a plan view in detail showing the blank after it has been taken from the conveyer and moved into position to receive the shield to be twisted and formed into a completed closed pin. This view shows the several parts in the initial position of operation; Fig. 11 is a plan view similar to Fig. 10 and shows the several mechanisms after they have been operated to place the shield, twist the blank, and to form a completed pin; Fig. 12 is a detail view in elevation, showing the spring finger for removing the pin from the holding jaws after said pin has been formed and released. Fig. 13 is a detail perspective view of the blank presenting guide; Fig. 14 is a vertical section on the line XIV—XIV, Fig. 1, with some of the parts removed; Fig. 15 is a vertical section on the line XV—XV, Fig. 1, with some of the parts removed; Fig. 16 is a similar view to Fig. 15 taken on the other side of the shield chute and shows the means for releasing and holding the shields; Fig. 17 is a fragmentary plan view of the shield chute showing the means for holding and releasing the shields. Fig. 18 is a vertical section on the line XVIII—XVIII, Fig. 17, looking in the direction of the arrow; Fig. 19 is a fragmentary elevation of the anvil showing the means for removing the shield when the blank is not in position to receive the same; Fig. 20 is a side elevation in detail of the twisting mechanism; Fig. 21 is a vertical detail section on the line XXI—XXI, Fig. 20, showing the relative positions of the centering pin and twisting head; Fig. 22 is a vertical section on the line XXII—XXII, Fig. 20, showing the means for lifting the centering pin and twisting head; Fig. 23 is a section on the line XXIII—XXIII, Fig. 20, showing how the fixed rack on the table operates the pinion rotating the segment, said segment in turn rotating the twister head; Fig. 24 is a vertical section on the line XXIV—XXIV, Fig. 1, looking in the direction of the arrow; Figs. 25, 26, 27, 28 and 29 show the blank from the time it is cut off until it is formed into a safety pin;

Fig. 30 is a detail view showing how the twister head grips the blank to hold the same while it is being twisted. Fig. 31 is a fragmentary vertical section showing the parts outlined in Fig. 24, but taken from the other side of the abutment plate 68' and looking in the opposite direction.

According to the preferred embodiment of my invention shown on the drawings the wire from which safety pins are to be constructed, is mounted on a reel (not shown), the end of said wire being fed to suitable holding means while a portion thereof is severed therefrom and the end thereof formed with a neck or crook for the reception of the protecting shield, in the manner to be hereinafter specifically pointed out. The safety pin blank thus formed, is fed to a suitable conveyer whereby it is transported to a device which arranges and positions the blank in suitable position to have a shield applied to the crooked end by a shield-applying mechanism. Subsequently to this operation, suitable twisting mechanism becomes operative and after forming the convolutions which resiliently connect the legs of the pin, deposits the pointed end within the shield after which the mechanism for discharging the pin from the machine becomes active. A general plan view of these mechanisms arranged in groups to adapt them to perform the foregoing operations, is shown in Fig. 1. Thus as shown in Figs. 1 and 4, the wire 1 as it leaves the reel referred to passes through a straightening device 2, said straightening device being of any suitable construction for this purpose. As shown in Figs. 1 and 4, a combined gripper jaw and anvil block 3 is arranged adjacent the path of feed of the wire entering the machine, suitable feeding mechanism (not shown) being provided to advance the wire until it projects slightly beyond the flat face of the jaw 3 which is in line with the direction of feed. Coöperating with the jaw 3 to clamp the wire, is a second gripping jaw 4 which holds said wire while a blank severing device, such as the cutter 5, severs the blank from the strand. While the blank is thus held, a reciprocating forming-die block 6 is forced against the projecting end of the pin blank, as shown in Fig. 4, said die block 6 having its end suitably formed to coöperate with the inclined face of the anvil 3, as shown in Fig. 7. The die block 6 is secured by a screw 7 to the reduced portion 8 of a slide 9, a post 10 being mounted on the forward end of said slide to project through a slot 11 in the cover plate 12. The post 10 is arranged at a suitable distance from another post 13 which is rigidly mounted on the cover plate 12, said posts 10 and 13 being connected by a spring 14 which tends to retain the slide 9 in its rearmost position, as shown in Fig. 1. Suitable uprights 15 are mounted on the rear end of the slide 9 for journaling the spindle 16 (see Fig. 7) of a cam roller 17 which coöperates with a cam 18 on the cam shaft 19, said cam 18 having a protuberance portion 20 which forces the slide 9 forward at each revolution of the cam shaft 19. As shown in Fig. 9, the combined gripping jaw and anvil block 3 project from the upper end of a vertical slide 21, said slide being provided on one face with a rack 22 meshing with a pinion 23 on a shaft 24, said shaft being journaled in a bed plate 25 of the gripping and forming device.

As shown in Fig. 7, the shaft 24 has on its outer end a crank arm 26 to which is connected one arm of a cam lever 27 pivoted at 28 to the bed plate 25. The rear end of the cam lever 27 is provided with a roller 29 which runs on a cam 30 on the cam shaft 19, a spring 31 being adapted to retain the roller 29 in contact with said cam. When the outer run of the cam 30 engages the cam roller 29, said roller is depressed against the action of the spring 31 and the pinion 23 is caused to rotate in a clockwise direction. As a result, the slide 21 is lowered to depress the anvil 3 out of the path of the pin blank 1 which is now free to be fed forward to the conveyer, to be presently referred to. By an inspection of Fig. 7 it will be seen that this operation takes place after the return movement of the slide 9 has been completed.

Suitable mechanism for holding the wire during the cutting and forming operations, may be provided, such as the well-known device shown in Fig. 5, which comprises a plunger 32 with a normal tendency to be forced out of engagement with the wire, but which is adapted to be depressed by a finger 33 mounted in one end 34 of a cam lever 35 pivoted at 36 to the bracket 37. Cam lever 35 is provided with a roller 38 which runs on a cam 39, the outer run of said cam being of suitable extent to retain the plunger 32 in clamping engagement with the wire during the cutting and forming operations. The cutter 5 is preferably mounted on one end of a cam lever 40 which is pivoted at 41 to the bracket 37. The lever 40 is provided with a cam roller 42 which runs on a cam 43, on the cam shaft 19, and when said lever is suitably depressed will cause the cutter 5 to sever the pin blanks.

In the present embodiment of my invention, suitable means for conveying the pin blanks from the position in which they are formed to a position suitable to have the shields applied thereto, are provided by a plurality of notched disks or plates 44, each of the notches 45 being adapted to receive one pin blank. In order to provide suitable and efficient means for feeding the pin

blanks to the conveyer disks 44, a table 46 is mounted on the base plate or table 47 by means of a web 48 which connects the table 46 to an attaching flange 49. A pair of reciprocable fingers 50 are adapted as shown in Figs 4 and 6, to slide over the table 46 to move the blank 1 into the notches in the disks 44. The present embodiment of my invention contemplates securing these fingers 50 to the forward end of a slide 51 which reciprocates in the base of a bracket 52. The bracket 52 is provided with an overhanging portion for mounting the pivot 53 of a bent cam lever 54, said cam lever having a depending extension 55, to which one end of a spring 56 is connected, the other end of said spring being connected to a fixed point 57. A link 58 connects the slide 51 with the cam lever 54 in the manner shown in Fig. 6. The normal tendency of the spring 56 is to hold the slide 51 in extreme forward position. Mounted on the shaft 19 is a cam 59 which coöperates with a cam roller 60 carried by the cam lever 54, to withdraw the fingers 50 to initial position. The rotation of the cam 59 is in the direction of the arrow shown in Fig. 6, the timing of its movement being adapted to feed the pin blanks forward one by one after they have been cut and the neck formed thereon.

The gripping block 4 as shown in Fig. 4, is operated in a manner similar to that of the forming-die block 6, being mounted on the forward end of a slide 61 which carries at its rear end a cam roller 62. The cam roller 62 runs on a cam 63, said cam operating to move the gripper block forward to gripping position while the spring 64 which connects a pin 65 on the housing with a pin 66 on the slide tends to withdraw said gripper block to initial position. I preferably place a spring retaining rod 67 above the table 46 to prevent upward displacement of the pin blanks as they are fed forward to the conveyer disks 44. A guide 68 may also be provided for alining the pin blanks, so that as they are fed forwardly, the sharpening mechanism, illustrated in Fig. 1 by one set of reciprocating files 69, will give the proper pointing effect on each of the blanks as they are passed on to shield applying position. An abutment plate 68′ is provided against which the crooked ends or necks of the pin blocks are forced by the end thrust due to the pointing mechanism.

The conveyer mechanism is of a type well known in the art but as heretofore employed, has not been used to convey pin blanks which have had their ends bent or crooked before being delivered thereto. During their progress along the pressure arch 70 the pin blanks are held in the conveyer by the pressure arch and retaining band 70′ but become arranged with their crooked ends projecting in various directions, due to the rotation of said pin blanks. It will be understood that as the conveyer disks 44 rotate the pin blanks disposed in the notches therein are deposited successively into the channel between the upper and lower guide blocks 74 and 77. In order to provide suitable and efficient means for holding them in the same relative positions after they have been arranged by the device to be presently described, I preferably provide a slotted guide 71 which has its upper wall removed adjacent one end (see Fig. 13) to accommodate a pair of guide blocks 74 and 77 which are secured to the inner face of the abutment plate 68′ (see Figs. 24 and 31), and which are spaced apart to provide a channel 76′. This construction permits the sliding guide 71 to be reciprocated so that as the fingers 106 (hereinafter referred to) move a blank forward said slide accompanies the blank and retains its crooked end in position. As shown in Fig. 13, the slot for holding the crooked ends of the blanks 1 is narrowed toward its forward end 73 to more closely confine the crooked end of the pin blank while it is being clamped by the gripping mechanism, to be hereinafter described. Coöperating with the guide 71 is a device which arranges the crooked ends to point in the same direction, said device comprising the parts now to be described. By an inspection of Fig. 24, it will be seen that a pad or block 79 is pivotally suspended from the arch 70 by means of a pin 79′. A spring 80 which has one end mounted in a socket in the forward end of the arch 70, bears with its other end against the pad or block 79, thus causing said pad or block to bear down on the pin blanks which are brought thereunder by the forward travel of the conveyer disks 44. It will be seen therefore that said pad or block will be adapted to rotate the pin blanks until their crooked ends are thrown into engagement with the upper guide block 77, in the manner to be presently pointed out, after which said blanks are caused to slide over the under surface of the pad or block 79 with their crooked ends presented forwardly.

By referring to Fig. 31, which represents the slide 71 in its rearmost position, it will be apparent that the corner between surfaces 77′ and 77ª does not interfere with the forward movements of the blanks 1 for the reason that when the crooked ends of the blanks 1 drop from between the blocks 74 and 77, they lie flat in the groove which extends longitudinally of the reciprocatory guide 71. In Figs. 10 and 11 the abutment wall 68′ together with the blocks 74 and 77, have been omitted for the sake of clearness. When a pin blank reaches a position corresponding to that of the uppermost blank 1 shown in Fig. 31, it is being whirled on its axis by the pad or block 79 (indicated in

dotted lines in Fig. 31, as it is nearer the observer than the plane of the drawing) which presses against the blank under the action of spring 80. The blank 1 is thus caused to rotate in a clockwise direction indicated by the arrow on the drawing. Under this condition, the blank as it approached the inclined wall 77′ has happened to rotate far enough to throw its crooked end above the corner between the surfaces 77′ and 77ª so that its continued forward and downward movement does not interfere with a continued rotary movement of the blank to accommodate this continued rotation. The lower guide block 74 is provided with a recess 75 which extends forward a sufficient distance to permit its crooked end to be brought against the surface 77ª after which its rotary movement is blocked, the blank 1 merely sliding along the under surface of the block or pad 79 without being rotated thereby. On the other hand should the uppermost blank 1 in Fig. 31 have reached the corner between surfaces 77′ and 77ª before its crooked end had been raised above said corner, its frictional engagement with the lower surface of the block or pad 79 would have served to retain the crooked end of said blank against the surface 79ª while the conveyer moved the blank forward.

The free end of the dependent member 79 is arranged to be in advance of the rounded portion 78 of member 77 so that rotation of the blank is assured before the member 74 and 77 act thereon. As shown in Fig. 13, the slotted guide bar 71 is provided with an aperture 81 for the reception of a pin 82 (see Fig. 11). Journaled on the pin 82 is a block 83 which slides in a slot 84 in one end of a bell crank lever 85 which is pivoted on a pin 86. The other arm of this bell crank lever carries a cam roller 87 which cooperates with a cam surface 88 on the shield applying slide, to be presently referred to. The object of this construction is to adapt the slotted guide to control the movement of the crooked end of the pin blank until said pin blank is in position to have the shield applied thereto. In order to provide suitable and efficient means for holding the blank in this position, a stationary jaw 89 is made adjustable in position by means of an adjusting screw 90 and is held in adjusted position by means of a set screw 91. A movable jaw 92 is adjustably mounted on a slide 93, as shown in Fig. 12, the adjusting movement being imparted by an adjusting screw 94, and the jaw retained in adjusted position by the set screw 95. The slide 93 is provided with a bifurcated bearing 96, within which is journaled a cam roller 97, which coöperates with a cam 98 on a cam shaft 99. The slide 93 carries a post 100 which is connected by a spring 101 with a post 102 on the housing of said guide. This spring serves to retain the roller 97 in contact with the cam 98.

By an inspection of Fig. 12, it will be seen that the fixed and movable jaws are provided with wedge-shaped protuberances 103, which project above the plane of the table 104 upon which the blank rests. This construction is adapted to have the pin blank moved over the protuberance on the fixed jaw into position to be gripped between the gripping jaws where it is held flat on the table and in suitable position to have the subsequent operations completed in the manner to be presently pointed out.

Suitable means for removing the pin blanks one by one from the notches in the conveyer disks and shoving them across the table 104, is provided by having a plurality of pusher fingers, each of which as shown in Fig. 14, comprise a shank portion 105 and a forwardly presented portion 106. As shown in Fig. 15, the shank portion 105 of each of said pushers is rigidly secured to a sleeve 107 which is journaled upon a crank pin 108 which is rigid with, but eccentric to a crank shaft 109, which is journaled in spaced bearings 110 (see Fig. 3).

In order to provide suitable means for oscillating the sleeve 107 on the crank pin 108 for the purpose of causing the push fingers to swing backwardly and forwardly, a crank arm 111 is rigidly secured to the sleeve 107 and has its outer end pivotally connected at 112 with a connecting rod 113. Said connecting rod comprises relatively movable portions connected by an adjusting screw 114, the purpose of this adjustment being to adjust the positions of the push fingers 106 so as to make it possible to accurately time the movements of said fingers. The forward end of the connecting rod 113 is pivotally connected at 115 with the lower end of a cam lever 116 which is pivoted on a stud 117 carried in a bracket 118 which is mounted on the frame, as shown in Fig. 14. The upper end of the lever 116 carries a cam roller 119 which runs on a cam 120 which is mounted on the cam shaft 99. From an inspection of Fig. 14, it will be seen that as the cam lever 116 is oscillated from the position shown in full lines to that shown in dotted lines, the push fingers comprising shanks 105 and fingers 106 will be oscillated from full line to dotted line positions. During these movements the cam roller is retained in running contact with the cam 120 by means of a spring 121, one end of said spring being connected at 122 with the crank arm 111, and the other end of said spring being connected to a hook 123 which is fixed to the frame. As shown in Figs. 2 and 15, the crank shaft 109 extends through the left bearing 110 and projects from the opposite end of said bearing. Keyed to this project-

ing end of the shaft 109 is the hub 124 of a crank arm. The outer end of said crank arm carries a wrist pin 125 which is journaled in the lower end of a vertical reciprocable cam rod 126. The upper end of the cam rod 126 carries a cam roller 127 which runs on a cam 128 keyed to a shaft 129.

As shown in Fig. 15, a collar 130 is keyed to the shaft 109 adjacent the bearing 110, said collar being provided with a radial pin 131 to which one end of a spring 132 is secured as shown in Fig. 14. The other end of said spring is secured to a fixed projection 133 carried by the main frame. The spring 132 serves to retain the roller 127 in running contact with the cam 128. The function of this mechanism is to oscillate the shaft 109 on its axis to vary the position of the axis of the crank pin 108. By an inspection of Figs. 14 and 15, it will be seen that during the period in which the cam 120 is imparting the forward movement to the fingers 106, the crank pin 108 will be in raised position as shown in Fig. 14. On the return movement of the fingers 106 however, the cam roller 127 will be traveling around the inner run of the cam 128 and the crank pin 108 will be dropped to lower position. In consequence the return movement of the fingers 106 will be depressed below that of the forward movement, such a return movement permitting said fingers to assume initial position without engaging the next following pin blank carried by the notched conveyers.

Referring now to Figs. 3, 15, 16 and 17, the hopper 134 for shields is provided with any suitable mechanism for transferring shields therefrom to a chute 135 which delivers the shields to a feeding runway 136 in suitable order to be fed one by one to the shield-applying mechanism, to be presently described. As shown best in Fig. 18, a pair of spring actuated feed dogs are provided, each of said feed dogs comprising a lever 137 pivoted intermediately of its ends at 138 in a bracket 139. One end of said lever 137 is provided with a head 140 within which is mounted a pin 141 which is adapted to block the discharge of a shield through the feeding runway. The other end of the lever 137 is deflected downwardly to form a cam arm 142, which is adapted to be engaged by a cam block 143 mounted on a slide 144. The slide 144 is reciprocated by any suitable mechanism to alternately raise and lower the pins 141. Thus the lowermost pin 141 is down while the uppermost is up and vice versa. By this means the column of shields in the feeding runway 136 is supported by the lowermost pin 141 while the other pin is in raised position. When however, the lower pin 141 raises to release the lowermost shield, the other pin descends to retain the succeeding shields within the runway. Then as the upper one lifts the lower one descends to hold the column. Suitable and efficient mechanisms for reciprocating the slide 144 in the present embodiment of my invention, is provided by a cam 145 (see Fig. 15) which is keyed to the shaft 129, said cam being provided with a rise or protuberance 146, which serves to operate a bent cam lever 147, which is pivoted on a stud 148 and provided with a cam roller 149 which runs on the cam 145. A link 150 serves to connect the upper arm of the cam lever 147 with the upper end of the slide 144. As shown in Fig. 17 a pair of retaining plates 151 serve to retain the shields within the feeding runway. Secured to one of said retaining plates is a tongue 152 which is provided with an enlargement 153 at its lower end, said tongue being adapted to coöperate with the shield holding die which reciprocates into and out of position to apply a shield to the neck or crooked end of a pin blank, which is held for that purpose between the gripping jaws 89 and 92.

Referring now to Figs. 10, 11 and 15, a slide 154 is reciprocally mounted in suitable guide 155, said slide being provided with a shield receiving pocket or die 156 (see Fig. 15), which in the outer position of the slide 154 as shown in full lines in Fig. 15, is disposed directly beneath the lower end of the feeding runway 136. When in this position, the enlargement 153 on the tongue 152 serves to direct a shield into the die socket 156. As shown best in Figs. 10 and 11, the inward movement of the slide 154 causes the cam surface 88 to displace the cam roller 87 inwardly and thereby automatically retracts the pin presenting guide bar 71 from the pin blank which remains in proper position within the gripping jaws 89 and 92. Thus as the slide 154 moves inwardly, the shield is forced into position over the neck and suitably supported by the die socket for the punching operation which follows, the punching mechanism being described hereinafter. Suitable and efficient means for imparting the reciprocating movements to the slide 154 are provided in the present embodiment by the cam 157 which is keyed to the shaft 129 and serves to coöperate with a cam roller 158 which is journaled on a stud 159 on an oscillating cam bar 160, which is swingingly suspended from the stud 148. The bracket 161 which supports the feeding runway 136 and the feed dog mechanism therefor serves to mount the stud 148. The lower end of the cam bar 160 is pivoted at 162 with one end of a connecting link 163, the other end of said link being pivotally connected at 164 to the slide 154. The spring 165 is connected at one end to the slide 154 and at its other end to an extension 166 on the box guide 167

within which the cam bar 126 reciprocates. The box guide 167 is secured to the frame in the manner shown in Fig. 15. As the slide 154 moves inwardly, the enlargement 153 on the end of the tongue 152 shoves the shield backwardly into the socket die 156, so that when said shield has been positioned on the neck of the pin blank, the punch 168 mounted in the chuck 169 at the lower end of a ram 170 which reciprocates in the slotted head 171 of the standard 172 mounted upon the main frame of the machine. Adjusting screws 173 serve to adjust the pressure between the punch 168 and the shield within the die socket 156. As shown best in Fig. 14, the ram 170 is pivotally supported in one end of a walking beam 174 which is pivoted on a bolt 175 carried in the standard 172. A cam roller 176 is suitably mounted in a bracket 177 pivoted at 178 to the walking beam 174, an adjusting screw 179 being provided to adjust the relations between the cam roller 176 and the cam 180 on which it runs. The cam 180 is keyed to the shaft 99 and is properly timed to lower the punch 168 immediately after the shield has been applied to the neck and before the twisting head begins its work. If for one reason or another, the pin blank presenting mechanism fails to deliver a pin blank to the gripping jaws 89 and 92 in time to receive a shield which is being applied by the slide 154, some means must be provided for removing said shield before the succeeding one is deposited thereupon, which would cause probable injury to parts of the machine. For this purpose I preferably employ a device such as that shown in Figs. 10, 11, 15 and 19, which comprises a block 181 in which is inset a strap 182 which carries at its outer end a depending finger 183. As shown in Fig. 10, the depending finger 183 travels in a slot 184 as the slide 154 reciprocates. Said slot opens inwardly into the die socket 156, so that in the event of a shield remaining in the die socket 156 during the rearward movement of the slide 154, said shield will be positively engaged by the depending finger 183 and displaced.

Referring now to Fig. 20, within a suitable guide block 185 is mounted a reciprocable slide 186 which carries a ram 187 for carrying the twisting head which is now to be described. Journaled within a vertical bearing 188 on the forward end of the ram 187, is a sleeve or mandrel 189 provided in its lower end with a chuck or blank gripping member 190 having a smaller bore than the mandrel 189. Rotatably and reciprocably mounted within the sleeve or mandrel 189, is a shaft or rod 191 from which depends the centering pin 192 which is adapted to move into and out of a hole 193 in the plate or table 47. A pin 195 serves to rigidly connect a collar 196 to the upper end of the rod 191. Rigid with the mandrel 189 is a pinion 197. A grooved collar 198 is also rigid with the mandrel 189. Within a vertical bearing 199 on the ram 187, is journaled a shaft 200 (see Fig. 23). On the upper end of said shaft 200, is rigidly secured a hub 201 of a segmental gear 202. 202′ is a spring for aiding the movement of the segmental gear. Keyed to the lower end of the shaft 200 is a gear pinion 203 which meshes with a rack 204 formed on the top flange of a rail 205 which is rigidly mounted on the plate or table 194 by means of a flange 206. It will be understood from this description that as the ram 187 is reciprocated inwardly and outwardly, the gear pinion 203 will be rotated by rack 204. Furthermore, the segmental gear 202 by partaking of the rotary movement of the pinion 203, will rotate the gear pinion 197 on the mandrel 189. Within a bearing box 207 is a sleeve or mandrel 208. The mandrel 208 is provided below with a socket 209, into which projects the rounded end 210 of a cam lever 211, which is pivoted on a stud 212 which projects from the box bearing 199. On the end of the cam shaft 211 is mounted a roller 213 which runs on a cam 214 on the shaft 99. As the roller 213 rises and falls under the action of the cam 213, the mandrel 208 will be caused to fall and rise. Mounted on the upper end of the mandrel 208 is the hub 215 of a radial arm 216, the outer end 217 of said arm being slidably mounted in the groove of the collar 198. The mandrel 189 will therefore partake of the up and down movements of the mandrel 208. Reciprocably mounted within the mandrel 208 is a rod 218 which carries at its upper end, a radial arm 219 with its outer end slidably mounted in the groove of the collar 196. The lower end of rod 218 is provided with a socket 220 into which projects the inner end of a cam lever 221 (see Figs. 10 and 20). Said cam lever 221 carries a cam roller 222 which runs on a cam 223 keyed to the shaft 99. The chuck 190 on the lower end of the mandrel 189 embodies a peculiar construction as shown in Figs. 28 and 30. Fig. 30 is a bottom plan view of the chuck 190 which is rotatable about the centering pin 192 for the purpose of winding the pin blank 1 around the centering pin 192 as the ram 187 travels inwardly and carries with it the centering pin 192. As shown in Fig. 30 the lug 224 which protrudes from the bottom face of the twisting mandrel 190, is provided with a flat face 225 which is parallel to the line of tangency between the centering pin 192 and the gripping point 226 of the lug 227. The peculiar feature about this arrangement is that when the twisting mandrel is in the position shown in Figs. 28 and 30, the pin blank enters between the gripping lug and

the centering pin 192 quite easily, but as soon as the rotary movement of the twisting mandrel has deflected the pointed branch of the pin blank to one side, said branch is positively gripped with great force between the lugs 224 and 226, making it impossible for the parts to slip during the twisting operation. As shown in Figs. 10 and 11, the plate or table 104 is provided with a slot 228 along which the centering pin 192 travels as the ram 187 retracts. Thus as the convolutions are formed in the pin blank 1, the pin is in the position shown in Fig. 10 at the start and at the end of the operation is in the position shown in Fig. 11, the pointed branch of the pin being revolved far enough to be deposited within the shield at the end of the second revolution. For this purpose, the rounded corner of the die socket 156 as shown in Fig. 15, together with the wedge-shaped protuberance on the gripping jaw 192, aids materially in guiding the point of the pin over the shield in the die socket 156. Consequently when the point is permitted to move backwardly, it becomes caught in the shield and is then ready to be discharged from the machine when the gripping jaws 89 and 92 are released.

Referring now to Figs. 10 and 14, the guard 229 is secured to the lateral face of the slide housing 100 and extends out over the table 104 in suitable position to depress the point of the pin at each revolution. A resilient member 230 which is secured at 231, has its outer end deflected to pass through an aperture 232 (see Fig. 14) in the outer end of the guard 229, so that the point of the pin will freely pass under said guard. Another resilient guard 233 (see Fig. 11) is secured to the slide housing 100 and as shown in Fig. 12, is provided with a curved blade 234 which overhangs the clamping jaws and normally exerts a resilient pressure on the blank as well as on the completed safety pin (see Figs. 10 and 11). After the pin has been completed and the gripper jaws 89 and 92 released, the resilient pressure exerted by the blade 234 upon that end of the safety pin which overhangs the edge of table 104, serves to expel the completed safety pin.

In order to impart the reciprocating movements to the ram 187, a connecting rod comprising rod ends 235 and 236 and adjusting screw 237 is provided. Power is transmitted through this connecting rod by means of a cam roller 238 which runs in a cam groove 239 in the cam 240 which is keyed to the shaft 99. As shown in Fig. 1, the shaft 99 is connected by beveled gears 241 with the main drive shaft 129, the drive shaft 129 having a pulley 242 keyed thereto to adapt it to be driven by any suitable belt. Beveled gears 243 serve to connect the other end of the drive shaft 129 with the cam shaft 19.

Referring now to Figs. 1 and 2, the drive shaft 129 has keyed thereto a driving worm 244 which meshes with a gear 245 which is keyed to a shaft 246. Also keyed to the shaft 246 is a spur gear 247 which meshes with another spur gear 248 which is keyed to a shaft 249 which is journaled in suitable hanging brackets indicated in dotted lines in Fig. 2. Also keyed to the shaft 249 is a spur pinion 250. The spur pinion 250 meshes with the teeth on the notched disks 44 to serve to convey the pin blanks from the neck forming position to the shield applying position.

The operation is as follows: The wire as it leaves the roll is made perfectly straight by the straightening mechanism (only a portion of which is shown on the drawings). The straightened wire is fed in the direction of the arrow shown in Fig. 4, until the end of the wire overlaps the anvil block 3. The wire is then clamped between anvil block 3 and gripping jaw 4, after which the cutter 5 is moved transversely to sever the pin blank. At the same time, the neck forming die 6 imparts a crook to the end of the blank as shown in Fig. 6. Immediately after jaws 3, 4 and 6 have completed their operations, fingers 50 engage the blank and move it laterally into the alined notches of the conveyer disks 44. Said conveyer disks transport the blanks in a known manner and at the same time cause them to rotate as they pass successively into grinding relation with the sharpening means. Prior to the delivery of a blank to the conveyers, the anvil block 3 has been depressed by means of the cam action illustrated in Figs. 7 and 9, which leaves the blank free to be presented to the conveyers. The conveyers deliver the pin blank onto the plate or table 104 in a predetermined position when they are seized by the gripping jaws 89 and 92. Immediately thereafter, a shield is released from the feeding runway and delivered thereby into the die socket 156. The several parts are then in the position shown in Fig. 10. Under the action of the cam mechanism shown in Fig. 15 the slide 154 is moved inwardly at the same time displacing the blank presenting guide bar 71. This leaves the neck of the pin blank free to receive the shield as it is forced thereon by the slide 154. Immediately thereafter, the punch 168 descends and securely clamps the shield to the neck and upon the completion of this operation, the twisting head becomes active. The pin blank has now assumed the appearance shown in Fig. 28, whereupon the twisting mandrel 190 descends and grips the pointed leg of the pin as shown in Figs. 28 and 30. As the mandrel 190 rotates in the direction of the arrow, Fig. 28 it will be seen that the pointed leg becomes rigidly gripped between the point 226 of the lug 227 and the

flat surface 225 of the lug 224. As the pointed leg is twisted about the centering pin 192, the ram 187 is forced inwardly at a velocity equal to the circumferential velocity of the point of contact between the pin 192 and the blank 1. The lugs 227 and 224 will therefore absolutely prevent any slipping of the wire around the pin 192, an action which absolutely insures an unvarying length of the pointed leg of the pin. As the ram 187 travels inwardly, the chuck 190 is rotated on the pin 192 by means of the gear connections shown in Fig. 24. At each revolution of the pointed leg of the pin blank the guard 229 will serve to depress said pointed leg and keep it in proper position on the table. Upon the completion of the second revolution of the pointed leg of the blank, said points will be caught in the shield after which the slide 154 will be withdrawn. As shown in Fig. 24, the cam 223 will permit the pin 192 to rise before the chuck 190 is permitted to be raised by the cam 214, thereby releasing the completed pin from the twister mechanism, the jaws 89 and 92 still retaining their hold upon one leg of the pin. After the twister mechanism recedes, the jaws 89 and 92 will open allowing the guard 234 to depress the pin and eject it from the operating mechanism.

What I claim is:

1. In a safety pin machine, the combination of means for severing a blank from a strand, means for holding said blank in position in which it is severed, and means operatively related to said holding means for forming a neck on the blank without moving it from blank severing position.

2. In a safety pin machine, the combination of means for holding a strand as it is fed from a reel, means operatively related to said holding means for severing a blank from said strand, and means coöperating with said holding means for forming a neck on said blank, said holding means constituting an operative portion of said neck-forming means.

3. In a safety pin machine, the combination of means for holding a strand as it is fed from a reel, means operatively related to said holding means for severing a blank from said strand, and means operatively related to said holding means for forming a neck on said blank, a portion of said holding means in holding position being disposed in the path of lateral displacement of said blank and adapted to be moved out of said path of lateral displacement.

4. In a safety pin machine, the combination with means for conveying a blank from blank-forming position to shield-applying position, of means for forming a blank, said blank-forming means including a neck-forming die.

5. In a safety pin machine, the combination with means for conveying a blank from blank-forming position to shield-applying position, of means for forming a blank, said blank-forming means being provided with a movable portion normally projecting above the plane of movement of said blank in passing from said forming means, and means for periodically depressing said portion below the plane of movement of said blank to permit said blank to pass to said conveying means.

6. In a safety pin machine, blank-holding means including a neck-forming die block movably mounted to assume a blank-forming position in the path of movement of a blank and afterward to assume a position out of the path of such movement.

7. In a safety pin machine, the combination with means for pointing pin blanks and a conveyer for moving blanks into and out of operative relationship to said pointing means, blank-forming means, a table interposed between the blank-forming means and said conveyer, and pusher fingers movable across said table.

8. In a safety pin machine, the combination with means for pointing pin blanks and a conveyer for moving blanks into and out of operative relationship to said pointing means, a table over which the blanks are passed to said conveyer, and pusher fingers movable across said table, said conveyer being constructed and arranged to receive the pin blank broadside on.

9. In a safety pin machine, means for imparting the convolutions to a safety pin blank, said means comprising a rotary twisting head provided with a centering pin, a lug having a flat face spaced from a tangent to said centering pin a distance substantially equal to the diameter of the safety pin blank, and a second lug having a gripping portion approximately on said tangent.

10. In a safety pin machine, means for imparting the convolutions to a safety pin blank, said means comprising a rotary twisting head provided with a centering pin, a lug having a flat face spaced from a tangent to said centering pin a distance substantially equal to the diameter of the safety pin blank, and a second lug having a gripping portion approximately on said tangent, said gripping portion of the second lug being constituted by a pointed edge of the second lug.

11. In a safety pin machine, means for imparting the convolutions to a safety pin blank, said means comprising a rotary twisting head provided with a centering pin, a lug having a flat face spaced from a tangent to said centering pin a distance substantially equal to the diameter of the safety pin blank, and a second lug having a gripping portion approximately on said tangent, said gripping lugs being rigid on the twisting

head and said twisting head being reciprocably mounted.

12. In a safety pin machine, a clamping die block provided with a lateral surface conforming to the neck of a safety pin blank, a clamping block movable into and out of position with respect to a portion of said surface to clamp a wire from which a blank is to be severed and formed, and another die block adapted to bend the end of said wire around another portion of said surface to form the neck on said blank, the first said die block being movable into position to form the neck and out of such position to permit the blank to be displaced from that position.

13. In a safety pin machine, a clamping die block provided with a lateral surface conforming to the neck of a safety pin blank, a clamping block movable into and out of position with respect to a portion of said surface to clamp a wire from which a blank is to be severed and formed, and another die block adapted to bend the end of said wire around another portion of said surface to form the neck on said blank, the first said die block being provided with a rack, a pinion meshing with said rack, and means for rotating said pinion.

14. In a safety pin machine, the combination of a vertically reciprocable die block provided with intersecting faces, of a clamping jaw adapted to coöperate with one of said faces in holding a strand of wire with one end projecting, a movable die block provided with a surface conforming to the other of said faces and adapted to engage the projecting end of said wire and force it against said other face to form a neck for the reception of a shield, and means for lowering said die block to release said blank.

15. In a safety pin machine, the combination of blank-forming means, means for conveying a blank from blank-forming position to shield-applying position, said blank-forming means including a member normally disposed in the path of said blank from blank-forming position to said conveyer, and means for removing said member from the path of said blank.

16. In a safety pin machine, the combination with means for forming a neck on a pin blank, of shield-applying mechanism, and means for transferring said blank from said neck-forming means to said shield-applying mechanism, said transferring means including blank-presenting means embodying a device for rotating said blank on its axis to cause the neck to project in a predetermined direction.

17. In a safety pin machine, the combination of shield-applying means, and means adapted to receive pin blanks with formed necks projecting in various directions, said means being adapted to arrange the pin blanks with the necks projecting in a single predetermined direction adapting them to receive shields.

18. In a safety pin machine, the combination of shield-applying means, and a grooved member in which one wall of the groove is cut away to permit the necks of pin blanks to enter when presented in any direction, the opposite wall of said groove being adapted to engage the necks of said pin blanks to retain them projecting in a single predetermined direction.

19. In a safety pin machine, the combination of shield-applying means, and means for arranging pin blanks with necks projecting in different directions to project in a single predetermined direction adapting them to receive shields, said blank-arranging means comprising a grooved member in which one wall of the groove is cut away to permit said necks to revolve about the axis of said blanks into engagement with the opposite wall of said groove, and a member adapted to exert resilient pressure on said pin blank.

20. In a safety pin machine, the combination with means for applying shields to pin blanks with necks formed thereon, of means for arranging said blanks with the necks projecting in a predetermined direction, the last said means comprising a pad adapted to rotatably engage the shanks of the pin blanks and a portion against which the neck is revolved and held in predetermined position.

21. In a safety pin machine, the combination with a shield-applying device, of means for arranging pin blanks with the necks projecting in a single predetermined direction, said means comprising a pad adapted to rotatably engage the shanks of the pin blanks and a portion against which the neck is revolved and held in predetermined position, said pad being resiliently mounted.

22. In a safety pin machine, the combination with shield-applying mechanism, of means for arranging pin blanks with the necks projecting in a predetermined direction, said means comprising a pad adapted to rotatably engage the shanks of the pin blanks and a portion against which the neck is revolved and held in predetermined position, said pad being pivotally suspended from above and provided with yielding means for holding it against the shanks of said pin blanks.

23. In a safety pin machine, the combination with shield-applying mechanism, of means for arranging pin blanks with the necks projecting in a predetermined direction, said means comprising a pad adapted to rotatably engage the shanks of the pin blanks, a portion against which the neck is revolved and held in predetermined position, and a guide block oppositely disposed

with respect to said portion to form a confined passageway for the necks of said blanks.

24. In a safety pin machine, the combination with shield-applying mechanism, of means for arranging said blanks with the necks projecting in a predetermined direction, said means comprising a pad adapted to rotatably engage the shanks of the pin blanks, a portion against which the neck is revolved and held in predetermined position, and a guide block oppositely disposed with respect to said portion, to form a confined passageway for the necks of said blanks, said guide block being provided with a recess extending for a portion of its length to permit a partial rotation of said neck.

25. In a safety pin machine, the combination with means for applying caps to safety pin blanks with necks formed thereon, of means for arranging said blanks with the necks projecting in a predetermined direction, said arranging means comprising a pad adapted to rotatably engage the shanks of the pin blanks, a portion against which the neck is revolved and held in predetermined position, and a guide block oppositely disposed with respect to said portion, to form a confined passageway for the necks of said blanks, said guide block being provided with a recess extending for a portion of its length to permit a partial rotation of said neck, and with an incline leading to said confined passageway.

26. In a safety pin machine, the combination with mechanism for forming a pin blank with a neck thereon, of means for transferring pin blanks from blank-forming position to shield-applying position, said transferring means including means for arranging said blanks so that their necks project in the same direction.

27. In a safety pin machine, the combination with mechanism for applying shields to pin blanks, which have necks formed thereon, of means for arranging said blanks so that their necks project in the same direction, means for transferring said blanks from the arranging means to said shield-applying mechanism, and means for retaining said necks in arranged direction during their transfer, said neck-retaining means comprising a bar provided with a slot within which the necks slide.

28. In a safety pin machine, the combination with mechanism for applying shields to the necks formed on safety blanks, of means for arranging said blanks so that their necks project in the same direction, and a bar provided with a slot within which the necks slide, said slot being narrowed toward the end farthest from said arranging means.

29. In a safety pin machine, the combination with mechanism for applying shields to pin blanks which have necks formed thereon, of means for arranging said blanks so that their necks project in the same direction, and neck-retaining means comprising a bar provided with a slot within which the necks slide, one wall of said slot being cut away beneath said arranging means to receive the blanks in arranged position.

30. In a safety pin machine, the combination of a shield-applying device, and means for presenting said blanks to said shield-applying device, including a guide bar provided with a longitudinal slot within which the necks of said blanks travel toward said shield-applying device, said slot being adapted to retain the necks in the same direction.

31. In a safety pin machine, the combination of a shield-applying device, a reciprocable bar provided with a longitudinal slot for retaining the necks of said blanks in a predetermined direction as they pass from one end to the other of said bar, said guide bar being adapted at one end to receive the neck of a blank and at its other end to deliver the neck of said blank into shield-applying position.

32. In a safety pin machine, the combination of a shield-applying device, and means for presenting said blanks to said shield-applying device, including a guide bar provided with a slot for retaining the necks of said blanks in a predetermined direction while the blanks are being fed along said bar, and means for feeding said blanks lengthwise of said guide bar.

33. In a safety pin machine, the combination with a device for feeding a continuous strand of wire, of a device for clamping the end of said strand, said clamping device being adapted to crook the end of said strand to form a neck, and means for severing said strand to form a blank including said crooked end.

34. In a safety pin machine, the combination with a gripping device adapted to hold a pin blank with the neck thereof presented in a predetermined direction, means for delivering a blank to said gripping means, a guide bar provided with a slot within which said neck slides to maintain it in said predetermined position while it is being delivered to said gripping device, and means for applying a shield to said neck.

35. In a safety pin machine, the combination with a gripping device adapted to hold a pin blank with the neck thereof presented in a predetermined direction, means for delivering a blank to said gripping means, a guide bar for retaining said neck in said predetermined position while it is being delivered to said gripping device, and means for applying a shield to said neck,

said guide being provided with a gradually narrowed slot for constraining the movement of said neck.

36. In a safety pin machine, the combination with a gripping device adapted to hold a pin blank with the neck thereof presented in a predetermined direction, means for delivering a blank to said gripping means, a guide bar for retaining said neck in said predetermined position while it is being delivered to said gripping device, and means for applying a shield to said neck, said guide bar being reciprocably mounted to adapt the end thereof adjacent said gripping device to be moved into and out of the path of said shield-applying means.

37. In a safety pin machine, the combination with a gripping device adapted to hold a pin blank with the neck thereof presented in a predetermined direction, means for delivering a blank to said gripping means, a guide bar for retaining said neck in said predetermined position while it is being delivered to said gripping device, and means for applying a shield to said neck, said guide bar and shield-applying means being alternately operative.

38. In a safety pin machine, the combination with a gripping device adapted to hold a pin blank with its neck projecting in a predetermined direction, means for delivering a pin blank thereto, a guide bar for the neck of said blank movable endwise to move the end thereof into proximity to the neck of a blank held in said gripping device, a shield-carrying member adapted to apply shields to pin blanks in said gripping device, and an operating connection between said guide bar and shield-carrying member.

39. In a safety pin machine, the combination with a gripping device adapted to hold a pin blank with its neck projecting in a predetermined direction, means for delivering a pin blank thereto, a guide for the neck of said blank, and a shield carrying member adapted to apply shields to pin blanks in said gripping device, said guide and member being operatably connected to move alternately into proximity to the neck of a blank held in said gripping device.

40. In a safety pin machine, the combination with a gripping device adapted to hold a pin blank with its neck projecting in a predetermined direction, means for delivering a pin blank thereto, a guide for the neck of said blank, and a shield carrying member adapted to apply shields to pin blanks in said gripping device, said guide and member being provided with interengaging cam operated connections.

41. In a safety pin machine, the combination with a gripping device, for pin blanks, of means for feeding blanks thereto, a fixed guide suitably disposed to engage the points of pin blanks fed by said feeding means, and a guide bar spaced from said fixed guide, said guide bar being provided with a surface inclined toward the fixed guide.

42. In a safety pin machine, the combination with a gripping device for pin blanks, of means for feeding blanks thereto, a fixed guide suitably disposed to engage the points of pin blanks fed by said feeding means, and a guide bar spaced from said fixed guide, said guide bar being provided with a surface inclined toward the fixed guide, said guide bar being also provided with a slot of which said inclined surface forms the bottom wall.

43. In a safety pin machine, the combination with a gripping device for pin blanks, of means for feeding blanks thereto, a fixed guide suitably disposed to engage the points of pin blanks fed by said feeding means, and a guide bar spaced from said fixed guide, said guide bar being provided with a surface inclined toward the fixed guide, said guide bar being also provided with a slot of which said inclined surface forms the bottom wall, said slot being narrowed toward said gripping device.

44. In a safety pin machine, the combination with a gripping device for pin blanks, of a fixed guide approximately normal to the position of a pin blank in said gripping device, and a reciprocable guide bar having a surface inclined with respect to said fixed guide.

45. In a safety pin machine, the combination with a gripping device for pin blanks, of a fixed guide approximately normal to the position of a pin blank in said gripping device, a reciprocable guide bar having a surface inclined with respect to said fixed guide, and means adapted to apply shields to pin blanks held by said gripping device.

46. In a safety pin machine, the combination with a gripping device for pin blanks, of a fixed guide suitably disposed to aid in determining the position of a pin blank in said gripping device, a reciprocable guide bar having a surface inclined with respect to said fixed guide, and arranged to cooperate with said fixed guide in determining the position of said pin blank, and means adapted to apply shields to pin blanks held by said gripping device alternately with the reciprocable movements of said guide bar.

47. In a safety pin machine, a reciprocable twisting head, a rotary arbor carried thereby, and means for rotating said arbor, said means comprising a fixed rack, and geared connections between said rack and arbor, said arbor being thereby adapted to be rotated by the reciprocations of said twisting head.

48. In a safety pin machine, a rotatable arbor for twisting pin blanks, said arbor being provided with a grooved collar, an

arbor parallel thereto and carrying an arm engaging said grooved collar, and means for reciprocating the second mentioned arbor.

49. In a safety pin machine, a reciprocating slide, an arbor journaled in said slide, said arbor being provided with means for engaging a blank for forming the convolutions therein, means for rotating said arbor, a reciprocating rod parallel to said arbor, and a lever arm connecting said rod and arbor.

50. In a safety pin machine, a reciprocating slide, an arbor journaled therein, said arbor being provided with means for engaging a blank for imparting the convolutions thereto, a centering pin journaled in said arbor, and means for rotating said arbor, and means for reciprocating said arbor independently of its rotary movement.

51. In a safety pin machine, a reciprocating slide, an arbor journaled therein, said arbor being provided with means for engaging a blank for imparting the convolutions thereto, a centering pin journaled in said arbor, means for rotating said arbor, and other means for reciprocating said arbor endwise into and out of blank-twisting position.

52. In a safety pin machine, a reciprocating slide, an arbor journaled therein, said arbor being provided with means for engaging a blank for imparting the convolutions thereto, a centering pin journaled in said arbor, means for rotating said arbor, means for raising and lowering said centering pin, and means acting independently of the rotating means for raising and lowering said arbor.

53. In a safety pin machine, a reciprocating slide, an arbor journaled therein, said arbor being provided with means for engaging a blank for imparting the convolutions thereto, a centering pin journaled in said arbor, means for rotating said arbor, means acting independently of said rotating means for raising and lowering said centering pin, and means for raising and lowering said arbor, the rise and fall of said centering pin being of greater extent than the corresponding movement of said arbor.

54. In a safety pin machine, the combination with a slide, of a blank-twisting arbor journaled in said slide, cam operated means for reciprocating said slide, said means embodying a connecting rod adjustable in length, and means operated by the reciprocating movements of said slide for rotating said arbor, said arbor-rotating means comprising a fixed rack, and a shaft parallel to said arbor, said shaft being geared to said rack and arbor.

55. In a safety pin machine, a twisting arbor provided with integral blank engaging lugs projecting therefrom and a centering pin tangentially alined with one of said lugs, the other of said lugs being provided with a flattened surface parallel to the line of tangency to the tangentially alined centering pin and lug.

56. In a safety pin machine, a twisting arbor provided with rigidly mounted blank-engaging lugs projecting therefrom and a centering pin tangentially alined with one of said lugs, the other of said lugs being provided with a flattened surface parallel to the line of tangency to the tangentially alined centering pin and lug, and means for lowering and raising said lugs.

57. In a safety pin machine, means for expelling the pin blank after the convolution has been formed, said expelling means comprising a resilient member normally under pressure tending to displace said blank.

58. In a safety pin machine, the combination with means for forming a convolution in the pin blank and for centering said convolution of a resilient member normally under pressure tending to displace said blank, said forming means being adapted to resist such pressure until after the convolution is completed.

59. In a safety pin machine, the combination with means for forming a convolution in the pin blank and for centering said convolution of a resilient member normally under pressure tending to displace said blank, said forming means being adapted to resist such pressure until after the convolution is completed, and means for raising said forming and centering means to release said blank.

60. In a safety pin machine, the combination with means for forming a convolution in a pin blank, of a resilient clip for retaining the pointed leg of said blank against undue lateral displacement during the formation of said convolution.

61. In a safety pin machine, the combination of shield-applying means, and means adapted to receive pin blanks with necks projecting in various directions, said means being adapted to arrange the pin blanks with the necks projecting in a single predetermined direction adapting them to receive shields, said blank receiving and arranging means being adapted to rotate the blanks to bring the necks into such predetermined direction and to retain them in such positions.

62. In a safety pin machine, the combination of shield-applying means, and means for receiving pin blanks with formed necks projecting in various directions and rotating said blanks relatively to each other to bring said necks to project in the same predetermined direction with respect to said shield-applying means.

63. In a safety pin machine, the combination of shield-applying means, and blank-

arranging means adapted to receive safety pin blanks with their necks projecting in different directions, said blank-arranging means including a grooved member having a portion of one wall of the groove cut away to permit the necks to swing about the axis of the pin blanks, the opposite wall of said groove being adapted to interrupt the swinging movements of the necks when they point in the same predetermined direction.

64. In a safety pin machine, an oscillatable shaft, a reciprocable arbor geared thereto, said arbor being provided with blank gripping means, and a reciprocable shaft suitably connected to said arbor to impart a reciprocatory movement thereto.

65. In a safety pin machine, an oscillatable shaft, a reciprocable arbor geared thereto, said arbor being provided with blank gripping means, a reciprocable shaft suitably connected to said arbor to impart a reciprocatory movement thereto, and a centering pin reciprocably mounted in said arbor.

66. In a safety pin machine, an oscillatable shaft, a reciprocable arbor geared thereto, said arbor being provided with blank gripping means, a reciprocable shaft suitably connected to said arbor to impart a reciprocatory movement thereto, a centering pin reciprocably mounted in said arbor, and a reciprocating rod coaxial with said reciprocable shaft and suitably connected to said centering pin to impart a reciprocatory movement thereto.

67. In a safety pin machine, the combination with a hollow blank-coiling arbor, of a centering pin reciprocably mounted therein, means for rotating said arbor, a collar keyed to said centering pin, a reciprocatory rod on an axis parallel to said centering pin, and a radial arm keyed to said rod and slidably engaging said collar.

68. In a safety pin machine, the combination with a hollow arbor for coiling safety pin blanks, of means for rotating said arbor, a centering pin reciprocably mounted in said arbor, a reciprocating shaft suitably connected to said centering pin to impart a reciprocatory movement thereto, and a reciprocating sleeve surrounding said shaft and having suitable connection with said arbor to impart a reciprocatory movement thereto.

69. In a safety pin machine, the combination with an oscillatory shaft, of a gear keyed thereto, a hollow blank-coiling arbor geared to said gear, said arbor being provided with a collar, a reciprocatory sleeve, an arm keyed thereto and in engagement with the collar on said arbor to adapt said arbor to be reciprocated while it is being rotated, a shaft reciprocably mounted in said sleeve, and a centering pin reciprocably mounted in said arbor and having a collar keyed thereto in engagement with the arm carried by said reciprocating shaft.

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