

June 12, 1934.

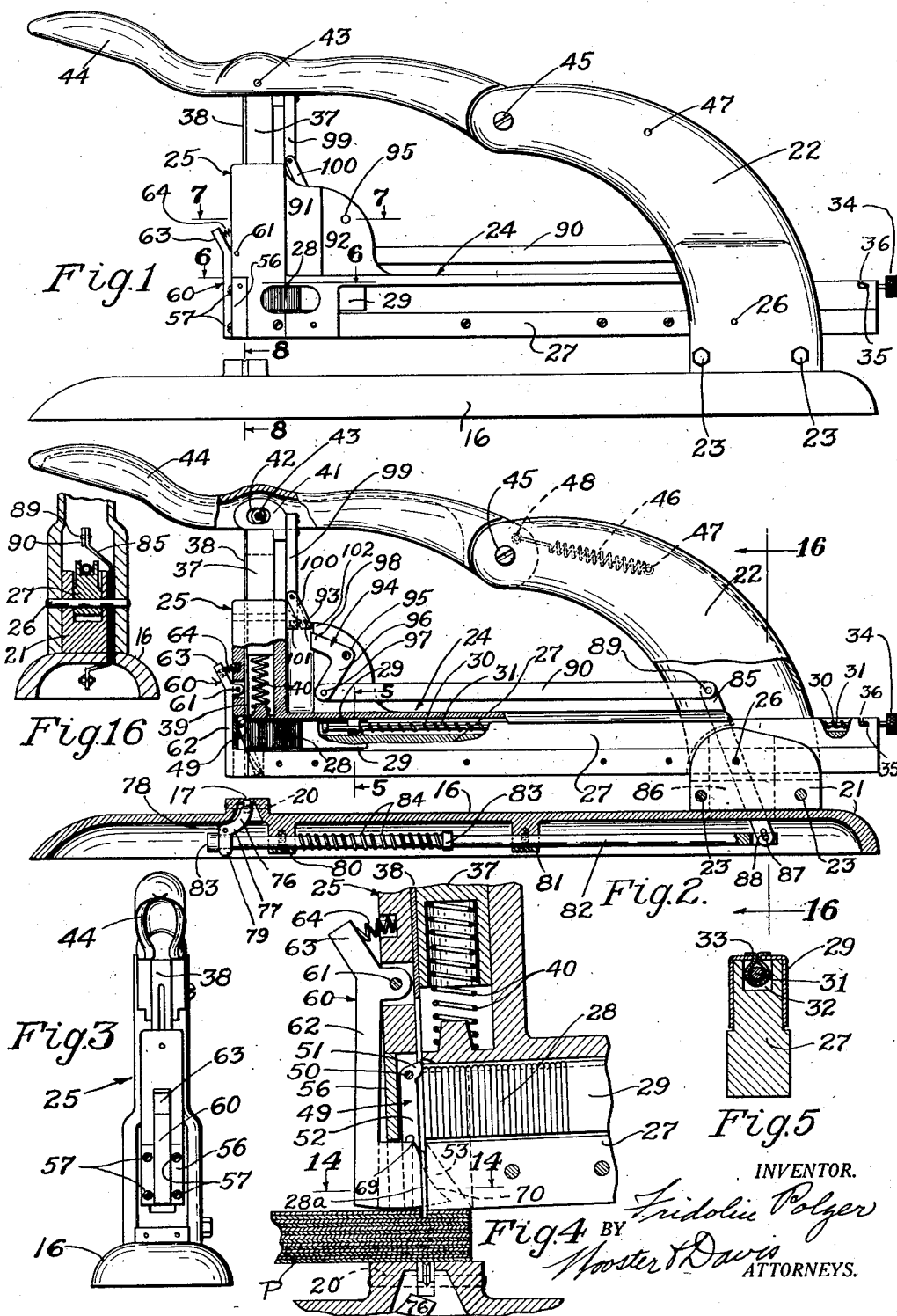
F. POLZER

1,962,874

STAPLE SETTING MACHINE

Filed Dec. 10, 1931

2 Sheets-Sheet 1



INVENTOR.

Fridolin Polzer

Fig. 4 BY

Hooster & Davis

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June 12, 1934.

F. POLZER

1,962,874

STAPLE SETTING MACHINE

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2 Sheets-Sheet 2

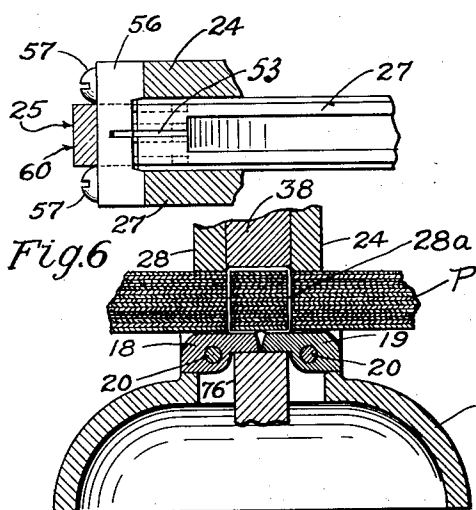


Fig. 6

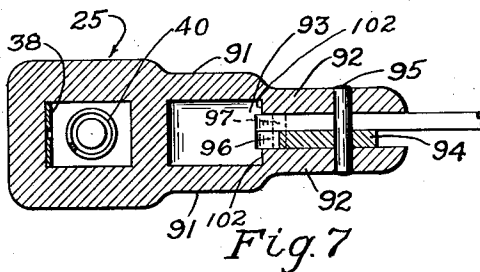


Fig. 7

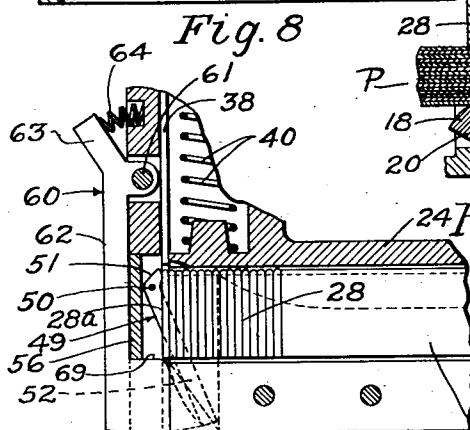


Fig. 8

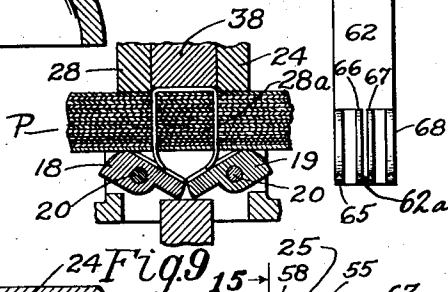


Fig. 9

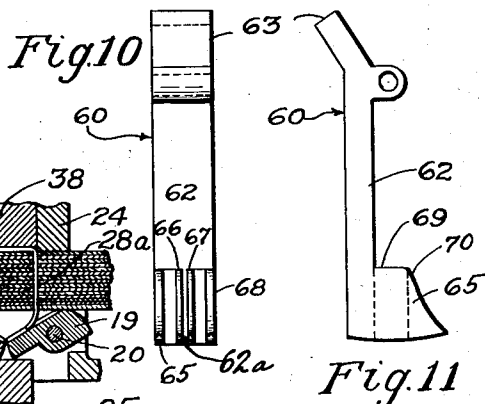


Fig. 10

Fig. 11

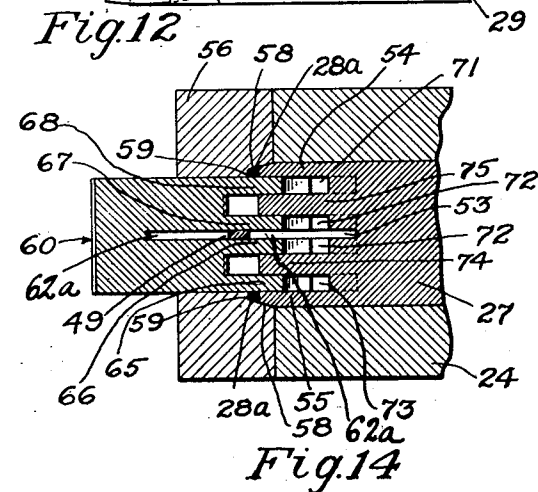


Fig. 12

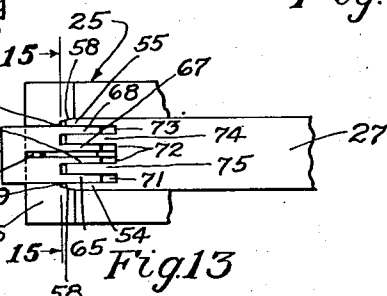


Fig. 13

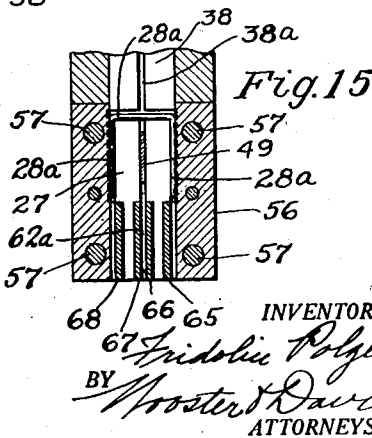


Fig. 14

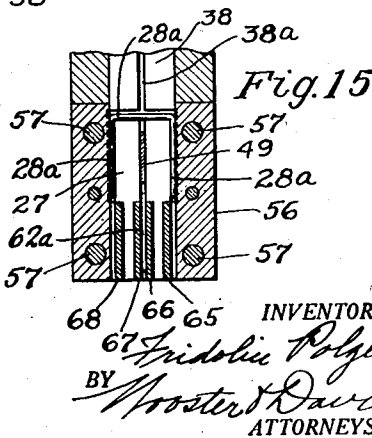


Fig. 15

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UNITED STATES PATENT OFFICE

1,962,874

STAPLE SETTING MACHINE

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Conn., a corporation of Connecticut

Application December 10, 1931, Serial No. 580,123

7 Claims. (Cl. 1—3)

This invention relates to new and useful improvements in staple setting machines.

An object of the invention is to provide a staple setting machine particularly adapted for setting relatively long staples, as for example, those used for securing together the pages of a book or the like.

Another object is to provide a staple setting machine including means whereby after a staple is driven, its end portions or prongs projecting below the articles to be secured are given a sharp or hammer-like blow to clinch them flat against the object through which the staple has been driven.

A further object is to provide a staple setting machine including a head having a raceway therein, means for feeding staples to the raceway, a plunger operating in the raceway to drive the staples, a support on the head and having a portion entering and forming part of the raceway so that the staple prongs are guided on all sides and prevented from buckling as they are driven by the plunger through the articles to be stapled so that long staples may be used, and said support movably mounted and adapted to have its said portion moved outwardly of the raceway by the connecting portion or cross bar of the staple as the staple is driven through the raceway.

Another object is to provide in combination with this means for guiding the staple prongs of long staples, means controlled by the staple in the raceway to prevent another staple entering the raceway until the first has been driven therefrom and thus prevent clogging of the machine.

An additional object is to provide a machine of the character stated and including means for driving a staple, an anvil mounted to recede as the staple is driven, and means to move the anvil to cause the same to deliver a hammer-like blow to the end portions or prongs of the driven staple whereby to clinch said portions or prongs against the object stapled, and particularly so that staples with relatively long prongs can be driven and properly clinched.

Yet another object is to provide a staple setting machine including a means to drive a staple, an anvil, means operated by the staple driving means and adapted to permit the anvil to recede as the staple is driven, and said means operated by the staple driving means adapted to cause the anvil to hammer the ends of the staple to clinch the same after the staple has been driven.

Other and additional objects and advantages will become apparent from a consideration of the

following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it will be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims to which claims reference should be had for a definition of the invention.

In the drawings:

Fig. 1 is a side elevational view of the complete staple setting machine of the present invention;

Fig. 2 is a view somewhat similar to Fig. 1, parts being broken away and other parts being shown in section to more clearly illustrate details of construction;

Fig. 3 is a front elevational view of the complete machine;

Fig. 4 is a vertical longitudinal sectional view on an enlarged scale through the forward portion of the machine showing the relative location of parts during the operation of driving a staple;

Fig. 5 is a detail sectional view on an enlarged scale, the same being taken substantially along the line 5—5 of Fig. 2;

Fig. 6 is a sectional view taken substantially along the line 6—6 of Fig. 1;

Fig. 7 is a sectional view taken along the line 7—7 of Fig. 1;

Fig. 8 is a sectional view along the line 8—8 of Fig. 1;

Fig. 9 is a view somewhat similar to Fig. 8 but showing the relative location of the parts during the operation of driving a staple;

Fig. 10 is a rear elevational view of the staple support alone;

Fig. 11 is a view at right angles to Fig. 10;

Fig. 12 is a view somewhat similar to Fig. 4 but showing the parts in their normal position;

Fig. 13 is a bottom plan view of the parts shown in Fig. 12;

Fig. 14 is a sectional view taken substantially along the line 14—14 of Fig. 4;

Fig. 15 is a sectional view substantially along the line 15—15 of Fig. 13; and

Fig. 16 is a detail section substantially on line 16—16 of Fig. 2.

Certain features of construction herein shown and described are the joint invention of myself and Roy E. Peterson and are specifically claimed in the co-pending application, Serial No. 580,122, filed December 10, 1931.

Referring in detail to the drawings as herein disclosed the improved staple setting machine includes a base 16 including or mounting an anvil 17 comprising parts 18 and 19 pivoted on the base as by the pins 20. Adjacent its rear end the base 16 carries a block or upstanding lug 21 to which is rigidly secured an upwardly and forwardly curving arm 22, the arm being adapted at its lower end to straddle the block 21, and being secured to the block as by bolts or rivets 23 passing through the lower portion of the arm and the block.

A housing 24 including a head 25 is disposed above the base 16 and toward its rear end is partially received in a notch in the block 21 and is pivotally mounted as on a cross pin 26. Within the longitudinally extending portion of the housing 24 there is arranged a guide bar 27 adapted to have a staple strip 28 disposed thereon.

Any suitable follower means may be provided for feeding the staple strip along the guide bar and the means here disclosed includes a follower head 29 straddling the guide bar and urged therealong as by a coil spring 30 arranged on a rod 31 extending through a longitudinal channel 32 in the guide bar. The head 29 of the follower includes a clip 33 surrounding the bar 31 and adapted to have one end of the spring bear against it whereby the follower head is urged forwardly along the guide bar. At its rear end portion the rod 31 includes a head or finger piece 34 and the rod also carries a cross pin 35 adapted to be engaged in a bayonet slot 36 in the housing whereby to secure the follower in place. As above suggested, this machine is not limited to this particular construction of follower as followers of other construction or different types of staple feeding devices might be used.

The head 25 of the housing is formed hollow to receive a vertically reciprocable member or plunger carrier 37 to the forward face of which is secured a plunger 38 adapted to operate in a raceway 39 in the head to drive staples. Arranged within the head and below the member 37 is a coil spring 40 adapted to resist movement of the member into the head and adapted to act to move the member upwardly in the head after each staple driving operation. The plunger 38, is of course, carried with the member 37 and it will be understood that the plunger is operated downwardly through the raceway 39 to cut the foremost staple from the strip 28 and drive it through the raceway and through the objects to be stapled and against the anvil 17.

At its upper end the member 37 is provided with a head-like portion 41 having an elongated slot 42 therein and through which slot extends a pin 43 adapted to connect the portion 41 with a hand member or lever 44 pivotally connected at its rear end as by the pivot 45 with the forward end portion of the upwardly and forwardly curved arm or bracket 22. A coil spring 46, preferably arranged within the arm 22, has one of its ends anchored to said arm as at 47, and has its other end connected with the hand lever 44 in eccentric relation to the pivot 45. It will therefore be apparent that the spring 46 normally acts to maintain the hand lever 44 in the elevated or normal position, in which it is shown in Figs. 1 and 2.

From the foregoing description the operation of the stapling machine will generally be understood. The follower mechanism described constantly urges the staple strip along the guide bar in the direction of the raceway 39 whereby the staples of the strip are fed one at a time to the

raceway, it being understood that the raceway is of a width to receive but the first staple on the strip. The papers or other material (P) to be stapled are disposed on the anvil portion of the base and the handle 44 is then operated downwardly about its pivot 45 to move the plunger downwardly through the raceway. During this movement the plunger operates to remove the first staple from the strip and drive said staple through the raceway and the object to be stapled and against the anvil. The springs 40 and 46 act to return the parts to normal position.

To prevent clogging of the machine, means are provided whereby a second staple may not enter the raceway until after the first staple to enter the raceway has been removed therefrom. This means is similar to that disclosed in my Patent Number 1,829,537, October 27, 1931. The means comprises a finger or dog 49 pivotally mounted as at 50 in a removable block 56 and having a relatively short arm or portion 51, and a relatively long arm or portion 52. The normal position of this means is as shown in Figs. 2 and 12, and here it will be noted that the forward staple 28a of the strip 28 has engaged the portion 51 of the dog and rocked the same about its pivot 50 in a manner to swing its lower end 52 into a notch 53 in the guide bar.

As the plunger is operated to drive a staple, the plunger moves the first staple of the strip downwardly through the raceway, and the cross bar or connecting portion of the staple engages the edge of portion 52 of the member 49 in a manner to rock said member from its position as shown in Figs. 2 and 12, to its position as shown in Fig. 4, whereby the staple and plunger may pass downwardly through the raceway. This movement of the dog 49 results in its portion 51 being swung across the raceway to engage the first staple on the strip remaining on the guide bar 27, and press the strip a short distance rearwardly along the guideway against the action of the follower and its spring, whereby the first staple on the strip may not enter the raceway. When the staple 28a shown as partially driven in Fig. 4 has been driven entirely out of the raceway and the plunger has returned to its normal position, the follower acting through the staple strip will return the member 49 to its normal position as shown in Figs. 2 and 12. In order that the finger or dog will not interfere with the plunger, the lower end portion of the plunger is bifurcated or has a vertical slot 38a (Fig. 15) leading upwardly from its lower end.

As above suggested, the present machine is particularly adapted for driving relatively long staples for stapling relatively thick work, such as a large number of pages or sheets of paper, and with this in mind means are provided for carefully guiding the staples through the raceway in a manner to prevent buckling of the legs of the staples while they are being forced through the articles. The inner surface or wall of the lower portion of the raceway or of that portion of the raceway through which the staples travel is defined by the forward end of the guide bar 27, and as we are here particularly concerned with the guiding of the legs or prongs of the staples the said surface or wall of the raceway may be said to be defined by the forward surfaces of the edge portions 54 and 55 of the guide bar. (See Figs. 13, 14 and 15.)

A member 56 secured to the forward face of the housing as by screws 57 carries the pivoted finger or dog 49, and this member 56 defines the

outer walls 58 of the lower portion of the raceway and is so shaped that the forward edge portions 54 and 55 of the guide bar enter partially into it as most clearly shown in Figs. 13 and 14.

Also, this member 56 defines the front wall or limit 59 of the lower portion of the raceway and it will thus be seen that three walls or sides of the lower portion of the raceway receiving the legs of the staples are defined by relatively immovable parts.

Means are provided to enter the raceway in a position to be straddled by a staple being driven therethrough whereby the legs or prongs of the staple will be guided on a fourth side and buckling of the legs in any direction will be prevented. This means comprises a support 60 pivoted on the forward portion of the housing as at 61, and having a depending portion 62 and an upwardly and outwardly inclined portion 63. A spring 64 is interposed between the said portion 63 and the forward face of the head 25 and this spring therefore normally acts to press the portion 62 of the support against the forward or outer face of the member 56.

The forward face of the member 56 stops short of the lower end of the head 25 and at its lower end on its inner surface the support 60 carries a portion or extension comprising spaced members 65, 66, 67 and 68 each having a short straight upper surface 69 and each having a forward curved surface 70. The members or projections 65, 66, 67 and 68 on the support 60 extend inwardly below the lower edge of the front portion of the member 56 and between the lower ends of the sides of said member as clearly shown in Figs. 4 and 12. These members 65 through 68 extend across the raceway and the forward end of the guide bar is notched or recessed as at 71 to receive the member 68, as at 72 to receive the members 66 and 67, and as at 73 to receive the member 65.

This notching of the forward end of the guide bar in addition to providing the side portions or extensions 54 and 55 above referred to, also provides portions 74 and 75, and it will be noted particularly with relation to Figs. 13 and 14 that the members 65 through 68 on the support fit rather snugly into the notches or recesses in the forward end of the guide bar whereby the support is guided in its movement on its pivot 61. Also, an inspection of these figures will show that the outer surfaces of the members 65 and 68 form a fourth side about the legs of the staple during the driving of the staple. That is, during the driving of the staple through the lower portion of the raceway the legs of the staple are within relatively small pockets or channels defined by the forward edges of the portions 54 and 55 of the guide bar, the walls 58 and 59 of the member 56 and the outer surfaces of the respective members 65 and 68 of the support 60.

From what has been said, and from an inspection of Figs. 12, 13 and 14, it will be apparent that in the normal positions of the parts the members 65 through 68 extend across the raceway to form the pocket-like portions for the reception of the legs of the staples as above described. However, it will be noted that the straight upper surfaces 69 of these members stop short of the raceway, (see Fig. 12) and that it is the curved forward surfaces 70 of the members which cross the raceway. Therefore, when the plunger is operated to drive a staple, the cross bar of the staple or the portion of the staple which connects the staple legs will

engage the curved surfaces of the members and force the same outwardly as the staple is driven downwardly.

The pivotal arrangement of the support 60 is such that the lower portion of the support may swing outwardly on the cross bar of the staple engaging the cam-like surfaces 70 of the members 65 through 68 during the downward movement of the staple. This is as suggested in Fig. 4, and here it will be noted that the portions or members are gradually moved rearwardly or outwardly as the staple progresses downwardly whereby the legs or prongs of the staple, or the portions of the legs of the staple remaining in the raceway are fully guided as long as they are in the raceway, being enclosed on four sides whereby the legs may not buckle in any direction. The legs of the staple are therefore prevented from buckling in any direction during the entire movement of the staple through the raceway and in addition to the fact that this prevents clogging of the raceway, it also provides for the driving of relatively long staples through relatively thick objects.

The space 62a between the inner pair of members 66 and 67 serves as a slot to accommodate the pivoted finger or dog 49 to guide this dog and prevent its being bent laterally out of position, and corresponds more or less with the notch or recess 53 in the forward end of the guide bar. When the plunger is released and returned to normal position by the springs 40 and 46 as above described the spring 64 acts to rock the support 60 about its pivot 61 to return the members 65 through 68 to their normal position extending across the raceway and entering the notches or recesses in the forward end of the guide bar 27.

As above described the parts 18 and 19 of the anvil are pivotally mounted at 20 and arranged below these parts is an arm 76 of a lever 77 pivoted to the base as at 78 and having a depending arm or portion 79. Slidably arranged in bearings 80 and 81 at the underside of the base 16 is a rod 82, the forward end of which includes a head or portion 83 adapted as will later appear, to, at the proper time, engage the depending arm 79 of the lever 77 and rock said lever about its pivot 78. Surrounding the rod 82 and arranged between the bearing 80 and a collar 83 on the rod is a coil spring 84, the function of which will later appear.

A lever 85 is pivoted intermediate its ends as by the pivot pin 26 before referred to, and this lever extends through a relatively wide slot 86 in the block 21 to one side of the housing 24 and through a similar slot in the upper wall of the base 16. At its lower end the lever 85 is pivotally connected with the rear or inner end of the rod 82 as by means of a pin 87 carried by the rod and passing through an elongated slot 88 in the lower end of the lever. At its upper end the lever is pivotally connected at 89 with the rear end of a forwardly extending bar 90 arranged above the housing 24.

The head 25 on the forward end of the housing 24 includes rearwardly extending spaced portions 91, the rear portions 92 of which (see Fig. 7) are off-set toward one another but spaced slightly apart whereby to provide a relatively deep substantially enclosed pocket or well 93. A bell-crank lever 94 is pivotally mounted between the portions 92 as on a pin 95 and to the arm 96 of this bell-crank lever is pivotally connected the forward end of the bar 90 as at 97. In the normal position of the parts as clearly shown in Fig.

2 the arm 98 of the bell-crank lever projects slightly forwardly into pocket 93.

5 Secured to the rear side of the head 41 of the plunger carrying member 38 is a plunger or upright 99, the lower end portion of which is adapted to move into the pocket 93 as the plunger is reciprocated in the driving of a staple. Adjacent the lower end of the upright 99 is pivoted a dog or pawl 100 and between this dog or pawl and the lower portion of the upright there is interposed a coil spring 101 the purpose of which is to normally maintain the lower or free end of the dog or pawl against the shoulders 102 defining one wall of the pocket 93 and beyond which project the end of the arm 98 of the bell-crank lever as most clearly shown in Fig. 2.

When the handle 44 is operated to depress the plunger and drive a staple the upright 99 and the pawl 100 are of course carried downwardly in the pocket 93. As these parts move downwardly the outer or free end of the dog or pawl engages the end of the arm 98 of the bell-crank lever and carries this end downwardly resulting in the bell-crank lever being rocked about its pivot 95 in a manner to cause its arm 96 to move rearwardly. Such movement of the bell-crank lever results in the bar 90 being reciprocated rearwardly whereby the lever 85 is rocked on its pivot 26 to throw its lower end forwardly and thereby slide the rod 82 forwardly in a manner to compress the spring 84 and carry the head or portion 83 of the rod away from the portion 79 of lever 77.

Therefore during the operation of driving a staple the parts 18 and 19 of the anvil may be rocked about their pivots 19 by the end portions of the staple and from the position shown in Fig. 8 to that shown in Fig. 9. The anvil then offers no resistance, or no appreciable resistance, to the passage of the remaining portions of the legs of the staple when the end portions have passed through the object being stapled and into engagement with the anvil. There is then no tendency of the legs of the staple to buckle due to their end portions engaging a fixed anvil.

45 As the plunger reaches the end of its stroke the bell-crank lever 94 has moved into such a position that the end of its arm 98 is between the portions 92 of the head and as the plunger completes its movement the pawl 100 is carried below this arm of the bell-crank and the compressed spring 84 is released to return the parts connected with it to their normal positions. That is, the rod 82 is thrown rearwardly and as this rod is thrown rearwardly its head or portion 83 strikes the depending portion 79 of lever 77 and throws the lever about its pivot to cause the arm 76 of the lever to force the parts 18 and 19 of the anvil upwardly, sharply, and have them deliver a hammer-like blow to the end portions of the legs of the staple.

This results in the staple being clinched against the object being stapled and moreover results in the end portions of the legs of the staple being flattened against said object. In the usual arrangement where a stationary anvil having two concave depressions is employed the ends of the staple are turned over but are not flattened against the object. With the present arrangement these said end portions of the staple are given a sharp and hammer-like blow and are absolutely flattened against the object through which the staple has been driven.

The movement of the rod 82 rearwardly on the expansion of the spring 84 as above described results in the lever 85 being rocked about its

pivot 26 to throw the bar 90 forwardly and return the bell-crank to its normal position. As the springs 40 and 46 act to return the handle 44 and plunger and associated parts to normal position the upright 99 and pawl 100 are of course carried upwardly and the pawl may pass the end of the arm 98 of the bell-crank since owing to its pivotal mounting and the spring 101 the pawl may pass by the end 98 of the bell-crank 94.

Fig. 8 shows the position of the parts after the spring 84 has acted to cause the parts of the anvil to hammer the end portion of the legs of the staple whereby to clinch said portions and flatten them against the object stapled.

From the foregoing description it will be apparent that the legs of the staples are each disposed in a relatively small pocket or channel and are held against buckling in any direction during their entire movement through the lower portion of the raceway. Therefore, it will be obvious that the machine of the present invention may be used to drive relatively long staples as through books or the like. Also, due to the hammer-like blow delivered to the end portions of the legs of the staple by the parts of the anvil after the staple has been driven through the object being bound, the said end portions will be clinched flat against the object as shown best in Fig. 8.

Having thus set forth the nature of my invention, what I claim is:

1. In a staple setting machine, a base, an anvil carried by said base, a housing including a head disposed above said anvil, a raceway in said head, means for feeding staples into the raceway, a plunger operable in the raceway to drive the staples, a support on the head and having a portion extending into the raceway to be positioned between the legs of the staple to form a guide and prevent said legs from buckling as the staple is driven, said portion having a vertical slot on the rear side, and a pivoted finger extending into said slot and operated by a staple in the raceway to hold back the staple strip, said support being movably mounted whereby said portion may be moved out of the raceway by engagement with the cross bar of the staple as the staple is driven through the raceway.

2. In a staple setting machine, a base, an anvil carried by said base, a housing including a head disposed above said anvil, a raceway in the head, means for feeding staples into the raceway, a plunger operable in the raceway to drive the staples, a pivoted finger operated by a staple in the raceway to hold back the staples, and a guide normally extending into the raceway and positioned to be straddled by a staple driven through the raceway whereby to co-operate with the walls of the raceway and prevent buckling of the legs of the staple, said guide straddling the finger, and said guide being adapted to be moved out of the raceway by engagement with the cross bar of the staple as the staple is moved through the raceway by the plunger.

3. In a staple setting machine, a base, an anvil carried by the base, a housing including a head disposed above said anvil, a raceway in the head, means for feeding staples into the raceway, a plunger operable in the raceway to drive the staples, a slotted support, means pivotally mounting the support on the head, said support having a portion normally extending into the raceway to occupy a position to be straddled by a staple driven by the plunger whereby the portion co-operates with the walls of the raceway to prevent buckling of the legs of the staple,

and a pivoted finger operated by a staple in the raceway to prevent following staples entering the raceway and guided in the slot in the support, said support being adapted to be rocked on its pivot and said portion moved out of the raceway by engagement between the cross bar of a staple and said portion as the staple is driven through the raceway.

4. In a staple setting machine, a base, an anvil carried by the base, a housing including a head disposed above the anvil, a raceway in the head, means for feeding staples into the raceway, a plunger operable in the raceway to drive the staples, a pivoted finger operated by a staple in the raceway to prevent forward feeding of the remaining staples, a guide normally extending into the raceway and positioned to be straddled by a staple driven through the raceway whereby to co-operate with the walls of the raceway and prevent buckling of the legs of the staple, said guide straddling the finger and forming a guide therefor, said guide adapted to be moved out of the raceway by engagement with the cross bar of the staple as the staple is moved through the raceway by the plunger, and spring means to return said guide to its normal position on the passage of the staple.

5. In a staple setting machine, a housing including a head, said head having a raceway therein, means for feeding staples into the raceway, a plunger operable in the raceway to drive the staples, a pivoted finger extending into the raceway and operated by a staple in the raceway to prevent following staples entering the raceway, a support, means pivotally mounting the support on the head, said support having a portion normally extending into the raceway to occupy a position to be straddled by a staple driven through the raceway whereby the portion co-operates with the walls of the raceway to prevent buckling of the legs of the staple, said support also forming a guide for the pivoted finger, said support adapted to be rocked on its pivot and said portion moved out of the raceway by engagement between the cross bar of a staple and said portion as the staple is driven through the raceway, and spring means to return said support to its normal position on the staple being driven.

6. In a staple setting machine, a base having an anvil, a housing above said base, said housing including a head, said head having a raceway therein above the anvil, a guide bar in said housing, a staple strip on said guide bar, a follower normally urging said staple strip in the direction of the raceway to feed the staples to the raceway, a plunger operable in the raceway to drive the staples, means mounted by the head and serving to prevent a second staple entering the raceway until the first staple to enter the same has been driven therefrom, and a guide normally extending into the raceway and positioned to be straddled by a staple driven through the raceway whereby to co-operate with the walls of the raceway and prevent buckling of the legs of the staple, said guide being adapted to be moved out of the raceway by engagement with the cross bar of the staple as the staple is moved through the raceway by the plunger.

7. In a staple setting machine, a base having an anvil, a housing above said base, said housing including a head, said head having a raceway therein above the anvil, a guide bar in said housing for a staple strip, a follower for normally urging said staple strip in the direction of the raceway to feed the staples to the raceway, a plunger operable in the raceway to drive the staples, a member secured to the head and forming a portion of a side of the raceway opposite the forward end of the guide bar, a pivoted dog carried by said member and serving to prevent a second staple entering the raceway until the first to enter the same has been driven therefrom, and a support pivoted to the head above said member, said support having a part extending through the lower portion of said member and across and forming part of the lower portion of the raceway, said part of the support being normally disposed to be straddled by a staple driven through the raceway whereby to co-operate with the other portions of the raceway and prevent buckling of the legs of the staple, and said support being adapted to be rocked on its pivot and said part moved out of its normal position due to engagement of said part by the cross bar of a staple being driven through the raceway.

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