

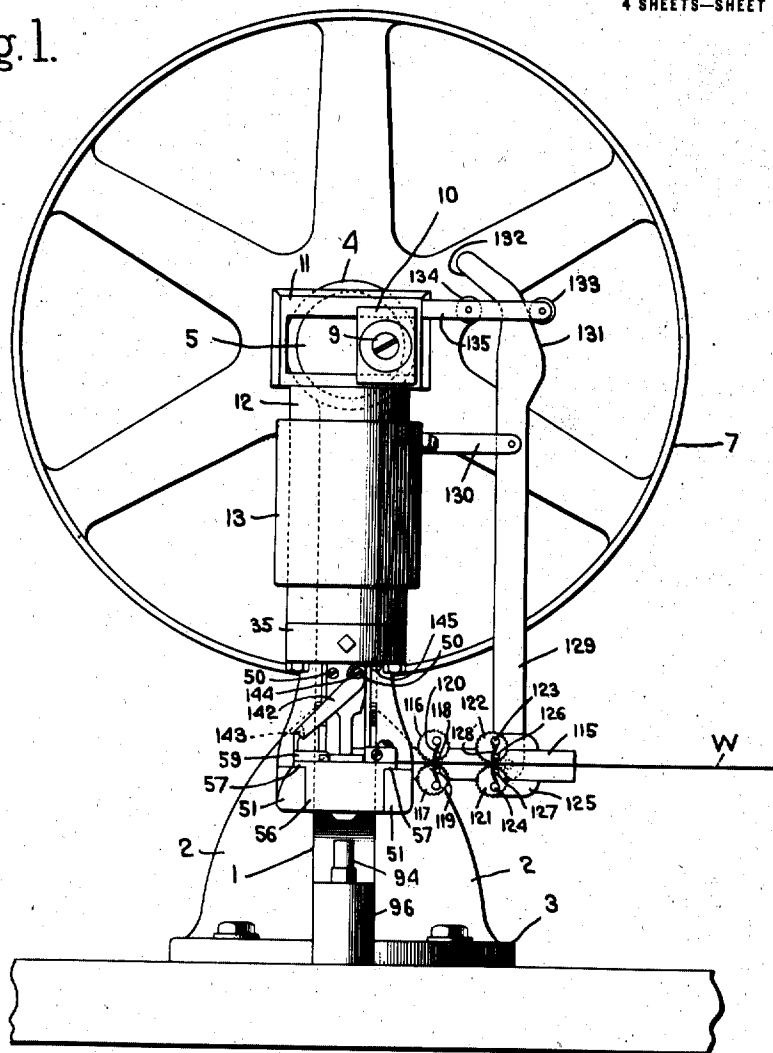
C. NISKANEN.
STAPLE MAKING AND SETTING MACHINE.
APPLICATION FILED APR. 11, 1916.

1,246,455.

Patented Nov. 13, 1917.

4 SHEETS—SHEET 1.

Fig. 1.



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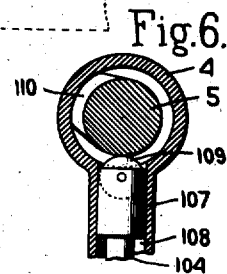
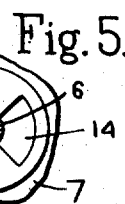
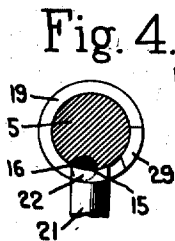
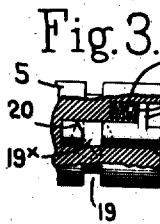
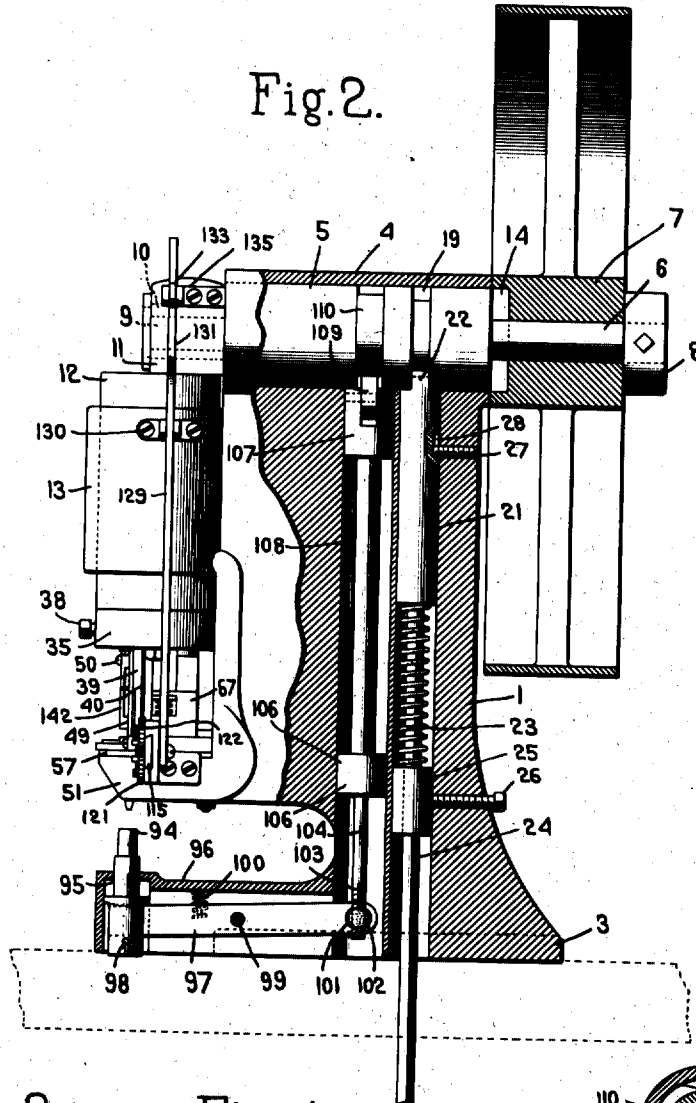
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

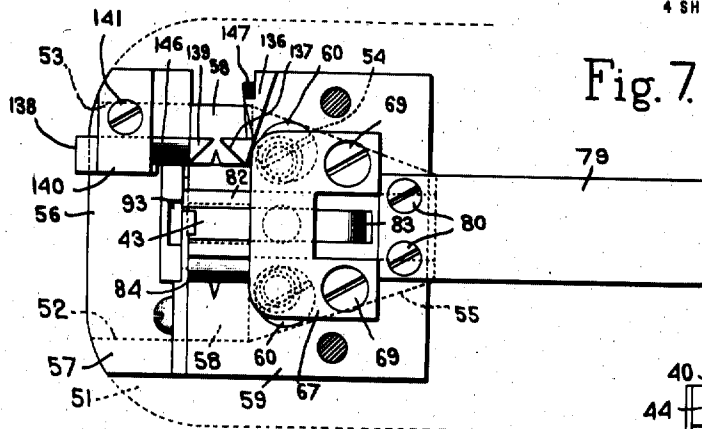


Fig. 7.

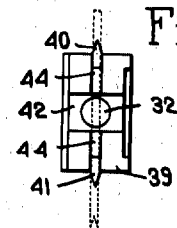


Fig. 9.

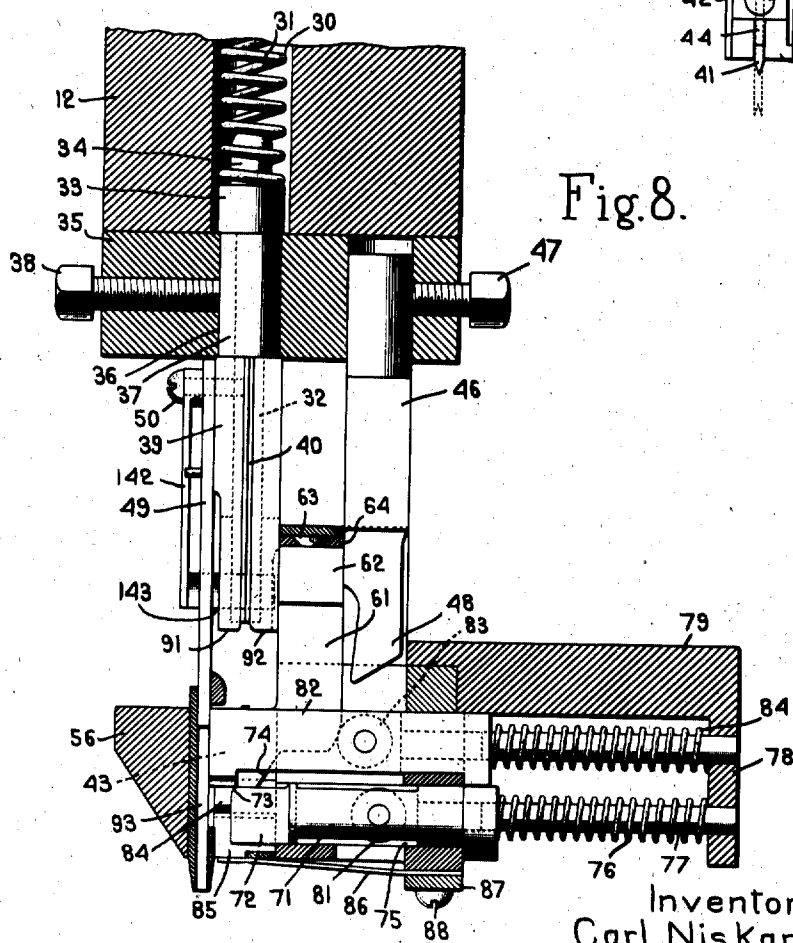
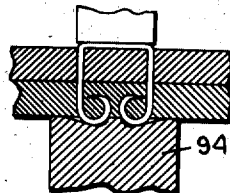
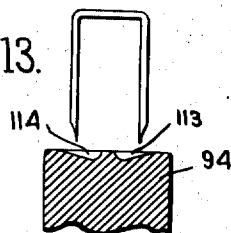
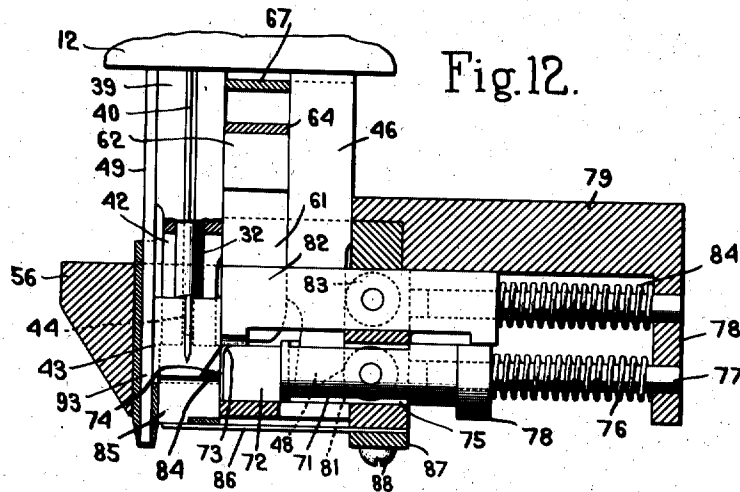
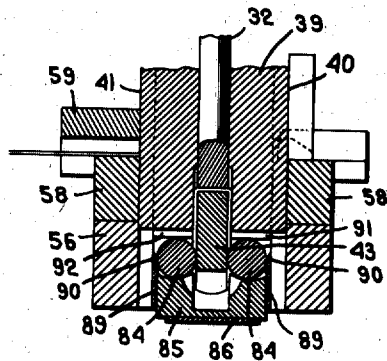
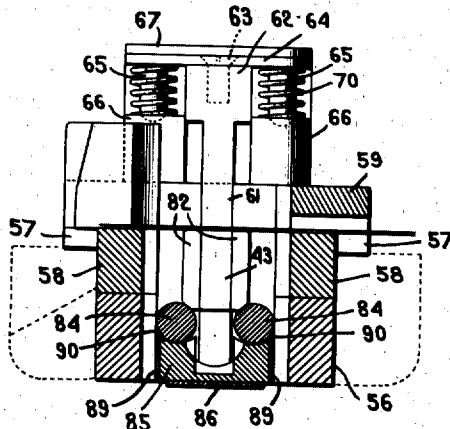


Fig. 8.

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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

CARL NISKANEN, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO THE STANDARD RIVET COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF NEW HAMPSHIRE.

STAPLE MAKING AND SETTING MACHINE.

1,246,455.

Specification of Letters Patent.

Patented Nov. 13, 1917.

Application filed April 11, 1916. Serial No. 90,501.

To all whom it may concern:

Be it known that I, CARL NISKANEN, a subject of the Emperor of Russia, and resident of Milwaukee, county of Milwaukee, State of Wisconsin, have invented an Improvement in Staple Making and Setting Machines, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to improvements in staple making and setting machines and the principal object thereof is to provide a simple and compact machine adapted to operate at high speed which will form staples from a continuous strip of material and set the staples in the article to which they are to be applied, each reciprocation of the head of the machine when in operation serving to form and to set a staple.

Another object of the invention is to provide an effective mechanism for swaging the ends of the staple immediately before it is transferred to the setting device whereby the staple may be presented to the work in an undamaged condition and consequently will be caused to penetrate the article with accuracy and to be clenched more effectively than heretofore.

Another object of the invention consists in the provision of controlling mechanism adapted normally to positively arrest the machine after each staple setting operation, but adapted under the control of the operator, to permit the continuous operation of the machine.

Other objects and features of the invention will more fully appear from the following description and the accompanying drawings and will be pointed out in the appended claims.

The drawings illustrate a preferred embodiment of my invention in a staple forming and setting machine particularly adapted for working upon leather and like articles although it will be understood that it may be applied to any other use to which a staple forming or staple setting machine is adapted.

In the drawings;

Figure 1 is a front elevation of a staple forming and setting machine embodying my invention,

Fig. 2 is a side elevation of the same

showing the standard partly in section to show the clutch controlling mechanism and the mechanism for raising and lowering the staple setting anvil,

Fig. 3 is a detail view of a portion of the shaft showing in elevation the spring actuated clutch engaging dog,

Fig. 4 is a transverse sectional view of the shaft showing the position of the dog and the clutch controlling mechanism,

Fig. 5 is an end elevation of the hub portion of the driving pulley showing the recess adapted to be engaged by the clutch dog,

Fig. 6 is a detail vertical sectional view through the driving shaft and standard showing the cam for raising and lowering a staple setting anvil,

Fig. 7 is a plan view of the block for holding the die forming mechanism with the retaining plate overlying the same,

Fig. 8 is a detail vertical sectional view of a portion of the head of the machine and of the die block support and die retaining plate showing in elevation the cutters, forming plunger, anvil and other associated members,

Fig. 9 is an underneath plan view of the reciprocating cutter and former showing in dotted lines the manner in which the wire strip is severed,

Fig. 10 is a vertical detail sectional view through the dies and die supports the swaging rolls and their support, and showing the forming plunger and its support in elevation,

Fig. 11 is a detail vertical sectional view through the dies and their support, the forming plunger, the swaging rolls and their support and the swaging plunger, illustrating the parts in the act of swaging the points of the staple,

Fig. 12 is a vertical sectional view through the die supporting block to expose the staple forming anvil and the mechanism for actuating the same, a portion of the reciprocating staple former being broken away to show the staple supported upon the anvil ready to be delivered to the staple setting mechanism,

Fig. 13 is a detail view showing a staple positioned above the staple setting anvil, which is shown in section, and

Fig. 14 is a detail view showing a staple passing through two thicknesses of material

and in the act of being clenched therein by the action of the driver and anvil.

The principal object of this invention is to provide a simple and compact machine which may be used to form staples, or preferably to form and set staples, which may be operated at high speed and which will be continuously under the control of the operator so that it may be instantly stopped when desired.

These features are accomplished by providing a staple forming and setting mechanism in which the formers and dies are actuated by a single reciprocating head, the head being driven from a rotating driving shaft having a clutch operatively positioned in respect to the driving pulley and normally withheld from clutch engaging position by treadle mechanism under the control of the operator.

In the drawing, Figs. 1 and 2 show an assembled machine embodying my invention which comprises a main frame, of which the standard 1 may be provided with integral laterally disposed webs 2 connecting the same to the integral base 3, the upper end of the standard 1 terminating in a cylindrical portion 4 forming a journal for a driving shaft 5, the driving shaft having a reduced cylindrical end portion 6 upon which a driving pulley 7 is rotatably mounted, the driving pulley being retained upon the reduced portion 6 of the driving shaft by a suitable collar 8 secured upon the latter. The opposite end of the driving shaft 5 is provided with an eccentrically mounted cylindrical stud 9 which is journaled in a cross head 10 slidably mounted in a rectangular recess in an extension 11 of a cylindrical head 12 which is reciprocally mounted in a cylindrical boss 13 extending from and preferably constructed integral with the frame or standard 1. The cylindrical head is so constructed as to support a combined reciprocating cutter and former for the staple, a holding and swaging plunger and the driver for setting the staple. It also serves to actuate the staple forming anvil, the swaging mechanism for pointing the staple and the mechanism for delivering the formed staple into the path of the driver so that the operation of these mechanisms always remain in proper synchronism and their effectiveness thereby is assured. The details of the various parts and their relations will hereinafter be more fully described.

In an automatic machine of this character it is very desirable that the machine may be so completely under the control of the operator that it may be stopped instantly as desired.

This is accomplished in the present embodiment of the invention by providing a clutch mechanism between the driving shaft and the driving pulley which normally is

maintained out of operative engagement but which may be released by the operator so that the pulley will be engaged during a single revolution and upon the completion of said revolution will again be disengaged unless the operator withholds the clutch operating mechanism to permit the continuous operation of the machine. In the preferred form of clutch mechanism illustrated herein the head of the driving pulley is provided with preferably two oppositely disposed recesses 14 which may be in the form of segments of a circle which are adapted to be engaged by a preferably cylindrical dog 15 slidably mounted in an aperture in the shouldered end portion of the driving shaft 5. The dog 15 is provided with a lateral extension 16 against which a spring 17 seated in a recess 18 in the shaft abuts and tends normally to project the dog into the extended position indicated in dotted lines in Fig. 3 at which time it enters one of the recesses 14 in the hub of the driving pulley 7.

The main shaft 5 is provided with an annular recess 19 a short distance from its end and the dog 15 is formed with a cut-away portion 19* corresponding to the annular groove in the shaft when the dog is in retracted position.

The recess 19* is extended laterally to provide a beveled portion 20 adapted to be engaged by the clutch controller to withdraw the dog into retracted position. The clutch controller as illustrated herein comprises a cylindrical member 21 having an extension 22 which enters and fits the annular groove 19 in the shaft and when in engagement with the dog maintains it in retracted position. (See Fig. 4). The extension 22 of the member 21 is normally maintained in the groove 19 by a helical spring 23 which surrounds a reduced portion or stem 24 of the controller, the spring 23 resting at its lower end upon a block 25 secured in the aperture of the casing through which the controller passes by a set screw 26, and at its upper end supporting the enlarged portion of the controller. The stem 24 of the controller may extend through the base of the machine and be attached to a pedal or other lever within the easy reach of the operator. The extent of movement of the controller may be limited by a screw 27 passing through the wall of the standard into a slot 28 in the controller. In the operation of the machine the driving pulley 7 is continuously rotated by means of a belt connected with any usual source of power. When it is desired to actuate the staple forming and setting mechanism the controller 21 is depressed by the treadle or other lever attached to the controller stem 24 withdrawing the extension 22 from the annular recess 19. This permits the dog 15 to be

forced forward by the spring 17 until its end engages one of the recesses 14 in the face of the driving pulley whereupon the driving shaft 5 is rotated.

- 5 If in the meantime the controller 21 is released by the removal of the foot of the operator from the treadle the spring 23 forces the extension 22 of the controller again into the recess 19 and as one full
10 revolution of the shaft is completed the end 22 of the controller engages the inclined face 20 of the dog, retracting it from the recess in the pulley and releasing the pulley so that the latter runs idly upon the shaft extension 6.

- 15 In order to insure the arresting of the driving shaft in the proper position a portion of the groove 19 may be filled in by a block or stop 29 which may partially or
20 wholly fill the annular groove 19 and engage the extension 22 of the plunger at the end of one revolution, by this means the reciprocating head 12 which carries the cutter and former and the driver will be arrested in
25 elevated position.

- The head 12 which is in the form of a solid cylindrical metallic block is slidably mounted in the boss 13 extending forwardly from the standard 1, and is provided with
30 a longitudinal cylindrical aperture 30 receiving and forming a seat for a helical spring 31 adapted to actuate a plunger 32 which serves first to clamp the wire from which the staple is about to be made upon
35 the anvil, then to hold the same upon said anvil during the forming of a staple and finally under the influence of the spring 31 to swage the ends or points of the staple in a manner which will hereinafter be described.
40

- The upper end of the plunger 32 is provided with an enlarged portion or collar 33 upon which the lower end of the spring 31 is seated, a smaller extension 34 of said
45 plunger preferably extending upwardly within the coils of the helical spring.

- The plunger 32 is retained in place by means of a cap 35 bolted or otherwise secured to the end of the head 12 said cap being provided with an aperture 36 in axial
50 alinement with the aperture 30.

- The cylindrical stem 37 of the reciprocating former is secured in this aperture by a set screw 38 and the plunger 32 extends
55 axially through the former and terminates adjacent the end of the former.

- The body 39 of the former is preferably rectangular in cross section and is provided with oppositely disposed grooves midway
60 of its sides in which are seated cutters 40 and 41 having their V-shaped points projecting beyond the edges of the former. These cutters may extend from the cylindrical stem 37 of the former nearly to the lower
65 end of it as illustrated in Fig. 8.

The lower end of the former is provided with a recess 42 to embrace the forming anvil 43 and the adjacent walls of the recessed portion are provided with vertical slots 44 adapted to direct the legs of the
70 staple as the same are being bent downwardly around the anvil.

The cap 35 which is attached to the head 12 also carries an actuator 46 which may be secured in a suitable aperture therein by
75 a set screw 47, said actuator comprising a downwardly extending stem terminating in a cam faced extension 48 adapted to actuate the staple stripping member and the anvil supporting member in a manner hereinafter
80 to be described.

A driver 49 also may conveniently be secured to the former by screws 50.

The members with which the reciprocating former and driver cooperate comprise
85 a pair of dies adapted to cooperate with the cutter in severing a blank of the proper length to form a staple, an anvil about which the staple blank is bent by the reciprocating former, a pair of swaging rolls
90 adapted to flatten the points of the staple so that when the staple is driven into the material to which it is applied and clenched the contact with the clencher will tend to force the ends of the staple toward each
95 other, and finally a stripping means adapted to remove the staple from the anvil and thrust it into a guide or chute.

These mechanisms are supported by an extension 51 projecting laterally from the
100 standard 1 beneath and in alinement with the boss 13 in which the reciprocating head 12 is mounted, the end of the extension 51 being recessed preferably as illustrated in Fig. 7 with parallel walls 52, 53 extending
105 inwardly from the forward end of the extension and thereafter merging into tapered walls 54, 55.

A die block 56 seated in the recess thus formed serves to contain and support the
110 mechanism which cooperates with the reciprocating members heretofore described. The die block 56 is provided with laterally extending flanges 57 which overlie the top of the extension 51, as illustrated in Fig. 1,
115 and the die block is recessed vertically to accommodate the former and other mechanisms hereinafter to be described. It is also recessed downwardly from its outer surface to receive dies 58 having V-shaped grooves
120 adapted to receive the cutting ends 40, 41 of the cutter which is carried by the reciprocating former. The die block may be further recessed beneath this cutter receiving recess to permit chips of metal to be discharged from the machine. These dies are held in their recesses in the die block by an
125 overlying retaining plate 59 of general rectangular form which is secured to the die plate by screws 60. The forming-anvil 43
130

which is supported centrally intermediate of the dies and at right angles to the plane of the cutting recesses comprises a member having a main or anvil portion extending 5 beneath and into the path of the recess 42 of the reciprocating former, said anvil member having a vertical extension 61 enlarged at its upper end 62 and secured by a set screw 63 to a cross piece 64 which is provided with downwardly extending stems 65 10 serving as guides extending into apertures in bosses 66 of a bracket 67 which is secured to the retaining plate by screws 69. Suitable helical springs 70 surrounding the 15 stems 65 and engaging at their opposite ends the upper ends of the bosses 66 and the under face of the cross piece 64 serve normally to retain the anvil in elevated position illustrated in Fig. 10 in which the upper 20 face of the anvil is in the same plane as the upper face of the dies 58 in which position the strip of material is fed into cutting position so that upon the descent of the head 12 the cutting and forming plunger will first 25 sever the strip at both ends in the dies 58 and upon continued movement will bend the same around the anvil until the legs of the staple assume a vertical position.

Inasmuch as the anvil is yieldingly supported in the manner aforesaid it is necessary to provide a rigid support during the cutting and forming operation. This is effected in the preferred form of the invention illustrated herein by providing a reciprocable forming-anvil support adapted 35 to underlie the anvil during the forming operation and to be removed therefrom during the subsequent operation of swaging the ends of the staple. The forming-anvil support as illustrated herein comprises a plunger 71 having a substantially rectangular head 72 having a slightly beveled portion 73 adapted to engage an inclined surface 74 40 upon the bottom of the forming-anvil said plunger being reciprocably mounted in ways 75 in the lower portion of the die supporting block 56. This plunger normally is retained in advanced position beneath the forming anvil by a helical spring 76 50 mounted upon a guide 77 extending at one end into the plunger and at its opposite end firmly seated in a depending extension 78 of a plate 79 which is secured to the retaining plate 59 by screws 80.

The plunger 71 is vertically slotted to receive the extension 48 of the reciprocating actuator 46 which is carried by the head 12. A roller 81 journaled in said recess is engaged by the cam faced extension 48 of the 60 actuator when the former has descended sufficiently to bend the legs of the staple in a vertical position around the forming anvil. Upon the further descent of the actuator the cam face 48 forces the anvil support back-

wardly in such a manner as to remove its 65 end 72 from beneath the anvil 43 so that the latter is permitted to descend with the staple to swaging position.

A stripper 82 is likewise actuated by the cam faced extension 48 of the reciprocating 70 actuator as the head descends. The stripper 82 preferably is in the form of a substantially rectangular bar slotted at its end to embrace the anvil 43 or its extension 62 and is provided with a roller 83 lying in 75 the path of the cam faced extension 48 of the actuator. The stripper normally is forced forwardly by a helical spring 84 engaging the rear end of the stripper and abutting at its opposite end against the extension 78 of the plate 79. In the operation 80 of the machine the descending head first causes the cam faced extension of the actuator 46 to engage the roller 83 and remove the stripper from its advanced position and 85 out of the path of the descending former and cutter. As the former and actuator continue to descend the wire is severed in the manner aforesaid and bent down around the anvil 43. Upon further descent the cam 90 faced extension 48 engages the roller 81 upon the anvil supporting member 71 and withdraws its head 72 from beneath the anvil so that the anvil is permitted to descend.

It is to be noted however that as the 95 former 39 bends the blank forming the staple about the anvil 43 the plunger 32 is arrested so that further descent of the head 12 during the bending down of the legs of the staple compresses the spring 31 which 100 rests upon the upper end or head 33 of the plunger 32 so that when the anvil supporting member 72 is retracted from beneath the anvil the latter will be forced downwardly by the impulsion of the expanding spring 105 31. This depression by the plunger 32 of the forming anvil with the formed staple clamped thereupon by the plunger 32 positions the staple in operative relation to the swaging instrumentalities which preferably 110 comprise a pair of rolls, one of which lies at each side of the path of the anvil. These swaging rolls as illustrated herein are in the form of hardened steel cylinders 84 which rest loosely upon the curved upper surfaces 115 of the block 85 which is centrally recessed to permit the descent of the anvil, said block 85 being supported upon a leaf spring 86 which is secured to the under face of the die block in any suitable manner as by a 120 clamping plate 37 fixed to the die block by screws 88. A pair of hardened steel plates 89 having beveled upper edges 90 are affixed to the walls of the die block at the sides of the yieldable supporting member and serve 125 to direct the rolls against the ends of the staple and to cause their swaging action thereupon. The rolls 84 and 85 are of a

sufficient length to be engaged by portions 91, 92 of the former which extend slightly below its cutting and forming surface.

When, in the operation of the machine, a staple has been bent by the formers around the forming-anvil 43 and the anvil support 72 has been removed from beneath the anvil, the clamping plunger 32 suddenly forces the anvil downwardly until the ends of the staple engage the rolls 84. Upon further downward movement of the former the ends 91 thereof engage the ends of the rollers and force them downwardly from the position illustrated in Fig. 10 to the position illustrated in Fig. 11, so that the rollers riding upon the inclined faces 90 of the hardened steel plates 89 are jammed against the ends of the staple and swage them to a sharp point the edges being in alinement with the inner surface of the legs of the staple.

At this time the head will have descended to its lowest position. Upon the raising of the head the anvil is elevated by the springs 70 and the rollers 84 restored to normal position by the spring 86. As the actuator 46, which is attached to the head, rises with the head its cam faced end 48 releases the anvil support which is returned by spring 76 beneath the anvil and upon the further elevation of the head the stripper 82 is forced forwardly by its spring 84 thrusting its bifurcated end along the sides of the anvil and forcing the staple into a vertical chute 93 in which the driver 49 reciprocates so that upon the next succeeding descent of the head the staple thus formed will be set by the driver in the article to which it is to be applied, another staple being formed at the same time in the manner described.

The staple thus formed and adapted to be affixed in the material by the descent of the driver 49 may be clenched by any usual form of setting mechanism. A preferred form of mechanism illustrated herein comprises a cylindrical clenching block 94 slidably mounted in a bearing 95 in the end of a hollow extension 96 of the main frame, said clenching block 94 preferably being provided at its lower end with a vertical slot to receive the end of an actuating lever 97. A pin 98 crossing said slot beneath the lever may be provided to cause the positive retraction of the clenching block. The lever 97 is pivoted intermediate of its end upon a shaft or rod 99 seated in the extension 96 and the clenching block is normally retained in depressed position by a helical spring 100 located between the pivot 99 and the end of the lever which engages the clenching block. The opposite end of the lever 97 is bifurcated and the bifurcated ends provided with alined slots 101 in which are mounted trunnions 102 extending from a preferably squared end which engages the screw threaded end

103 of a plunger 104 which is actuated by a cam upon the driving shaft 5. The plunger 104 preferably is provided with enlargements 106 and 107 slidably journaled in a vertical aperture 108 in a frame or a standard 1, the enlargement 107 being bifurcated to provide a journal for an antifriction roller 109 adapted to engage a cam 110 upon the driving shaft 5.

In the operation of the machine the cam 110 engages a roller 109 as the head 112 begins to descend, forcing the rod 104 downwardly and actuating the lever 97 to raise the clenching block 94 together with the work resting thereon in proximity to the end of the chute 93 into which the staple is delivered. The cam 110 maintains the clenching block in raised position until after the driver 49 has descended sufficiently to drive the staple through the material upon the clenching block and clench the same.

The clenching block 94 preferably is provided with recesses 113 114 inclined toward each other as illustrated in Fig. 13 so that as the end of the staple engages the upper face of the block within these recesses the points will be turned toward each other and curled up in the manner illustrated in Fig. 14.

The wire from which the staple is to be made may be forwarded to the staple forming and setting machine in any suitable manner. A convenient and novel wire feeding mechanism is illustrated in Fig. 1 and comprises a guide 115 which may be conveniently secured to the side of the main frame, said guide having upwardly extended ears, not shown, upon which toothed wheels 116, 117 are mounted upon eccentrically disposed pivots.

These wheels are provided with pins 118, 119 and a spring 120 connected to the pivots of the gears and exerting a slight pressure against the pins serves to keep the teeth of the gears in contact with each other or if the wire strip is introduced between the same in contact with the wire strip.

This device serves to clamp the wire against removal during the descent of the cutting and forming mechanism. The feeding mechanism may conveniently comprise a pair of similar toothed wheels 121, 122 mounted eccentrically upon pivots 123, 124 carried by a slide 125 mounted upon the guide 115, said toothed wheels likewise being provided with pins 126, 127 which are engaged by a spring 128 to cause the toothed wheels to engage the upper and under surfaces of the wire strip from which the staple is to be formed. The slide 125 may conveniently be reciprocated upon the slide 115 by a lever 129 pivotally connected to said slide and fulcrumed upon a bracket 130 carried by the casing. The lever 129 is pro-

vided at its upper end with a cam face 131 and with the lateral extension 132, said cam face and extension being adapted respectively to be engaged by rollers 133 and 134 mounted in the bifurcated arms of a bracket 135 carried by the rectangular portion 11 of the reciprocating head 12.

It will be obvious that in the operation of the machine downward movement of the head 12 will cause the roller 133 to ride down the cam surface 131 thereby actuating the lever about its pivotal support to draw the slide 125 away from the forming mechanism.

Inasmuch as the toothed wheels are eccentrically mounted, movement in this direction will cause the same to ride freely over the wire W which is to be fed into the machine, any backward movement of the wire being prevented by the gripping engagement of the toothed wheels 116, 117 which clamp upon the wire to prevent its movement in such direction.

Upon the ascent of the head 12 the roller 134 will engage the cam surface 132 at the end of the lever, rocking the lever about its pivotal support so that the slide 125 is forced forward by this movement to feed the wire W to the staple former.

The extent of the wire feeding movement is necessarily so adjusted that a little more than enough wire is fed forward at each operation to form a staple blank so that both ends may be severed by the V-shaped cutters to form proper penetrating points upon the staple and also enable the wire to be properly positioned in respect to the dies by suitable guides. In the present embodiment of the invention one of these guides 136 is constructed as an integral part of the clamping plate 59 and provided with a projecting beveled face 137, adapted to be engaged by the end of the blank and direct it in such a manner as to position the blank over the die. The opposite guiding member may conveniently be made in the form of an adjusting plate 138 having a beveled end 139 oppositely inclined to the beveled guide 137, said adjusting plate 138 being secured to the die block 56 by an overlying clamping plate 140 affixed to the die plate by a screw 141. It will be obvious that by releasing the screw 141 the guiding end 139 of the plate 138 may be adjusted toward and from the cooperating guide 137.

The small piece of waste formed in cutting successive blanks from the wire if permitted to accumulate would be likely to drop into the dies and interfere with the operation of the machine. I have therefore provided clearing mechanism adapted to remove this waste as rapidly as formed.

This clearing mechanism may conveniently comprise a sweep carried by the former and so constructed as to wipe over the die

58 and remove the waste portion therefrom, suitable means being provided to direct the same in its clearing operation. The preferred form of clearing device illustrated herein comprises a resilient arm 142 with a lateral extension 143 extending over the die block 58, the side arm being normally depressed by a spring 144 attached to the under surface of the plate 35 by a screw 145, the free end of said spring bearing upon the upper face of the arm 142. The adjusting plate 138 is provided with a beveled portion 146 which is adapted to be engaged with the end of the arm 142 as the head and former descends so that the lateral extension 143 of said arm will upon further descent of the head sweep across the upper surface of the die 58 clearing the die of any waste material which may rest thereupon. In order to complete the movement of the sweep the end of the extension 143 of the resilient arm 142 is forced laterally until it engages a cam face 147 upon the guide 136 so that as the head and former ascend the end of the sweep will be guided in a path away from the die block. Upon the plunger reaching its highest point of movement the extension 143 will ride over the tip of the cam 147 and be restored to starting position by the pressure of the spring 144 upon the upper side of the arm 142. Upon the next downward movement the end of the plunger will ride over a cam surface upon the vertical guide 137 thus again flexing the resilient arm 142 in the manner above described.

It will be understood that the embodiment of my invention disclosed herein is illustrative and not restrictive and that various changes in form and construction may be made within the meaning and scope of the following claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is;

1. A staple making and setting machine comprising a head, means for reciprocating the same, and mechanisms actuated by said head upon each full reciprocation thereof to set a formed staple and to cut, form and swage the points of another staple and deliver the same to the staple setting mechanism.

2. A staple making and setting machine comprising a head, means for reciprocating the same, and mechanisms actuated by said head upon each full reciprocation thereof to feed into the machine material for a staple, to cut therefrom a blank, form the same into a staple, swage the ends thereof and deliver the formed staple to staple setting mechanism and simultaneously with the forming and swaging operation to set a previously formed staple.

3. A staple making machine comprising a head, means for reciprocating the same, a

former carried by said head, a yieldably mounted anvil positioned to cooperate with said former upon its descent to form a staple from a staple blank, means for rigidly supporting said anvil during the staple forming operation, means carried by said head adapted to retract said anvil supporting means after the completion of the forming operation, and means for delivering the formed staple from said anvil upon the ascent of said head.

4. A staple making machine comprising a head, means for reciprocating the same, a former carried by said head, a yieldably mounted anvil positioned to cooperate with said former upon its descent to form a staple from a staple blank, means for rigidly supporting said anvil during the staple forming operation, means carried by said head adapted to retract said anvil supporting means after the completion of the forming operation, means operable upon further descent of said former and anvil to swage the ends of the staple, and means operable upon the ascent of the head for delivering the formed staple from said anvil.

5. A staple making machine comprising a head, means for reciprocating the same, a former carried by said head, a yieldably mounted anvil positioned to cooperate with said former upon its descent to form a staple from a suitable blank, a spring actuated anvil supporting means normally positioned rigidly to support said anvil during the forming operation, an actuator carried by said head adapted to retract said anvil supporting means upon the completion of the forming operation, swaging instrumentalities, means for depressing said anvil with the formed staple thereupon into operative relation to said swaging instrumentalities, and means adapted upon further descent of the former to cause the swaging instrumentalities to engage the ends of the staple and swage the same against the sides of the anvil.

6. A staple making machine comprising a head, means for reciprocating the same, a former carried by said head, a yieldably mounted anvil positioned to cooperate with said former upon its descent to form a staple from a suitable blank, a spring actuated anvil supporting means normally positioned rigidly to support said anvil during the forming operation, an actuator carried by said head adapted to retract said anvil supporting means upon the completion of the forming operation, swaging instrumentalities, means for depressing said anvil with the formed staple thereupon into operative relation to said swaging instrumentalities, means adapted upon further descent of the former to cause the swaging instrumentalities to engage the ends of the staple and swage the same against the sides of the anvil,

and spring actuated stripping means embracing said anvil and arranged to be retracted upon the descent of said actuator and to be released upon the ascent to cause the formed staple to be delivered from the anvil.

7. A staple making machine comprising a head, means for reciprocating the same, a former and a relatively yieldable clamping member carried by said head, a yieldably mounted anvil positioned to cooperate with said former upon its descent to form a staple from a suitable blank, means for rigidly supporting said anvil during the staple forming operation, means for retracting said anvil supporting means after the completion of the staple forming operation, the arrangement being such that the anvil with the formed staple thereupon will be depressed by said clamping member, means actuated by said former upon further descent to swage the ends of said staple against the sides of the anvil, and means for delivering the formed staple from the anvil.

8. In a staple making machine, a reciprocating head carrying a former, an anvil and swaging instrumentalities cooperating with said former successively to form a staple from a staple blank and to swage the ends thereof, and means carried by said head adapted to clamp the staple blank upon said anvil during the forming and swaging operation.

9. In a staple making machine, a reciprocating head carrying a former, a yieldably mounted anvil and swaging instrumentalities cooperating with said former during its reciprocation successively to form a staple from a staple blank and to swage the ends thereof, and a spring actuated plunger telescopically mounted within said former adapted to clamp said staple blank upon the anvil during the forming and swaging operations.

10. In a staple forming and setting machine, a reciprocating former, a yieldably mounted anvil, swaging rollers movably supported adjacent and below the sides of the anvil, and means adapted to cooperate with said rollers upon engagement of said rollers by the former during its descent to cause said rollers to swage the ends of the staple against the anvil.

11. In a staple forming machine, a reciprocating former, a relatively movable spring actuated clamping plunger carried thereby, a yieldably mounted anvil adapted to be engaged by said former and clamping plunger with the staple blank therebetween, means for rigidly supporting said anvil during the staple forming operation, swaging rollers located below and adjacent to the sides of said anvil, means for retracting said anvil supporting member at the end of the staple forming operation, the arrange-

ment being such that the anvil with the formed staple thereupon will be depressed by said spring actuated plunger to present the ends of the staple to the swaging rollers, and means to cause the swaging rollers, when engaged by the former upon its further descent, to swage the ends of the staple against the sides of said anvil.

12. In a staple forming machine, a reciprocating former, a relatively movable spring actuated clamping plunger carried thereby, a yieldably mounted anvil adapted to be engaged by said former and clamping plunger with the staple blank therebetween, means for rigidly supporting said anvil during the staple forming operation, swaging rollers located below and adjacent to the sides of said anvil, means for retracting said anvil supporting member at the end of the staple forming operation, the arrangement being such that the anvil with the formed staple thereupon will be depressed by said spring actuated plunger to present the ends of the staple to the swaging rollers, wedge shaped guides for said rollers adapted, when the rollers are engaged by the former upon its further descent, to force said rollers toward the sides of said anvil whereby the ends of the staple will be swaged.

13. In a staple making machine, a reciprocating head carrying a cutter and former, a cooperating staple forming and swaging mechanism including a spring supported anvil, and a spring actuated plunger telescopically mounted in said former and adapted to engage and clamp the staple blank upon said anvil and to retain the same thereupon during the forming and swaging operations.

14. In a staple making machine, a reciprocating head carrying a cutter and former, a spring actuated clamping plunger telescopically mounted in said former, relatively stationary dies adapted to cooperate with said cutter, a spring supported anvil adapted to cooperate with said former upon its descent to form a staple, swaging instrumentalities located in cooperative relation to said anvil, means for retracting said anvil supporting member at the end of the staple forming operation, the arrangement being such that the anvil will be caused to descend under the influence of the spring actuated clamping plunger to swaging position, and means cooperating with said former upon its

further descent to actuate said swaging instrumentalities to swage the ends of said staples.

15. In a staple making and setting machine, a head carrying a former and cutter and a driver, a main shaft operatively connected to said head for causing a reciprocation thereof, cooperating means operable by said head upon its reciprocation to form a staple and to position the same beneath the driver, a staple clenching block positioned in cooperative relation to said driver, and means for raising said clenching block in synchronism with the descent of said driver whereby a staple will be driven and clenched in the work placed upon said clenching block.

16. In a staple making and setting machine, a head carrying a former and cutter and a driver, a main shaft operatively connected to said head for causing a reciprocation thereof, cooperating means operable by said head upon its reciprocation to form a staple and to position the same beneath the driver, a staple clenching block, positioned in cooperative relation to said driver, and means actuated by a cam upon said main shaft for raising said clenching block in synchronism with the descent of the driver whereby a staple will be driven and clenched in the work placed upon said clenching block.

17. In a staple making and setting machine, a head carrying a former and cutter and a driver, a main shaft operatively connected to said head for causing a reciprocation thereof, cooperating means operable by said head upon its reciprocation to form a staple and to position the same beneath the driver, a staple clenching block positioned in cooperative relation to said driver, a lever supporting said clenching block, a reciprocating plunger actuated by a cam upon said main shaft for oscillating said lever whereby the clenching block will be raised in synchronism with the descent of the driver, and means adjustably connecting said plunger with said lever whereby the position of the clenching block may be varied in accordance with the requirements of the material in which the staple is to be set.

In testimony whereof, I have signed my name to this specification.

CARL NISKANEN.