Feb. 23, 1932. J. B. CROFOOT 1,846,545

STAPLING MACHINE

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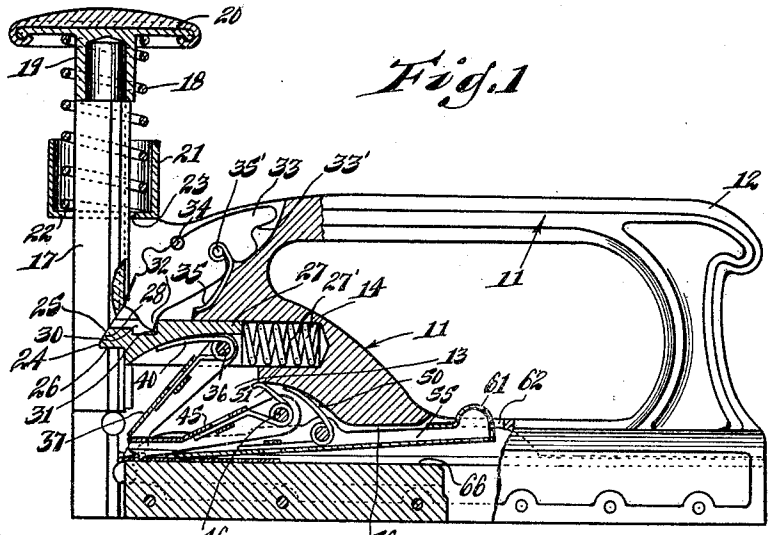


Fig. 1

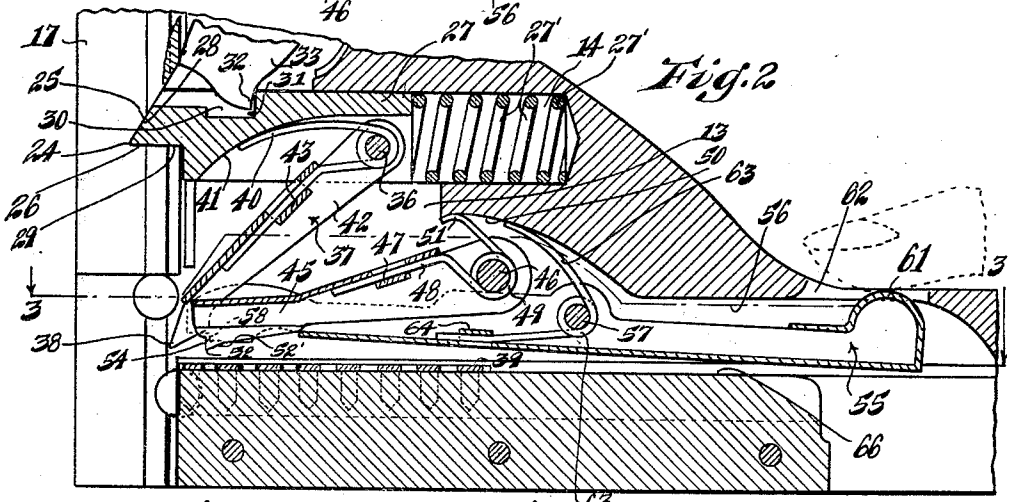


Fig. 2

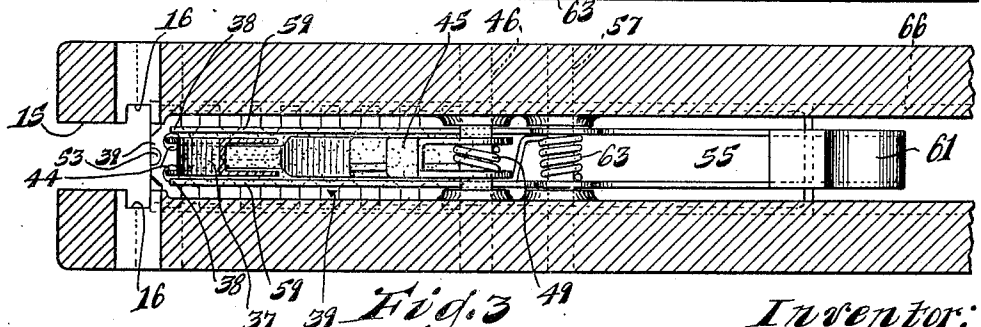


Fig. 3

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Fig. 4

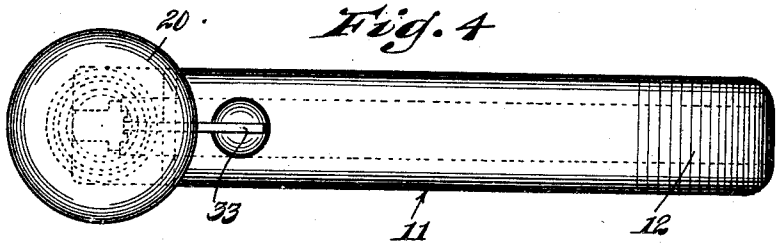


Fig. 5

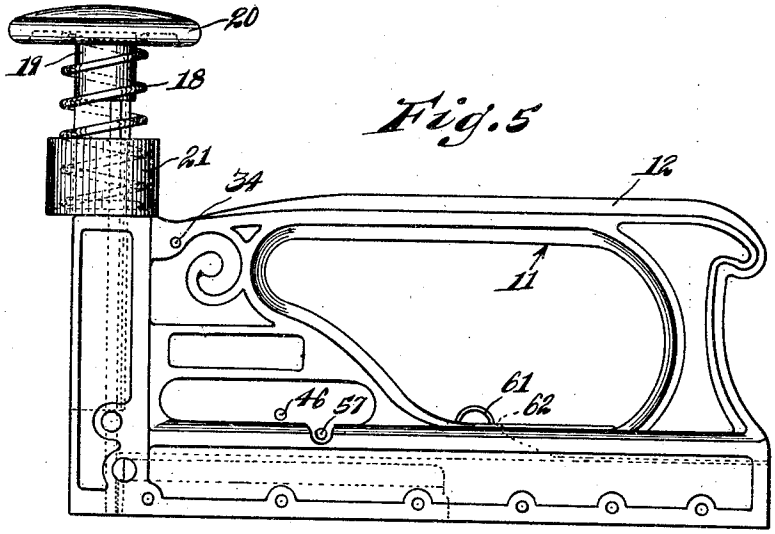


Fig. 6

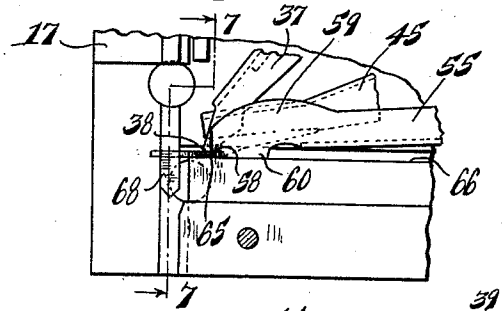


Fig. 7

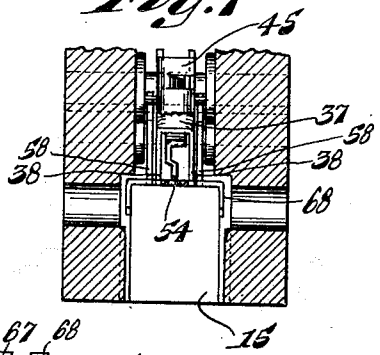
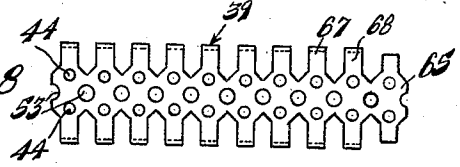


Fig. 8



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Patented Feb. 23, 1932 1,846,545

UNITED STATES PATENT OFFICE

JOHN B. CROFOOT, OF MOUNT PROSPECT, ILLINOIS

STAPLING MACHINE

Application filed June 14, 1929. Serial No. 370,303.

My present invention relates to stapling machines, being an improvement over the device disclosed in my copending application, Serial No. 274,988, filed May 4, 1928. The general object of this invention is to provide certain desired improvements in a stapling machine and particularly to provide means adapted to permit the release of a stapling strip after insertion.

Another object is to provide means in a device of the kind described for firmly holding the end of a strip of staples in such fashion as to insure the positive ejection and application of the last of a strip of staples.

Further objects and advantages of the method and construction employed in the present device will appear more fully in the details hereinafter set forth when taken in connection with the accompanying drawings, in which:

Fig. 1 is an elevational view, partly in section, with parts broken away, of a stapling machine embodying my invention;

Fig. 2 is a fragmentary enlarged elevational view, partly in section, of details disclosed in Fig. 1, showing the actuation of the manually operable staple holding and releasing mechanism;

Fig. 3 is a plan sectional view taken on line 3—3 of Fig. 2;

Fig. 4 is a top plan view of the device;

Fig. 5 is a side elevational view of my stapling machine;

Fig. 6 is an enlarged fragmentary elevational view of certain details shown in Figs. 1 and 2, showing the manually operable means retaining the last staple securely in position to be sheared off and applied;

Fig. 7 is a fragmentary sectional view, partly in elevation, taken on line 7—7 of Fig. 6; and,

Fig. 8 is a plan view of a strip of staples employed in connection with the present device.

In the drawings, wherein similar characters of reference indicate corresponding parts in the several views of the preferred form of my invention, 11 designates the body portion or housing of a stapling machine having the usual gripping handle 12, a chamber 13 having a pocket 14 and a guideway 15 provided with grooves 16, the guideway and grooves serving to slidably retain the plunger 17 in position for performing its functions of severing and applying the staples.

The plunger 17 is maintained in normal raised inoperative position by a coil spring 18 which latter encircles the shank of the plunger and a shoulder 19 thereon, the spring 18 being confined between the under side of a cap 20 secured to the plunger 19 and the upper end of the walls defining the guideway 15. The spring 18, as best shown in Figs. 1 and 2, is partly incased in an annular member 21, the bottom 22 of which has a hole 23 through which the shank of the plunger 17 reciprocates. The annular member 21 serves both to arrest downward motion of the plunger and as a receptacle for the spring 18 when under compression as the plunger is struck downwardly.

As best shown in Figs. 1 and 2, the plunger 17 is formed with a notch 24 having a sloping portion 25, and a horizontal portion 26. A lever bolt 27 having a projecting sloping surface 28 coacting with the corresponding sloping portion 25 of notch 24, is slidably received in the pocket 14 of the housing 11, a coil spring 27′ confined in the pocket 14 and engaging the end of the lever bolt maintains same in the normal position shown in Figs. 1 and 2. The projecting sloping surface 28 of lever bolt 27 has a square shoulder 29 which seats against a corresponding square portion of notch 24 and serves as a check to prevent the withdrawal of plunger 17 from the guideway 15. The lever bolt 27 is further formed with a recess 30 and a shoulder 31 which serve respectively as a guide and a stop for the downwardly projecting heel 32 of a dog 33 having a notch 33′, the dog 33 being swingable about a fulcrum pin 34 secured in the housing 11, and is held in the normal position shown in Fig. 1 by a spring 35 which is secured in a groove 35′ on the dog 33. When it is desired to release and withdraw the plunger 17 out of the housing 11 altogether, this is accomplished by inserting a suitable implement in the notch 33′ and swinging the dog 33 in a counter-clockwise

direction about the fulcrum pin 34, thereby causing heel 32 to thrust back the lever bolt 27 and consequently to disengage the horizontal portion 26 of the lever bolt from the corresponding squared portion of the notch 24 of the plunger 17 thereby freeing the plunger so that it may be withdrawn completely from the body portion 11.

Rockingly mounted on a pin 36 secured on the lever bolt 27 is a feeding pawl 37 having bifurcated ends which are formed to provide spaced prongs 38, the function of which will be set forth hereinafter. The feeding pawl 37 is pressed into engagement with the stapling strip 39 by a spring 40 which is fastened to the pin 36 and has one end abutting the roof of a slot 41 which is formed in the lever bolt 27, the other end of the spring 40 being clampingly held between the opposed folded sides 42 of the pawl 37 by a small strap 43 truck down from the upper surface of the pawl 37.

As best shown in Fig. 1, it will be seen that the prongs 38 consecutively engage one at a time at the outermost holes 44 of the strip of staples 39, the feeding action being accomplished after the feeding pawl 37 is retracted when the plunger 17 descends to cut off an individual staple. The forward movement of the pawl 37 occurs when the plunger 17 is ascending into the normal inoperative position shown in Fig. 1.

Cooperating with the feeding pawl 37 is a holdback pawl 45 which is rockingly mounted on a pin 46 and is formed with a downwardly struck strap 47 which latter clampingly engages and end 48 of a coil spring 49 which is secured on the pin 46 mounted in the housing 11. The other end 51 of the spring 49 abuts against a portion of the roof 50 of the chamber 13, the function of the spring 49 being to maintain the prong 52 of hold-back pawl 45 in one of the series of center holes 53 on the staple strip 39, it being observed that a sloping surface 52′ of the prong 52 permits the strip of staples to progressively advance in a direction from right to left, as viewed in Fig. 2, while the square shoulder 54 of the prong 52 prevents retrograde movement of the staple strip in a direction from left to right, while the prongs 38 of the feeding pawl 37 are passing over the upper surface of the staple strip 39 to be again engaged in the next of the series of opposed holes 44.

As forming a special feature of the present invention, I provide an elongated member 55 which is rockingly mounted within a slot 56 communicating with the chamber 13 on a pin 57 secured to the housing 11, the member 55 being bifurcated at one end with shoulders 58 formed on the opposed prongs 59 thereof. As clearly shown in Fig. 6, the opposed prongs 59 have horizontal shoes 60, the function and purpose of the shoulders 58 and the shoes 60 being described hereinafter. At the other end of the member 55 I provide a manipulating button 61 which normally protrudes through a hole 62 formed in that portion of the housing 11 which forms a part of the handle 12, the member 55 being retained in the normal position shown in Fig. 5 by a spring 63 which is secured on the pin 57, one end of the pin being secured by a strap 64 struck upwardly from the under surface of the member 55, in the position as best shown in Fig. 2, the other end of the spring abutting a portion of the roof of chamber 50.

Referring to Fig. 6, it will be seen that the shoulders 58 of the member 55 are particularly adapted to prevent wobbling or side motion of the last portion 65 of a strip of staples and thus to defeat a tendency, heretofore occurring quite frequently, to jam the last staple into the side grooves 16 and crevices adjacent thereto, necessitating considerable time for its removal. It will be particularly observed, as best shown in Fig. 6, that the last portion 65 following the last staple is pressed against the floor of the channel or magazine 66 by the two prongs 38 of the feeding pawl 37, the prong 52 of the hold-back pawl 45 and the two shoulders 58 of the elongated member 55, or five points of contact in all, these elements combining in the manner indicated to retain the last staple in operative position for application much more securely than that hitherto has been the case in this art. This is an important feature since it overcomes the defect formerly inherent in this species of mechanism of jamming the last staple into the mechanism as indicated above.

The function and manner of operation of staples of the type above indicated are well understood, and, consequently, only those features which form the special objects of the present invention will be described in detail herein:

After the lever bolt 27 has been thrust backward against the spring 27′, and the prongs 38 of feeding pawl 37 have passed over a portion of the upper surface of the staple strip 39 until they engage in the next pair of the series of outer holes 44, during which return movement of the hold-back pawl 45, with its prong 52 engaged in one of the middle rows of holes 53, securely holds the entire strip of staples motionless in the chamber 66; and assuming, as best shown in Fig. 6, that all of the staples have been severed save the last two illustrated,—it will be noted that immediately after severance of the staple 67, the staple 68 will be thrust into the position occupied by staple 67 and upon the downward descent of the plunger will be cut off. The shouldered portions 58 of the elongated member 55, the prong 52 and the prongs 38 will be retained meanwhile in op-

erative hold-down position upon the last strip of metal 65 which remains after the staple 68 has ben cut off. In practice I form the staple strip 39 in the manner indicated, that is, with a mutilated or last portion 65 without downwardly depending staple tines, but if desired the staple strip may be fashioned without the mutilated or last portion 65, in which case the last staple will be ejected from the device without being used. In Fig. 2, it will be noted that the manipulating button has been pressed down by a finger of the operator thereby rocking the elongated member 55 about the pin 57, thus raising the end of the elongated member, the prong 52 of the hold-back pawl 45 and the prongs 38 of the feeding pawl away from the staple strip 39 in the order indicated. The staple strip 39 is now released and may be shifted longitudinally in the channel 66 by any suitable instrument. If the strip is a fresh one, the outer end of the staple strip may be grasped and the entire strip of staples withdrawn. This is a convenient feature since without the provision of the elongated member 56, the hold-back pawl 45 would prevent the retraction of the strip of staples 39 from the device. In stapling machines at the present time it is found that the tendency of the last staple of the strip of staples to jam or clog in the mechanism has been a defect which has occasioned considerable inconvenience, but with the present mechanism, the last staple may be utilized while the fragment of metal remaining will be ejected into the guideway 15 and thus permitted to drop out of the machine without interfering with its normal functions.

While I have described with particularity a preferred form of the invention, it will, of course, be understood by those skilled in the art to which my invention appertains that change and modification may be made in the details described without departing from the spirit or sacrificing any of the advantages of the device; hence, I wish it to be understood that I do not confine myself to the precise details save to the extent these are circumscribed within the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A stapling machine comprising a housing interiorly recessed to provide a staple receiving magazine and having a guideway, a staple shearing plunger in said guideway, a series of spring actuated pawls rockingly mounted within said chamber, one of said pawls serving to feed a staple strip so as to dispose the staples thereof one at a time in said guideway, a plurality of said pawls serving to retain and prevent retraction of the staple strip, and manually operable means on one of said last mentioned pawls for retracting the same from the staple strip, said pawl when so retracted also retracting the feed and other retaining pawl from said strip thereby freeing the same and permitting it to be retracted out of the machine.

2. A stapling machine comprising a housing having a staple receiving magazine therein, a chamber in the housing communicating with said magazine, and a series of pawls engaging consecutively individual staples on a strip of staples, a plurality of said pawls serving to retain securely in position the last staple of said strip of staples in position for severance and ejection by a plunger slidably mounted in a guideway and formed in said housing, one of said pawls being automatically operated by said plunger, and another pawl being manually operable to permit the retraction and adjustment of said strip of staples and for the release of the other pawls.

3. A stapling machine comprising a housing, a staple strip receiving magazine formed in said housing, a chamber communicating with said magazine, a spring pressed element slidably mounted in said chamber, a plunger reciprocably mounted in a guideway, said plunger coacting with said spring actuated element, a staple feeding pawl connected to said spring-pressed element, a hold-back pawl rockably mounted in the chamber, and a third pawl connected to said housing, said third pawl serving to securely hold in fixed position the last of a series of staples and adapted to be manually operated for retraction from a staple strip and to cause retraction of said feeding pawl and said hold-back pawl to free said strip and permit it to be retracted out of the machine.

4. A stapling machine of the kind described comprising a housing configured to provide a handle, a chamber in said housing, a series of pawls rockably mounted in said chamber, and a staple shearing plunger slidably mounted in a guideway provided on the housing, said plunger automatically actuating one of said pawls which acts as a feed pawl, another of said pawls serving to prevent retraction of a strip of staples when said feeding pawl is returning to position to again thrust forward one of said staples into said guideway to be sheared by said plunger, and a third of said pawls serving to maintain the last of said staples in position to be sheared by said plunger and adapted to be manually operated for retraction from a staple strip and to cause retraction of said feeding pawl and said hold-back pawl to free said strip and permit it to be retracted out of the machine.

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

JOHN B. CROFOOT.