E. T. GREENFIELD.

STAPLING MACHINE.

APPLICATION FILED MAY 14, 1915.

1,217,749. Patented Feb. 27, 1917.

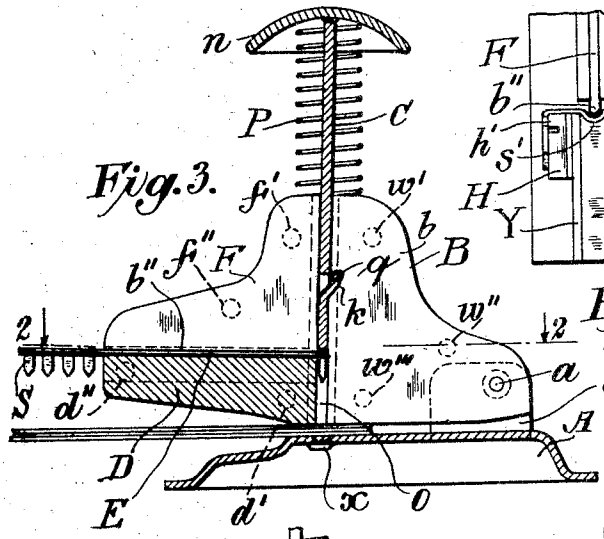


Fig. 3.

Fig. 6.

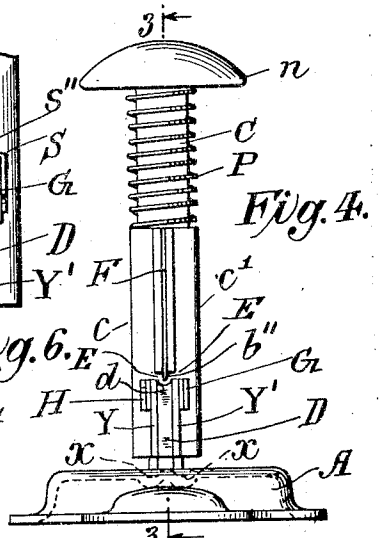


Fig. 4.

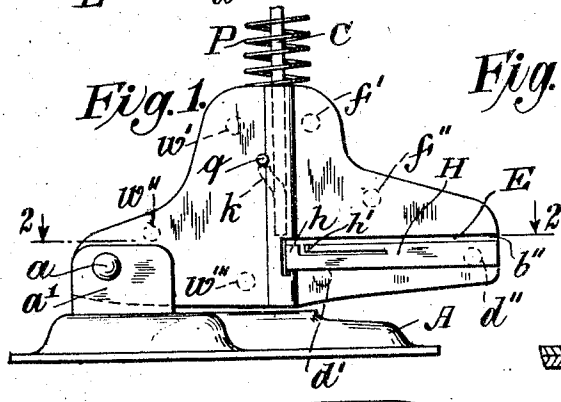


Fig. 1.

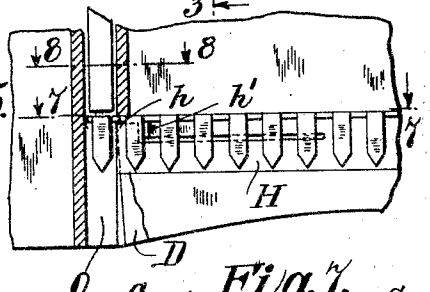


Fig. 5.

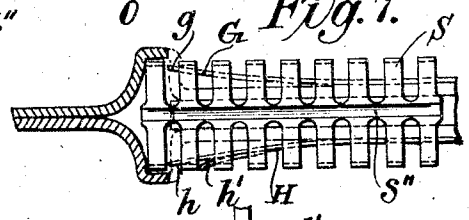


Fig. 7.

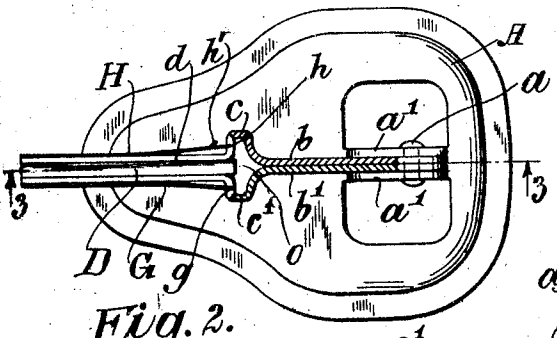


Fig. 2.

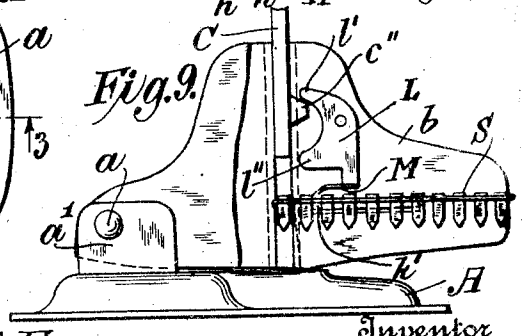


Fig. 9.

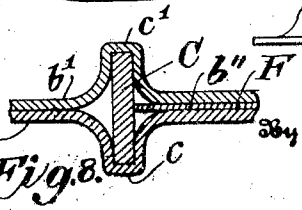


Fig. 8.

Witnesses:

Geo. Schwartz

M. F. Keating

Inventor

Edwin T. Greenfield

By his Attorneys

Kiddle & Thompson

UNITED STATES PATENT OFFICE.

EDWIN T. GREENFIELD, OF KIAMESHA, NEW YORK.

STAPLING-MACHINE.

1,217,749. Specification of Letters Patent. Patented Feb. 27, 1917.

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To all whom it may concern:

Be it known that I, EDWIN T. GREENFIELD, a citizen of the United States, and resident of Kiamesha, county of Sullivan, and State of New York, have invented a new and useful Stapling-Machine, of which the following is a specification.

My invention is directed particularly to improvements in stapling machines of the type disclosed in United States Letters Patent No. 572,293 and No. 936,996, granted to me on the 1st of December, 1896, and 12th of October, 1909, respectively, in which staples are successively cut from a blank or strip of completed staples and driven through papers or material to be bound together.

The object of this invention is to provide a simple and compact machine in which the last staple of the strip can be fed forward into the machine in a manner to avoid a tendency to clog due to the last staple, or in fact any other staple, being turned during its downward movement. The machine is also preferably constructed so that the last staple can be fed by hand into a position where it can be driven and also so that the last staple can be removed by hand from the machine, if desired.

My machine is also preferably constructed so as to use the staple blank or strip covered by the invention shown, described and claimed in United States Letters Patent No. 1,106,938, granted to me on the 11th of August, 1914.

As showing certain specific embodiments of my invention reference is made to the drawing forming a part of this specification and in which drawing,

Figure 1 is a side elevation of my stapling machine, the upper portion of the plunger and its retracting spring being broken away.

Fig. 2 is a horizontal sectional view taken as along the plane indicated by the horizontal line 2—2 Fig. 1, looking in the direction of the arrows.

Fig. 3 is a transverse vertical view taken as along the plane indicated by the line 3—3, Fig. 2, or 3—3 Fig. 4, looking in the direction of the arrows in each instance.

Fig. 4 is a front or end elevation of the stapling machine.

Fig. 5 is a vertical sectional view showing the strip of staples supported in place on its guide-way ready for one staple to be severed from the rest of the strip by the plunger located above it.

Fig. 6 is a front view of the members constituting the guide-way and in this figure a strip of staples is indicated in place on the guide-way.

Fig. 7 is a horizontal transverse view taken as on the line 7—7 of Fig. 5.

Fig. 8 is a horizontal transverse view taken as on the line 8—8, Fig. 5. Figs. 5 to 8 inclusive show the parts on a larger scale than the corresponding parts are shown in the rest of the figures of the drawing.

Fig. 9 shows a modified form of stapling machine in which there is an automatic feeding of all staples, except the last staple, to the position where each staple in the strip can successively be sheared and driven.

Referring now to the drawing in detail in which like characters of reference represent like parts wherever used, A represents the base of the machine to which there is pivoted by means of the pin *a* the frame or support B of the staple severing and driving apparatus. The base A is preferably made of pressed sheet metal and is provided with upstanding ears *a' a'* between which the frame or support B swings. These upstanding ears *a'* are integral with the rest of the material in the base and are formed by cutting the metal in the base and subsequently bending the ears upwardly. The base is also provided with a pair of recesses or clenching surfaces X X which are located below the plunger the latter of which will be hereinafter more specifically described. These clenching surfaces are arranged and shaped so as to give an inward inclination to the free ends of the staple as they are driven forward through the parts or materials to be secured by it. This base serves as an anvil to oppose the thrust imparted to the staple by means of the plunger, and as the base also coöperates with the plunger to clench the free ends of the staple upon the under side of the material to be bound or secured, the base may be referred to as a clenching anvil.

The pivoted frame or swinging support B is also made of pressed sheet metal, preferably steel, and it comprises two main leaves or parts *b b'*. These main leaves have a

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portion bent laterally at c c' so as to provide a set of ways for receiving and guiding the vertical movable plunger C, the function of which plunger is to sever a staple from the strip, drive the severed staple through the material until the ends of the staple come in contact with the inclined faces of the clenching surfaces X X in the anvil and to continue to force the staple downwardly until the inner faces of the depending legs of the staple engage the under face of the material which is to be secured by the staple. These clenching surfaces are preferably arranged so that the free ends of the depending legs are bent toward each other as they are forced to the position where they engage the under side of the material to be secured.

A shear blade D is provided between the main leaves or parts b b' and this shear blade coöperates with the lower portion of the plunger in severing the staple desired to be driven. The front end portions of the leaves are slotted at E to provide a receiving space for the staple blank or strip S.

As it is desirable to use a staple blank in which the legs of the individual staples will remain in parallel position relative to each other, that is, without being bent out of their normal position up to the time that they are severed by the driving plunger, I preferably use the staple blank or strip shown in United States Letters Patent No. 1,106,639; that is, a staple blank or strip provided with a plurality of integrally connected staples and having a longitudinally corrugated web or back. In the staple shown the corrugation extends downwardly in the direction of the legs of the staples and in order that the staple strip may be centrally located when in the machine the shear blade D has been provided with a longitudinally extending grooved portion d and the frame has also been provided with a depending rib b''. The grooved portion d receives the under portion s' of the staple strip S while the rib b'' enters the groove s'' in the corrugated web of the staple strip, and from an inspection of Fig. 6 it will be observed that the lower portion of the rib b'' extends below the top surface of the staple strip.

In the construction shown the rib b'' is the lower portion of a member F which is inserted between the leaves or parts b b', but it will be manifest that this rib b'' could be made integral with or remain a part of one or both of the leaves or parts b and b'.

From an inspection of the drawing, and also from what has preceded, it will be apparent that the shear blade D and the portions Y Y' of the leaf members b and b' provide a staple-supporting guide-way that extends longitudinally. This guide-way is of substantially the same configuration as the staples comprised in a staple blank and the staples in this blank straddle the guide-way member, as it may be called.

The main leaves or parts b and b' directly engage each other and are connected together by spot-welding, as at w', w'', w''' and said leaves or parts are furthermore also indirectly secured by both being spot-welded to the member F at f'; f'', and by being spot-welded to the shear blade D at d' d''. In other words, the swinging frame B is a slotted construction with all the parts thereof permanently welded together when the frame is completed. The horizontally extending guide-way member has secured thereto, at opposite sides thereof, a pair of springs which serve the function of pivoted holding or checking pawls. These springs restrain the staple strip or blank from movement away from the path of the plunger or, in other words, away from shearing position, unless the springs are forced toward each other in a manner to free the strip. These springs are designated by the reference characters G and H and the free ends g and h thereof are located so as to engage the depending legs of a staple about to be driven, so as to prevent the latter from becoming cramped or turned in such a way as to clog the outlet O of the machine and thus prevent the machine from operating. The springs G and H are shaped so that the staple blanks can be fed either by hand or by mechanism such as is shown in Fig. 9—in position for a staple to be sheared or driven. The spring H has also provided thereon what may be considered a second holding or checking pawl and this second checking pawl engages the staple which is next to the staple ready to be driven whereby the staple strip or blank will be retained in place on the guide-way of the machine. This second holding or checking pawl serves the function of a spring-pressed pivoted holding and checking pawl. The staple strip, however, can readily be removed when desired by simultaneously pressing the thumb nail against the springs or pawls at one side of the horizontal guide-way member and by pressing the spring or pawl at the other side of the horizontal guide-way member with the nail of one of the fingers. When this is done the flesh of the thumb and finger will engage the staple strip with sufficient force to effect the withdrawal of the staple strip. At this time the withdrawal of the strip can take place as the free ends g, h and h' of the springs or pawls will be all removed from the position where they engage the depending legs of the strip. The free ends g, h and h' of the springs or pawls are normally spring-pressed laterally outwardly to a position where they can engage or where they can be engaged by the depending legs of the staples in the strip, and

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from what has preceded it will be manifest these ends are pressed laterally inwardly when it is desired to remove the strip of staples by hand.

The forward portions of the members that provide the vertically extending guide-way for the plunger are cut away adjacent to the free ends of the springs G and H sufficient to permit the last staple of a strip to be forced forward by hand past the free ends g and h of the springs G and H.

The construction shown in Fig. 9 is similar to that described heretofore in connection with the construction shown in Figs. 1 to 8, but in the construction shown in Fig. 9 a bell crank feeding lever L is provided between the leaves b and b' for automatically feeding a strip so that a staple will be ready to be severed and driven each time the plunger assumes its raised position.

From an inspection of Fig. 9 of the drawing, it will be observed that the lug c'' on the plunger engages the projections l' l'' on the bell crank lever each time the plunger is raised and lowered so that as the plunger is raised and lowered the lower end of the bell crank lever automatically moves toward and from the plunger. This bell crank lever has secured to the lower portion thereof a spring or pawl M which is arranged to engage the staples in the staple strip in a manner to force the staple strip toward the vertically extending guide-way portion as the plunger assumes its raised position. This spring or pawl M is of such shape and has sufficient flexibility therein to permit it to slide over the staple strip, while the latter is being held against movement away from the path of the plunger by the spring or pawl h' which serves as a stop member.

As previously indicated, the stapling machine shown in connection with Figs. 1 to 8 is entirely hand fed, while in the stapling machine shown in Fig. 9 there is an automatic feeding to driving position of all staples, except the last staple of the strip.

An individual staple, as the last staple of a strip, will not drop through the outlet even when placed in position to be driven under the plunger, but will remain hanging on the shear blade until forced downwardly by the plunger. The staple which is located in position to be driven hangs on the shear blade due to an extension or projection, on the central part of the staple, resting on the end of the shear blade. It will be noted that the action of the springs or pawls G and H also prevents the tipping of the staple which is thus hanging on the end of the blade.

From what has preceded it will be manifest that the last staple of a staple strip or blank can be driven in a machine embodying the invention herein described. It will also be manifest from what has preceded that this last staple can be placed in position to be driven by hand and that it will remain in this position until it is forced downwardly by the driving plunger; and that the machine parts are constructed so as to prevent this last staple from turning in a manner to clog the outlet of the machine and thus prevent its operation. It will furthermore be observed that the last staple of the strip can be readily removed when desired by merely pressing toward each other—between the thumb and fingers—the springs or pawls on opposite sides of the horizontally extending guide-way member.

The plunger C is preferably made of a piece of bar metal and a projection or boss k is formed thereupon as by stamping. The plunger is also provided with a stamped handle or hand engaging portion n which is preferably welded to the upper end of the piece made of bar metal. The plunger is held in elevated or retracted position by the coiled compression spring P. The upward movement of the plunger is limited by the stop or projection k thereupon engaging the pin q which passes through the leaves b and b'.

It will be manifest that if desired the function of the pin q could be performed by a stop or projection formed upon one of the leaves b, b'. All of the main parts of the stapling machine are preferably made of stamped sheet steel and when the machine is made in the manner hereinbefore described there is provided a light, simple and strong construction.

The improvements herein set forth are not limited to the precise construction and arrangement shown and described, as they may be embodied in various forms and modifications without departing from the spirit and scope of the invention.

What I claim is:

1. A stapling machine having a base, a frame member pivotally mounted upon the base, and a driving plunger slidable in a vertically extending guide-way in the frame member, said frame member being provided with a shear blade which is arranged to cooperate with said plunger, said frame member also having a slotted portion for receiving a strip of staples, the shear blade and a part of said frame constituting a horizontally extending guide-way member for the staple strip when the latter is in the slotted portion of the frame, the guide-way member having secured thereupon a pawl having an end located adjacent to the path of movement of the plunger and in a position to prevent a turning of the staple under the plunger by engagement with a depending leg of said staple, the machine also having a second pawl or stop for engaging the staple which is located next to the staple that is under the plunger, the free ends of each of

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said pawls being movable laterally outwardly to staple engaging position.

2. A stapling machine embracing a staple supporting guide-way, a staple severing and staple driving plunger, and means for holding the staple blank or strip from movement away from the path of movement of the plunger, said means comprising pawls having the free ends thereof arranged adjacent to the path of movement of the plunger and in a position so as to move laterally outwardly so as to engage or to be engaged by the depending legs of the staple which is in position to be sheared and driven by the plunger; said means also comprising another pawl the free end of which is arranged to move laterally outwardly so as to engage or so as to be engaged by a depending leg of the staple which is next to the staple to be driven.

3. A stapling machine embracing an anvil, a staple supporting guideway member which extends horizontally, a staple severing and staple driving plunger, a frame providing a vertically extending guideway for the plunger, and springs secured to the staple supporting guideway member, which springs are so constructed and located that the staples in a strip of staples can pass over the springs toward the path of the plunger but the movement of a staple from its position in the path of the plunger will be prevented by the engagement of the free ends of the springs with the depending legs of said staples, said springs being arranged so that their free ends are movable laterally toward and from the staple guideway member, the frame being cut away adjacent to the staple supporting guideway member so that the last staple of the strip can be positioned by hand in the path of the plunger.

4. A stapling machine embracing therein a frame having a vertically extending guideway member, a horizontally extending staple supporting guide-way member, and a staple severing and staple driving plunger mounted in the vertically extending guideway member, said frame also having located upon the opposite sides of the staple supporting guide-way member a pair of horizontally extending springs or pawls the free ends of which are located adjacent to the path of movement of the vertical reciprocating plunger, which free ends are also located so as to prevent the turning of a staple which is in driving position below the plunger by engagement with the depending legs of the said staple, the frame of the machine being cut away adjacent to the delivery end of the vertically extending guideway in such manner that the last staple of a strip can be inserted in driving position below the plunger by hand; the machine also being constructed so that when lateral pressure is applied to said spring pawls the staple strip which is on the guide-way member can be removed as desired.

5. A stapling machine having a base, a frame member movably mounted upon the base, and a driving plunger, the frame member having a vertically extending guideway, in which guide-way the plunger slides, said frame member being provided with a shear blade which is arranged to coöperate with said plunger, said frame member also having a slotted portion for receiving a strip of staples, the shear blade and a part of said frame together providing a horizontally extending guide-way member for the staple strip when the latter is in the slotted portion of the frame, the guide-way member having secured thereto a pawl having an end located adjacent to the path of movement of the plunger and in a position to prevent a turning of the staple under the plunger by engagement with a depending leg of said staple, the machine also having a second pawl or stop for engaging the staple which is located next to the staple which is under the plunger, the second pawl or stop also being secured to said guide-way member and being so located as to engage between the depending legs of the second staple mentioned above and the staple next succeeding in the staple strip when the latter is in place upon the horizontally extending guide-way member.

6. A stapling machine embracing an anvil, a staple supporting guide-way member, a staple severing and staple driving plunger, a frame providing a guide-way for said plunger, and springs secured to the staple supporting guide-way member, which springs are constructed and located so that the staples in the strip of staples can pass over the springs toward the path of the plunger and so that movement of the staple from its position in the path of the plunger will be prevented by the free ends of the springs engaging the depending legs of the staples, the frame providing the guide-way for the plunger being cut away adjacent to the staple guide-way member so that the depending portions of the legs of the staple can be engaged by the hand and can be positioned by the hand in the path of the plunger.

7. A stapling machine embracing therein a frame having a vertically extending guideway, a horizontally extending staple supporting guide-way member, and a staple severing and staple driving plunger mounted in the vertically extending guide-way, said frame also having located on the opposite sides of the staple supporting guideway member a pair of horizontally extending pawls the free ends of which are located adjacent to the path of movement of the vertical-reciprocating plunger and which free ends tend to move laterally outwardly

to a position where they can engage the staples and which ends are located so as to prevent the turning of the staple which is below the plunger in position to be driven, the frame of the machine being cut away adjacent to the delivery end of the staple supporting guide-way member, the cut extending in such a manner that the depending portions of the legs of the last staple can be engaged by the hand and thereby the last staple can be placed in position to be driven below the plunger, the machine also being constructed so that when lateral inward pressure is applied to the pawls a staple strip which is on the guide-way can be removed by the hand of the operator, as desired.

8. A stapling machine embracing therein a frame having a vertically extending guide-way, a horizontally extending staple supporting guide-way member, and a staple severing and staple driving plunger mounted in the vertically extending guide-way, said frame also having upon opposite sides of the staple supporting guide-way member a pair of horizontally extending springs or pawls the free ends of which are located adjacent to the path of movement of the vertical-reciprocating plunger and over which free ends the staples pass while being moved to position where a staple can be driven by the plunger, said free ends being located so as to prevent the turning of a staple which is below the plunger in a position to be driven, the frame of the machine being cut away adjacent to the vertically extending guide-way and along the sides of the horizontally extending supporting guide-way member in such a manner that the last staple of a strip can be inserted by hand in driving position below the plunger, the machine also being constructed so that the nails of the fingers can apply pressure to the springs or pawls whereby the staple strip which is on the guide-way can be removed as desired.

9. A staple machine comprising in combination an anvil, a staple supporting guide-way member, a frame providing a guide-way for a plunger, a staple severing and staple driving plunger slidable in said guide-way in the frame, and pawls secured to the staple supporting guide-way member which pawls are constructed and located so that the staples in a strip of staples can pass over the free ends thereof toward the path of the plunger but so that movement of a staple from its position in the path of the plunger will be prevented by the free ends of said pawls engaging the depending staple legs, said pawls being arranged so that the ends thereof are movable laterally toward and from the staple supporting guide-way member, said frame being cut away adjacent to the staple supporting guide-way member so that the last staple of the strip can be positioned by hand in the path of the plunger.

This specification signed and witnessed this 12th day of May, A. D. 1915.

EDWIN T. GREENFIELD.

Signed in the presence of—

G. McGRANN,

EDWIN A. PACKARD.