

April 9, 1929.

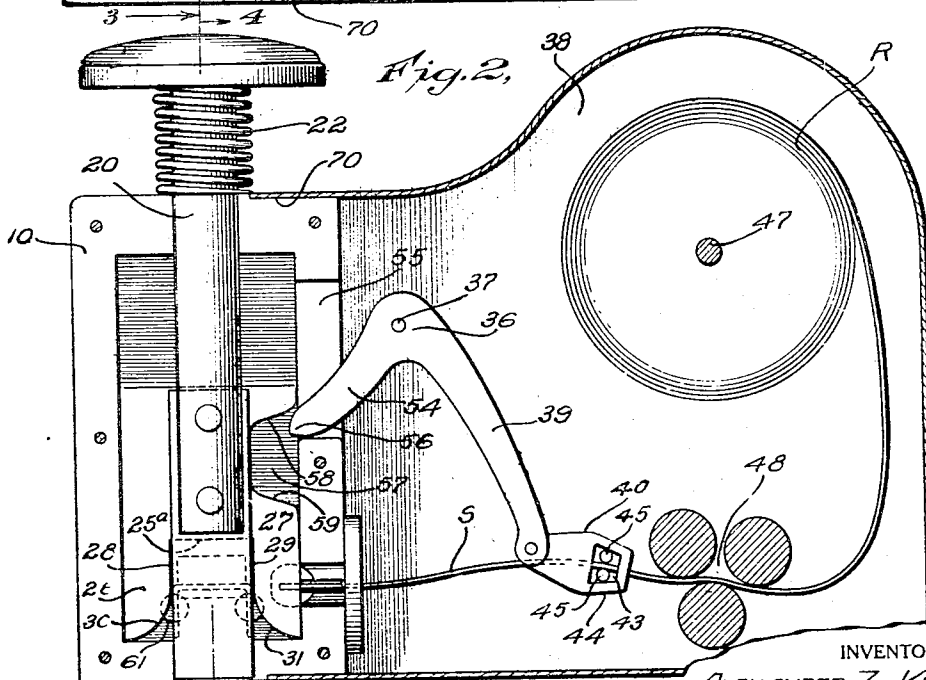
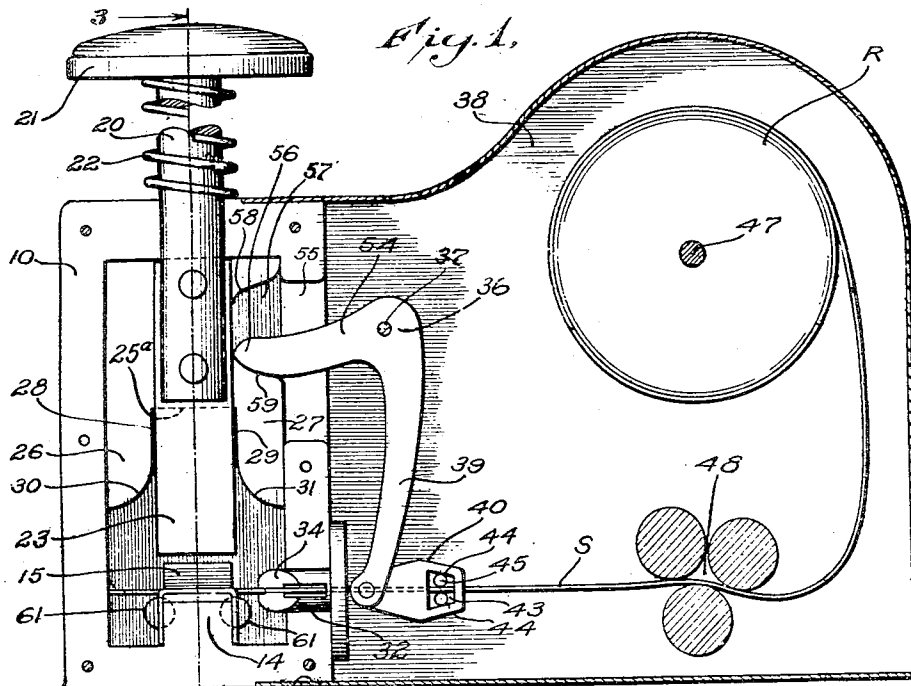
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1,708,730

STAPLING MACHINE

Filed March 10, 1925

2 Sheets-Sheet 1



WITNESSES

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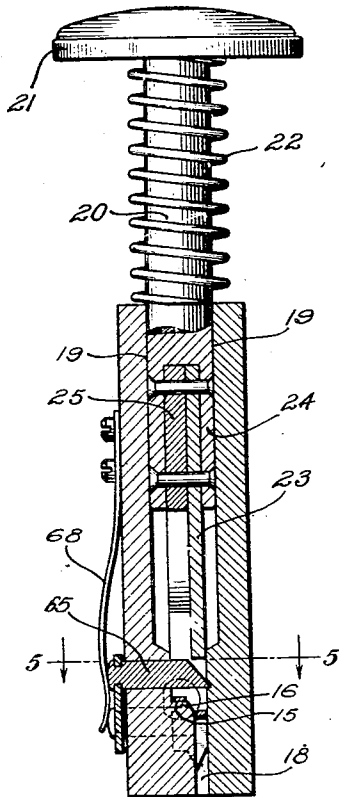


Fig. 3.

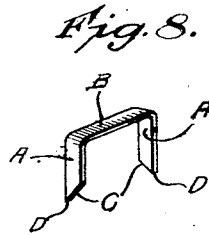


Fig. 8.

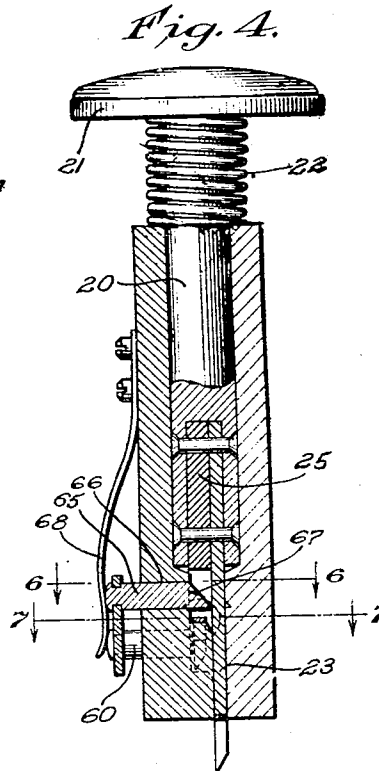


Fig. 4.

Fig. 6.

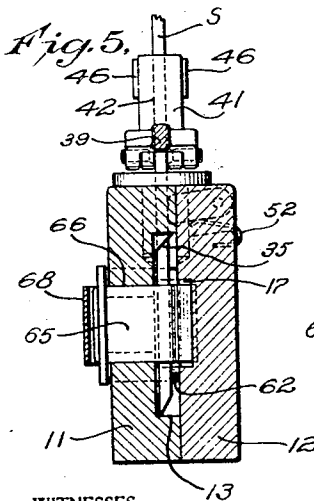
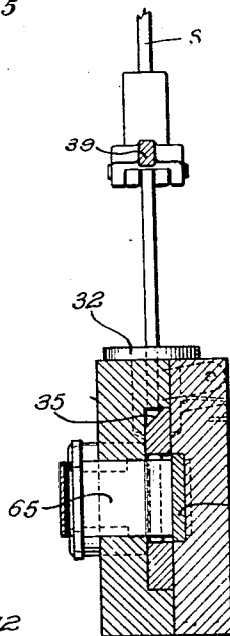
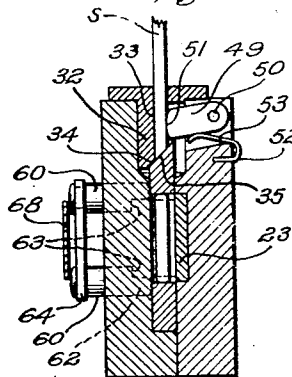


Fig. 5.

Fig. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

ALEXANDER Z. KRUSE, OF BROOKLYN, NEW YORK.

STAPLING MACHINE.

Application filed March 10, 1925. Serial No. 14,500.

This invention pertains to stapling machines and contemplates a machine for cutting blanks from a strip of material, forming staples therefrom and setting the staples thus formed, the elements of the machine being so designed and arranged that during the setting operation of one staple, a succeeding blank is cut and a staple formed thereby.

Machines of this character which are now on the market are open to many objections and principally to the objection that they are extremely limited in the number of staples which can be set without refilling or recharging the same and furthermore such machines are subject to frequent clogging.

The present invention comprehends a machine of the character set forth which is practically immune from clogging and which will form and set an appreciably greater number of staples without refilling than machines of this type now in general use.

More specifically the invention resides in a machine for forming and setting staples from a roll or spool of strip material, in which a common means is provided for actuating the machine, by virtue of which means the operation of setting of a previously formed staple simultaneously effects the feeding of the material, the cutting of a staple blank therefrom and the bending and forming of a staple from said cut blank so that the length of the stroke of the operating means is reduced to a minimum and the time incident to the blank cutting and staple forming operations is minimized due to the fact that said operations are accomplished at the same time as the setting of the formed staples, hence increasing production.

The invention furthermore aims at the production of a machine which is comparatively simple in its construction and mode of operation, which is strong and durable, inexpensive to manufacture and which is highly efficient in its purpose.

With the above recited and other objects in view reference is had to the following specification and drawings in which there is exhibited one example or embodiment of the invention which is in no way intended as a limitation upon the scope of the appended claims as it is to be clearly understood that variations and modifications which properly fall within the scope of said claims may be resorted to when found expedient.

In the drawings—

Figure 1 is a longitudinal sectional view through the machine illustrating the normal position of the parts.

Fig. 2 is a similar view illustrating the actuated position of the parts.

Fig. 3 is a transverse sectional view taken approximately on the line 3—3 of Fig. 1.

Fig. 4 is a similar view taken approximately on the line 4—4 of Fig. 2 and illustrating the actuated position of the parts.

Fig. 5 is a horizontal fragmentary sectional view taken approximately on the line 5—5 of Fig. 3.

Fig. 6 is a similar view taken approximately on the line 6—6 of Fig. 4.

Fig. 7 is a similar view taken approximately on the line 7—7 of Fig. 4.

Fig. 8 is a perspective view of one of the staples formed by the machine.

Referring to the drawings by characters of reference 10 designates a casing which in the present instance is composed of two sections 11 and 12 secured together in any suitable manner. The section 11 is provided with a recess 13 on its inner face which is substantially of rectangular formation and is closed by the opposing inner face of the section 12 to define a compartment. The lower wall of the recess has disposed at the longitudinal center thereof an upstanding lug 14 which constitutes an anvil having a horizontal upper face 15 and a beveled side edge 16. The section 12 at the longitudinal center of its inner face is provided with a vertical recess 17 of slightly greater width than the width of the anvil, said recess extending from its lower edge upwardly to define from the beveled side face 16 of the anvil to its lower end a staple outlet and guide slot 18. The confronting inner faces of the sections 11 and 12 are provided with substantially semi-circular mating recesses 19 which extend from their upper edges to a point above the anvil for receiving and guiding a plunger rod 20 which plunger rod carries at its upper end a plunger head 21. A coiled expansion spring 22 surrounds the plunger rod 20 and is interposed between the upper edge of the casing 10 and the plunger head for normally effecting an upward projection of the plunger. A staple setting member 23 is secured within the bifurcated lower end 24 of the plunger rod and said mem-

ber 23 is movable with the plunger, guided in the recess 17 and projectable into the staple outlet and guide slot 18 upon downward movement of the plunger against the action of the spring 22. The bifurcated end 24 of the plunger rod 20 carries and has secured therein in parallel relation to the member 23 a die member 25 which is formed with longitudinally spaced depending legs 26 and 27 the inner edges 28 and 29 of which are disposed parallel to each other for the major portion of their length and terminate in outwardly flared or curved portions 30 and 31. The edges 28 and 29 are spaced apart a distance slightly greater than the length of the anvil 14. The inner end or rear wall of the casing 10 adjacent its lower end has extending therethrough a sleeve-like member 32 the bore 33 of which is disposed in alinement with the horizontal upper face 15 of the anvil and is of a size and configuration to snugly receive therethrough a strip of material from which the staple blanks and staples are to be formed. The end of the sleeve member 32 which extends into the casing is beveled as at 34 and the outer side edge of the depending leg 29 of the die member 25 is correspondingly beveled as at 35 whereby the downward movement of said bevel portion 35 past the bevel portion 34 of the sleeve member will set up a shearing action to cut off a length of the strip of material which is fed through the sleeve member and across the upper horizontal face 15 of the anvil. Due to the co-acting bevel faces 34 and 35, it is obvious that the cutting of the strip will be at an angle, whereby the opposite ends of the blank will be pointed.

In order to provide means for intermittently feeding the strip S through the sleeve member 32 and across the horizontal face 15 of the anvil, a bell crank 36 is pivoted on a transverse shaft 37 in the side walls of the housing 38 which is attached to the casing 10. The arm 39 of the bell crank has pivotally attached thereto a strip gripping element 40 of the type which grips the strip upon movement of the arm in a direction toward the casing 10 and releases the strip upon movement of the arm in a direction away from the casing 10. In the present instance this gripping means as specifically illustrated consists of a body 41 having a longitudinal bore 42 of substantially the same size and configuration as the strip S. The body is further provided with a transverse opening 43 having rearwardly converging upper and lower walls 44 which coact with a pair of rollers 45 maintained in the opening 43 by means of side cover plates 46. The housing 38 contains a strip roll or spool R mounted on a transverse shaft 47 and also contains a strip straightening means 48 for the purpose of removing

from the strip the inherent curvature due to its convolute arrangement on the roll or spool R. In order to prevent rearward movement of the strip when the gripping element 40 is moved rearwardly to obtain a fresh grip, a strip clutch consisting of an eccentric arm 49 is pivoted as at 50 and has its eccentric terminal 51 extending through a slot 52 in the sleeve member 32, the said eccentric arm 49 being urged into gripping relation with the strip by a spring 53. In order to impart the necessary movement to the arm 39 of the bell crank 36 to actuate the strip gripping element 40, the arm 54 of the bell crank 36 extends through an opening 55 in the casing 10 and the terminal 56 of said arm protrudes into the notch 57 formed in one end of the die member 25, the said notch 57 having upper and lower end walls 58 and 59 which are spaced apart a distance appreciably greater than the width of the terminal 56.

In order to provide means for laterally displacing the formed staple from the anvil 14 to present the same at the upper end of the staple outlet and guide slot 18 and in the path of movement of the staple setting member 23, a pair of push arms 60 are provided which are laterally slidable through openings 61 in the casing section 11. The innermost terminals of said push arms are cut away on their confronting faces to provide extremities 62 spaced apart a distance approximately equal to the distance between the end walls of the anvil 14 and the said extremities 62 are of a length approximately equal to the thickness of the anvil. The said terminals at their juncture with the main body of the arms present stop shoulders 63 which contact with the outer side of the anvil to arrest the inward sliding movement of the push arms. The push arms at their outer ends are secured to a connecting cross piece 64 which is further connected to a vertically spaced actuating arm 65 extending through a transverse bearing opening 66 in the section 11 of the casing. The actuating arm 65 is provided with a beveled inner terminal 67 whereby the spring 68 engaging the outer end of the actuating arm 65 normally projects the actuating arm and push arm inward to dispose the beveled terminal 67 in the path of movement of the staple setting member 23.

In use and operation of the machine the terminal of the strip S which is provided initially with a bevel pointed end is trained through the strip straightening means 48, through the strip gripping element 40 thence through the sleeve 32 and over the horizontal upper shelf or surface 15 of the anvil with the bevel pointed terminal engaging the inner face of the outer wall of the recess 13. The first downward movement of the

plunger rod 20 will cause the beveled edge 35 of the depending leg 27 to coact with the beveled inner end 34 to shear the portion of the strip projecting from the end of the sleeve 32 thus initially cutting off a length or section constituting a staple blank. Continued further downward movement of the plunger causes the outwardly flared or curved portions 30 and 31 of the depending legs 26 and 27 to bend the ends of the blank downwardly and inwardly toward the end walls of the anvil 14 until the parallel inner edges 28 and 29 thereof complete the bending of said ends at a right angle to the intermediate portion of the blank and effect a complete engagement of said ends with the end walls of the anvil. The final movement of the plunger is arrested by the engagement of the lower edge 25^a of the die member with the intermediate portion of the blank, which completes the forming operation of the clip. During the downward movement of the plunger, the upper end wall 58 of the notch 57 in the die member engages with the free terminal 56 of the bell crank arm 54 thereby swinging the arm 39 of the bell crank in a rearward direction or away from the casing 10 whereby the strip gripping element 40 is positioned to obtain a fresh grip on the strip S. The downward movement of the plunger also effects the engagement of the staple setting member 23 with the beveled inner terminal 67 of the actuating arm 65 so that said arm together with the push arms 60 is moved outwardly against the action of the spring 68. The return upward movement of the plunger initially causes the depending leg 27 to uncover the inner end of the sleeve 32, immediately following which the lower end wall 59 of the notch 57 engages the terminal 56 of the bell crank arm 54 so that the arm 39 is swung forwardly or in a direction toward the casing 10 whereby the strip gripping element 40 effects a gripping of the strip to feed another end portion across the upper face or shelf 15 of the anvil. Immediately prior to the advancement of said end portion into overlying relation to the anvil, the staple setting member 23 will have moved upwardly a sufficient distance to disengage the actuating arm 65 so that the spring 68 will function to move the actuating arm inwardly together with the push arms 60. This inward movement of the push arms will cause the terminal 62 to engage the downwardly bent legs or ends of the previously formed staple whereby to displace said staple laterally from the anvil. This lateral displacement causes the bight or intermediate portion of the staple to slide down the inclined or bevel side edge 16 and into the upper end of the staple outlet and guide slot 18, the inherent resiliency of the material from which the staple is formed setting up a tendency of the legs to spring slightly outward at their free end, thereby causing the staple to be retained at the upper end of the outlet or guide slot. Further continued upward or return movement of the plunger under the action of the spring 22 causes the arm 39 of the bell crank and the strip gripping element 40 to feed the free end of the strip S completely across the anvil for the next operation of the machine. The next downward movement of the plunger, in addition to cutting a staple blank and forming another staple therefrom, simultaneously brings the lower end of the staple setting member into engagement with the bight or intermediate portion B of the previously formed staple which staple is now positioned in the upper end of the guide slot and outlet 18 so that the said staple is forcibly projected from the staple outlet and guide slot 18 and anchored or set in the article upon which the lower face of the casing has been superimposed.

In Fig. 8 the completed staple formed and set by the machine is shown in which A designates the parallel legs connected by the bight B. It will be noted that the free terminals of the legs A are cut off at an angle or beveled as at C so as to produce entering points D for facilitating the driving of the staple into the article or material to which it is applied.

In order to gain access to the interior of the housing 38 for the purpose of inserting a new roll or spool and for training the same through the straightening means, the open forward end of the housing is telescopically engaged over the rabbeted portion 70 of the casing and may be secured in place either frictionally or by any suitable retaining means.

I claim:

1. A portable machine for forming staples from a strip of material and setting the staples thus formed, comprising a casing and a stationary anvil therein, a manually operable spring retracted plunger, means operable by the plunger upon each retractive movement for feeding a length of said strip across the anvil, means on said plunger operable upon downward movement thereof for severing the length fed across the anvil, means on said plunger for forming a staple on said anvil, staple setting means carried by the plunger, and means normally operable through the side of the casing to displace the staple from the anvil into the path of movement of the setting means, said staple displacing means being retractible by the staple setting means upon downward movement of the plunger immediately preceding the staple forming operation.
2. A portable stapling machine for form-

ing staples from a strip of material and setting the staples thus formed, including a casing having a recessed inner wall, a stationary anvil with the recess, a manually operable spring retracted plunger, means operable by the plunger upon each retractive movement for feeding a length of said strip across the anvil, a strip guide having a beveled end, and a central bore in alignment with the top of said anvil, a forked member on said plunger having an outwardly beveled cutting edge cooperating with the beveled end of the strip guide upon movement thereof for severing at an angle the length of strip fed across the anvil to provide pointed terminals for the finished staples, the inner confronting faces of the forked member constituting means for subsequently bending the opposite ends of the length fed over the anvil to form a staple, staple-setting means carried by the plunger, and spring actuated means normally operating to displace the staple from the anvil and dispose the same in the path of movement of the setting means, said displacing means being retractible by the staple-setting means upon downward movement of the plunger immediately preceding the staple forming operation and releasable immediately preceding the feeding of the succeeding staple blank across the anvil.

3. A machine for forming staples from a strip of material, and setting the staples thus formed, comprising a casing, a stationary anvil therein, a spring retracted manually operable plunger, means operable by the plunger upon each retractive movement thereof for feeding a length of said strip across the anvil, with portions projecting beyond the opposite ends of the anvil, cooperating means within the casing and on said plunger operable upon movement of the plunger for severing the length fed across the anvil, and means on said plunger for forming a staple, staple setting means carried by the plunger for setting the formed staple, and means normally operable to dis-

place the staple from the anvil into the path of movement of the setting means, said staple displacing means being retractible by engagement of the staple setting means therewith upon downward movement of the plunger immediately preceding the staple forming operation.

4. A machine for cutting staple blanks from a strip of material forming staples from said blanks and setting said formed staples, comprising a casing, an anvil in said casing, a spring retracted plunger projecting into said casing, a staple forming element carried by the plunger, a stationary cutting element having a beveled end projecting into the casing, a movable cutting element carried by the plunger having a beveled cutting edge coacting with the beveled end of the stationary cutting element to sever the blank whereby to provide pointed terminals for the finished staples, a housing carried by the casing, means in the housing for supporting the strip in roll form, means in the housing through which the end of the strip roll is trained for straightening the same, means in the housing for gripping the strip and feeding the same, a connection between the strip gripping and feeding means and the plunger for moving the strip gripping and feeding means in a direction to feed the strip through the stationary cutting element and across the anvil upon retractive movement of the plunger, means carried by the plunger and disposed within the casing for setting a formed staple, said casing having a staple setting guide and outlet adjacent the anvil and in alignment with the staple setting member, and means normally movable transversely of the casing for displacing a formed staple from the anvil and in the staple guide and outlet, said displacing means being retractible by engagement of the staple setting member therewith immediately prior to cooperation of the forming die with the anvil.

ALEXANDER Z. KRUSE.