Feb. 20, 1923. 1,446,107.

A. D. TIBBALS.

STAPLE SETTING IMPLEMENT.

FILED APR. 19, 1919. 2 SHEETS—SHEET 1.

Fig. 1

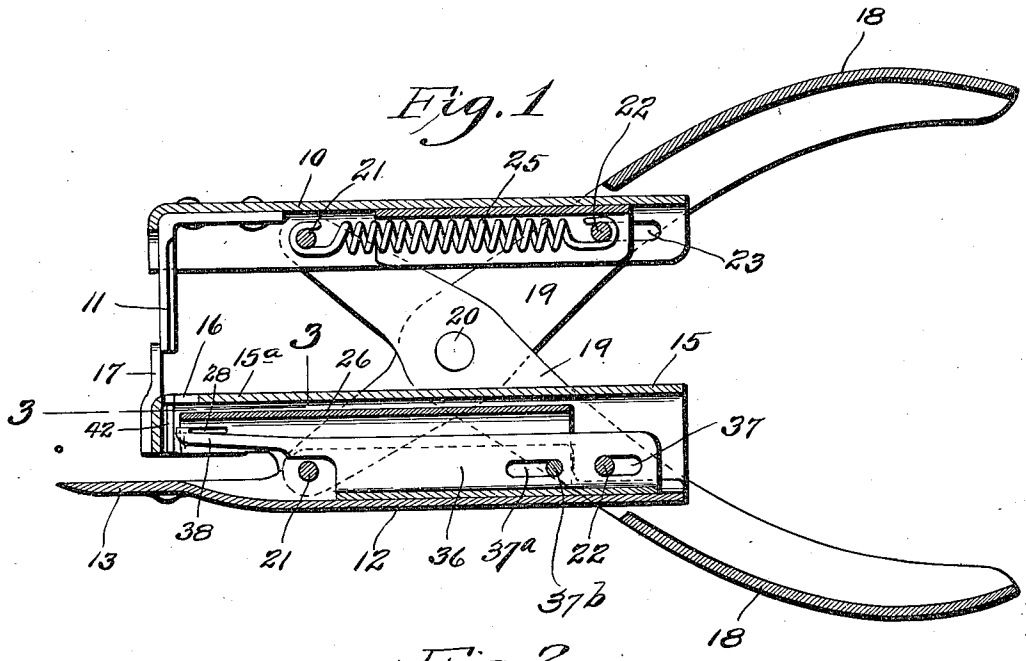


Fig. 2

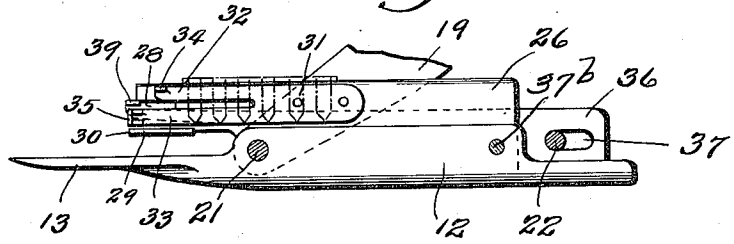


Fig. 3

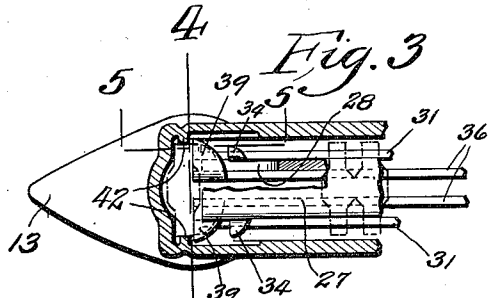


Fig. 4

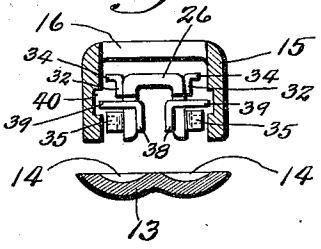
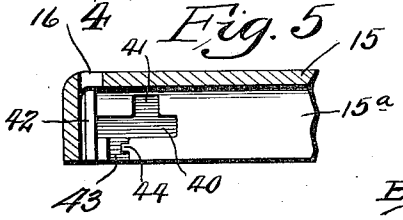


Fig. 5



Inventor

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By D. K. Cornwall. Atty.

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Fig. 6

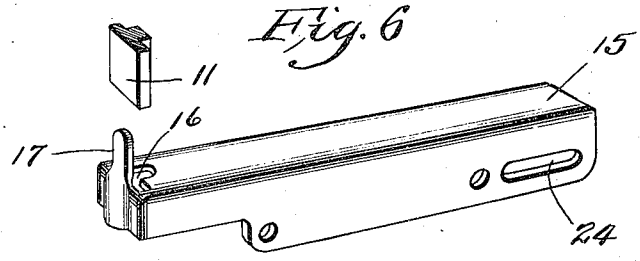


Fig. 7

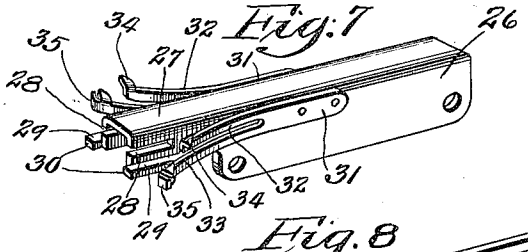


Fig. 8

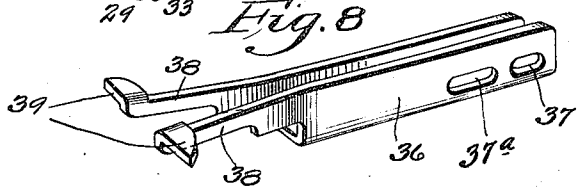


Fig. 14

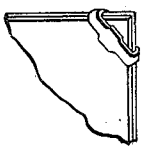


Fig. 9

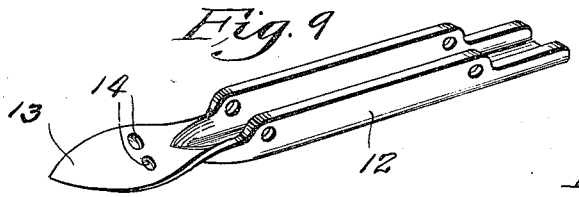


Fig. 13

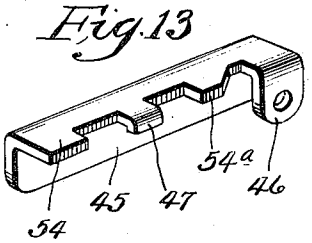


Fig. 10

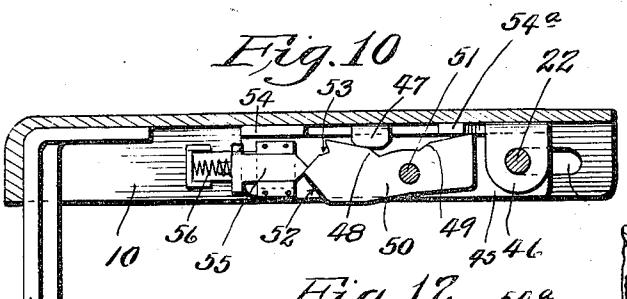


Fig. 11

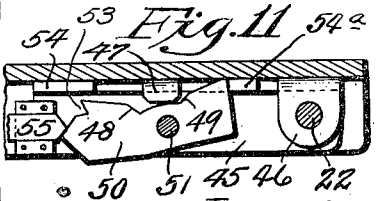
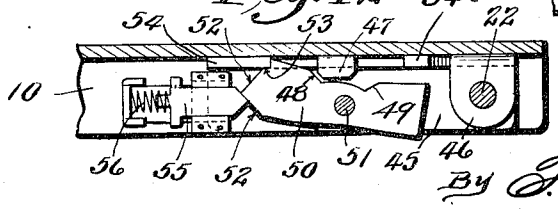


Fig. 12



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UNITED STATES PATENT OFFICE.

ALBERT D. TIBBALS, OF ST. LOUIS, MISSOURI.

STAPLE-SETTING IMPLEMENT.

Application filed April 19, 1919. Serial No. 291,201.

To all whom it may concern:

Be it known that I, ALBERT D. TIBBALS, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Staple-Setting Implements, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to new and useful improvements in staple setting tools, particularly of the type wherein a pair of substantially parallel jaws or members are moved toward one another by a pair of pivotally connected handles, one of said jaws or members carrying a strip of staples and the other jaw carrying a driving member or hammer which cooperates with an anvil to sever the outer end staple of the strip and drive or force the legs of said severed staple through one or more sheets of thin material such as paper, and clinch said legs by engagement with a relatively fixed part of the tool.

The principal objects of my invention are, to generally improve upon and simplify the construction of the existing types of staple setting tools; to provide a construction which will feed and drive the last staple of a strip, thereby eliminating the waste of staples and likewise the necessity for manufacturing staple strips with "blind" staples at its ends; to provide simple and efficient means for effecting a positive forward feeding movement of the strip of staples during the time the jaws of the device are moving away from each other; to provide simple means for guiding the severed staple while it is being forced downward toward and into engagement with the bayonet or puncturing member of the tool and which latter is effective in bending and clinching the ends of the legs of the staple; to provide a staple setting tool with a full stroke mechanism, that is, a mechanism which will make it imperative that the operator actuate the handles of the device so that the staple will be severed, driven and clinched before a succeeding severing, driving and clinching operation can be effected; and, further, to provide a staple setting implement which is relatively simple in construction and operation and very effective in performing its intended functions.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section taken lengthwise through the center of a staple setting tool of my improved construction.

Figure 2 is an elevational view of the lower jaw of the tool with the housing therefor removed in order to show the staple strip support and the staple feeding and guiding fingers.

Figure 3 is an enlarged horizontal section taken approximately on the line 3—3 of Figure 1.

Figure 4 is a cross section taken approximately on the line 4—4 of Figure 3.

Figure 5 is a detail vertical section taken approximately on the line 5—5 of Figure 3.

Figure 6 is a perspective view of the housing for the anvil or lower jaw of the device.

Figure 7 is a perspective view of the anvil member of the lower jaw and which anvil carries the staple guiding fingers and retaining springs.

Figure 8 is a perspective view of the member which cooperates with the anvil, and is effective in feeding the staple strip forwardly therethrough.

Figure 9 is a perspective view of the lower member of the lower jaw of the device and which member is provided with a bayonet or blade adapted to be forced through paper or the like.

Figure 10 is a vertical section of the upper jaw or punch carried by the tool and showing the full stroke mechanism arranged therein, the parts of said mechanism being in normal or neutral positions.

Figure 11 is a vertical section similar to Figure 10 and showing parts of the full stroke mechanism in position to lock the jaws and handles of the tools against opening movement after a partial closing movement.

Figure 12 is a vertical section similar to Figures 10 and 11 and showing parts of the full stroke mechanism in position to lock

the jaws and handles against closing movement after they have been partially opened.

Figure 13 is a perspective view of one of the actuating members of the full stroke mechanism.

Figure 14 is a perspective view of the corner portions of a pair of sheets temporarily fastened or secured to each other by a staple driven by my improved machine.

Referring by numerals to the accompanying drawings, 10 designates the upper jaw of the device, said jaw being of inverted U-shape in cross section and provided at its forward end with a depending hammer or staple severing and driving member 11. The lower jaw or member comprises a lower part 12, the main body portion of which is substantially U-shape in cross section, and formed integral with and projecting forwardly from the front end of this member is a horizontally disposed plate 13, the forward end of which is pointed and the side edges thereof being sharpened to form a bayonet or blade which is adapted to be forced through a sheet of paper or the like. Formed in the top of this plate or blade is a pair of recesses 14 into which the lower ends of the staples engage when driven, and said recesses being formed so as to deflect the ends of the legs of the staples inwardly and upwardly, thereby clinching the same against the underside of the sheet through which the staple is forced.

Secured in any suitable manner to member 12 is the upper member 15 of the lower jaw, said member being of inverted U-shape in cross section and combining with the lower member 12 to form a housing for the staple feeding, guiding and retaining means. The forward portion 15^a of housing member 15 overhangs the rear portion of blade 13 and formed in the top of the outer end of said overhanging portion 15^a is an aperture 16 through which driving member 11 passes during the staple severing and driving operation.

Formed integral with the outer end of overhanging portion 15^a is an upwardly projecting lip 17 which bears directly against the front face of staple driving member 11, thereby always closing the front portion of the opening between the jaws of the device and preventing the insertion of paper or the like between the lower jaw and the lower end of driving member 11.

The forward portions of a pair of handles 18 are bifurcated in order to form pairs of legs 19, the latter being pivotally connected at 20 and occupying positions to the sides of the upper and lower jaws of the device. The forward ends of the legs 19 are pivotally connected by means of pins 21 to the upper and lower jaws, and the rear portions of said legs carry transversely disposed pins 22, which latter operate in longitudinally disposed slots 23 and 24 which are formed in the rear portions of members 10 and 15, respectively.

Secured to the pin 21 which passes through the forward portion of member 10 and to the pin 22 which passes through slot 23, are the ends of a retractile spring 25 which acts to resist the movement of the rear portions of the handles toward each other, and consequently normally holds the jaws of the device apart.

Secured in any suitable manner between the lower member 12 and housing 15 is an anvil member 26 which is substantially of inverted U-shape in cross section, said member being provided at its forward end with an extension 27 which occupies the portion 15^a of the housing and overhangs the rear portion of plate or blade 13.

Formed in the side walls of this overhanging portion 27 are short longitudinally disposed slots 28 and formed on the lower edges of these side walls immediately below said slots are outwardly projecting longitudinally disposed flanges 29, the forward ends of which project slightly beyond the front end of the overhanging portion 27, thereby forming guiding fingers 30 which are effective in guiding the staple while the same is being forced downwardly onto blade or plate 13.

Secured to the upper portions of the side walls of anvil member 26 are the rear portions of flat springs 31, the forward portions thereof being slotted lengthwise to form an upper pair of staple retaining springs 32, and a lower pair of staple guiding springs 33. The springs 32 are slightly shorter than the springs 33 and their forward ends are provided with short outwardly projecting fingers 34. These fingers are adapted to engage behind the legs of the staple at the forward end of the strip on the anvil and retain said strip against rearward movement while the staple feeding means is moving rearwardly. The forward ends of the lower pair of springs 33 are provided with short outwardly projecting fingers 35 which are effective in cooperating with the guiding fingers 30 to guide the severed staple in its downward movement past the anvil, and at the same time, these last mentioned springs cooperate with the springs 32 in holding the staple strip against rearward movement while the feeding means is moving rearwardly.

Arranged to slide lengthwise between member 12 and anvil 26 is a substantially U-shaped member 36 through the rear portions of the side walls of which are formed relatively short slots 37, and which latter receive the pin 22 carried by the lower one of the handles 18. Formed through the walls of member 36 immediately in front of the slots 37 are longer slots 37^a and pass-

ing therethrough is a pin 37[b] which is seated in the side walls of member 12. These slots and pin are for the purpose of limiting the stroke or backward and forward movements of member 36 which carries the staple feeding arms and fingers. Projecting forwardly from the upper portions of the side walls of this member 36 is a pair of resilient arms 38 and projecting laterally from the forward ends of said arms are staple feeding fingers 39, which latter, during operation, move lengthwise through the slots 28 and between the forward portions of the staple retaining and guiding springs 32 and 33.

Formed in the inner faces of the side walls of the overhanging portion 15[a] and near the forward ends thereof are longitudinally disposed recesses 40 which accommodate the outer ends of the fingers 39 during their backward and forward movement, and these recesses are extended upwardly at points near their centers, as indicated by 41, in order to accommodate the outer ends of the retaining fingers 34.

Projecting inwardly from the side face of member 15[a] in front of the recesses 40 and directly below the ends of opening 16 are vertically disposed ribs 42 with which the outer faces of the legs of the staple frictionally engage while the same is in position to be severed and driven and while being driven and forced downwardly onto blade 13.

The forward portions of the recesses 40 are extended downward immediately to the rear of the ribs 42, as designated by 43, for the accomodation of the outer ends of the guiding fingers 35, and projecting into these recesses are lugs 44 which serve as bearings or supports for the lower ends of the legs of the second staple or that one immediately to the rear of the forward staple, and which latter is in position to be severed and driven.

The full stroke mechanism is arranged in the rear portion of upper jaw or member 10 and said mechanism includes a substantially inverted L-shaped member 45, the rear end of which is provided with a depending ear 46 which receives the upper one of the pins 22. Thus as the handles 18 are moved toward and away from each other, member 45 slides backward and forward within member 10.

Formed on the upper portion of member 45 and near the center thereof is a lug 47, the same being adapted to engage with a pair of oppositely disposed shoulders 48 and 49, on the upper edge of a locking pawl 50. This pawl is pivotally mounted on a pin 51 which is seated in member 10 and when said pawl is in normal or neutral position, and the jaws of the device in full open or full closed position, said pawl occupies the position illustrated in Figure 10. The front end of this pawl is provided with a pair of oppositely disposed beveled faces 52 and formed at the upper forward corner of said pawl is a notch 53. When the pawl 50 occupies the locking position, as illustrated in Figure 12, this notch 53 receives the rear end of lug 54 which projects laterally from the forward end of member 45.

Projecting outwardly from the upper portion of member 45 between lug 47 and ear 46 is a lug 54[a] against which the rear end of pawl 50 is adapted to engage to lock the jaws and handles against opening movement after having been partially closed. (See Fig. 11).

The beveled front edges of pawl 50 are adapted to cooperate with corresponding beveled edges formed on a locking dog 55, the latter being arranged for sliding movement in suitable bearings on the side wall of member 10 opposite the wall against which member 45 engages and said dog being normally forced toward said pawl by a small compression spring 56.

The operation of my improved stapling implement is as follows:

A strip of staples is inserted from the rear into housing 15 and moved forwardly over anvil 26 until the forward end of the forward staple is positioned even with the forward end of said anvil and with the rear edges of the legs of said forward staple engaged by the forward edges of retaining fingers 34. To bring this forward staple into position for the first stapling operation, it is necessary to make one complete operation of the device, that is, to fully close the jaws and then permit the same to return to their normal open positions. When this complete operation has been effected, the forward one of the staples will be brought into position immediately beneath opening 16 and in the path of travel of the hammer 11.

The sheets to be secured with a staple are now positioned between plate or blade 13 and the overhanging portion 15[a] of the housing 15 and the handles 18 are now forced toward each other to effect the staple severing and clinching operations.

As the handles are thus forced toward each other, punch or hammer 11 will bear against the top of the outer one of the staples and the inner lower edge of said punch or hammer will cooperate with the upper outer edge on the forward end of the portion 27 of the anvil to sever or cut said front staple from the next adjacent staple of the strip, and said severed staple will be forced downwardly so that its legs will pass through the sheets positioned on plate or blade 13 and the ends of the staples engaging in the recesses 14 will be turned inwardly and upwardly, thereby clinching said legs on the underside of the lowermost sheet

During the first part of the movement of

the handles 18 and jaws of the device toward each other, the lower one of pins 22 will travel through slots 37 in the rear portion of member 36 and during the latter portion of the movement of the handles toward each other, said pin will move member 36 and the feeding fingers carried thereby rearwardly between member 12 and housing 15, this rearward movement being such as to move the fingers 39 rearwardly past the legs of the staple immediately adjacent to the one which has just been severed and clinched so that at the end of the rearward movement of member 36, said fingers will spring outwardly immediately behind the legs of that staple which is now the forward staple of the strip.

As the handles 18 and jaws of the device move apart under the influence of retractile spring 25, the lower one of the pins 22 in its forward movement will move member 36 forwardly and the feeding fingers 39 bearing against the rear sides of the legs of the forward one of the staples of the strip will move said staple and the entire strip forwardly the distance of one staple so as to bring said forward staple into position immediately beneath opening 16 through which the hammer or punch 11 operates. During this forward feeding movement of the staple strip, the legs of the forward staple will move past the fingers 35 on the guide springs 33 and the second or next adjacent staple moves past the fingers 34 on the retaining springs 32. At the termination of the forward feeding movement, the legs of the forward one of the staples will be positioned immediately against the vertical ribs 42 on the inner faces of member 15ª and likewise said legs will bear directly against the lugs 35 on the forward ends of the guiding fingers 33. As a result, the forward one of the staples is held in proper position to be severed and driven on the next downward movement of the punch or hammer 11.

At the termination of the forward feeding movement of the staple strip, the fingers 34 on the forward ends of the retaining springs 32 will be positioned immediately behind the legs of the second staple or that one immediately to the rear of the forward staple and on the succeeding rearward movement of the feeding fingers 39, these retaining fingers 34 will be effective in preventing the staple strip from being carried rearwardly through friction and thereby displacing the forward one of the staples or the staple which is in position to be severed and driven.

During the latter portion of the forward feeding movement of the staple strip, the lower ends of the legs of the forward staple bear upon the lugs 44 projecting into the recesses 43 in part 15ª, and, as a result, the extreme lower ends of said legs are guided into position between the lower portions of the ribs 42. Consequently, the liability of the device becoming clogged due to any slight inaccuracies in the manufacture of the staples is reduced to a minimum.

Under normal conditions or when the device is fully opened, the pawl 50 occupies the position illustrated in Figure 10 with the forward end of locking dog 55 engaging on the upper one of the beveled edges 52, this position being the result of the engagement of lug 47 with shoulder 48 on said pawl. When the jaws are moved toward each other a sufficient distance to effect the severing of the forward one of the staples, the upper one of the pins 22 has moved member 45 rearwardly a sufficient distance to position the forward edge of lug 54 immediately to the rear of pawl 50 whereupon said pawl will be rocked slightly owing to the pressure exerted by dog 55 against the upper one of the beveled edges 52 on the forward end of said pawl, and as a result, the upper rear corner of the pawl will be moved upwardly in front of lug 54ª or into the position illustrated in Figure 11.

When so positioned, the device is locked against opening movement or movement of the jaws and handles away from each other, and thus before another severing operation can be effected it is necessary to continue the movement of the handles toward each other to effect the driving and the clinching of the staple which has just been severed. When the jaws have been moved to their full closed position, the lug 47 bears against shoulder 49, thereby bearing downward upon the rear end of the pawl and rocking the same so that the forward pointed end thereof moves upwardly or into a position where the upper one of the beveled faces on dog 55 bears against the lower one of the beveled faces 52 on the forward end of said pawl.

On the succeeding movement of the handles and jaws away from each other, member 45 will be moved forwardly and when the rear end of lug 54 moves beyond notch 53, the pressure of dog 55 against the lower end of the inclined faces 52 will rock said pawl so as to swing its forward end upwardly, thereby positioning notch immediately to the rear of lug 54, as illustrated in Figure 12. This action takes place when the jaws and handles are moved partly open and with the pawl so positioned, it will be impossible to move the handles and jaws toward each other until they have moved into their full open position.

Just prior to the time the handles and jaws reach their full open position, lug 47 will engage shoulder 48, thereby bearing downward upon the forward portion of the pawl to rock same and force its forward pointed end below the end of dog 55, where-

upon the parts will be restored to the positions illustrated in Figure 10. Thus by virtue of the full stroke mechanism just described, it is essential that the handles and jaws of the device must complete their full strokes in both directions to properly effect the staple feeding, severing, and driving operations.

In the event that it is desired to effect a temporary fastening of two or more sheets of paper with a staple, the handles can be moved partially toward each other to sever the forward one of the staples of the strip and after the corners of the sheets have been brought together, as illustrated in Figure 14, and the corners of said sheets placed on the plate 13, the device can be further actuated to drive said staple and clinch the legs thereof around the edges of the sheets adjacent to the corner. This manner of temporarily fastening is particularly desirable where checks, leaflets or the like are attached to a letter of transmittal.

One of the particular features of my invention is the staple feeding and retaining means, for by the employment of such means it is possible to utilize all the staples of a strip and this being the case, it is not necessary to provide staple strips with blind staples at their ends and which latter provision entails a waste of material.

A staple setting tool of my improved construction is comparatively simple, positive in operation, is economical by virtue of the fact that the device is effective in setting all of the staples of a strip, and the various operating parts of the device handle the strip of staples in the machine so that it is practically impossible for said staples to clog while being fed through the device and while they are being severed and driven.

It will be readily understood that minor changes in the size, form and construction of the various parts of my improved staple setting tool can be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim:

1. In a staple setting tool, an inverted U-shaped housing, a blade extending forwardly therefrom and secured between the legs thereof, an inverted U-shaped anvil nested in said housing and forming a guideway for a strip of staples, a staple feeding mechanism mounted for operation in said anvil, and a handle having a slot and pin connection with said mechanism.

2. In a staple setting tool, a pair of parallel jaws, each of inverted U-shape, handles pivotally connected together and pivotally connected to said jaws at their forward ends, said handles having a slot and pin connection with said jaws behind the pivotal connection between the handles, a contractile spring arranged within one of said jaws and connected to one of said handles, the energies of said spring being directed to hold said jaws open and staple feeding mechanism arranged within the other of said jaws.

3. In a staple setting tool, a support for a strip of staples, means for moving the strip of staples upon said support, said means including a pair of spring arms provided at their free ends with laterally projecting staple leg engaging fingers, means for holding the strip of staples against reverse movement upon said support, which holding means includes a pair of resilient arms provided at their free ends with laterally projecting staple leg engaging fingers, and a pair of resilient arms fixed to said support and provided at their free ends with laterally projecting fingers for yieldingly engaging and holding the forward one of the staples of the strip in position to be severed and driven.

4. In a staple setting tool, a pair of jaws, a housing forming a part of one of said jaws, said housing being provided with an opening, staple severing and driving means carried by the other jaw and adapted to pass through said opening, means for feeding a staple into position beneath said opening, and inwardly projecting vertically disposed ribs on the housing at the sides of said opening which ribs are adapted to be frictionally engaged by the legs of the staple while the same is positioned beneath said opening and in the path of travel of the severing and driving means.

5. In a staple setting tool, a pair of jaws, handles cooperating with said jaws for moving the same toward and away from each other, staple strip feeding means carried by one of said jaws, staple severing and driving means carried by the other jaw, and means carried by one of said jaws and actuated by the movement of the jaws toward and away from each other for locking said jaws against movement toward and away from each other after a partial movement toward or away from each other has been effected.

6. In a staple setting tool, a pair of jaws, handles cooperating with said jaws for moving the same toward and away from each other, staple strip feeding means carried by one of said jaws, staple severing and driving means carried by the other jaw, and means carried by one of said jaws and actuated by the movement of the jaws toward each other for locking said jaws against movement away from each other until said jaws have made their full stroke or movement toward each other.

7. In a staple setting tool, a pair of jaws, handles cooperating with said jaws for

moving the same toward and away from each other, staple strip feeding means carried by one of said jaws, staple severing and driving means carried by the other jaw, and means carried by one of said jaws and actuated by the movement of the jaws away from each other for locking said jaws against movement toward each other until said jaws have completed their full stroke or movement away from each other.

8. In a staple setting tool, a pair of jaws, handles for moving said jaws toward and away from each other, a staple strip support carried by one of said jaws, means for moving a strip of staples forwardly upon said support, staple severing and driving means carried by the other jaw, and means carried by said last mentioned jaw and operable by the movement of the jaws toward and away from each other for locking said jaws against movement away from each other until they have completed their full stroke toward each other and also locking said jaws against movement towards each other until they have completed their full stroke away from each other.

9. In a staple setting tool, a support for a strip of staples, means for feeding a strip of staples upon said support, said feeding means including a pair of resilient arms provided at their free ends with laterally projecting staple leg engaging fingers, resilient arms on said support, staple retaining fingers projecting laterally from the free ends of said arms, a second pair of resilient arms on said support, staple guiding members projecting laterally from the free ends of said second pair of arms, and a combined severing and driving member arranged to move across the end of said support.

10. In a staple setting tool, a support for a strip of staples, a pair of resilient arms on said support, portions of which arms project laterally to form staple retaining means, a second pair of resilient arms on said support, staple guiding means projecting laterally from the free ends of said second pair of arms, and staple feeding means arranged for reciprocatory movement between said pair of arms, said staple feeding means including a pair of resilient arms, and staple leg engaging fingers projecting laterally from the free ends thereof.

11. In a staple setting tool, a pair of jaws, handles for actuating said jaws, a staple driving member carried by one of said jaws, means on the other jaw for feeding a single staple into position to be engaged by said driving member, and inwardly projecting vertically disposed ribs on said last mentioned jaw for engaging and retaining said staple in position until engaged and driven by said driving member.

12. In a staple setting tool, a pair of jaws, means for operating the same, a staple support carried by one of said jaws, means for feeding a staple forwardly and to a point beyond the end of said support, resilient means on said support and rigid means on one of the jaws for engaging and retaining the staple in position after being moved forwardly, and means on the other jaw for driving said staple.

13. In a staple setting tool, a support for staples, means for feeding a staple over said support, a housing for said support and feeding means, and resilient means on the support and vertically disposed ribs on said housing which ribs cooperate with said resilient means for retaining a staple in position to be driven after it has been fed beyond the forward end of the support.

14. In a staple setting tool, a support for staples, means for feeding a staple over said support, a housing for said support and feeding means, and vertically disposed inwardly projecting means formed on the inner faces of the side walls of the housing with which ribs the legs of the staple are adapted to engage to retain the staple in position to be driven after it has been engaged and moved forwardly by the feeding means.

15. In a staple setting tool, a pair of jaws adapted to move toward and away from each other, a staple support within one of said jaws, a staple driving member carried by the other jaw, means for feeding a staple forwardly upon the support, yielding means adapted to engage the legs of the staple to prevent rearward movement thereof upon the support, resilient means carried by the support for engaging the legs of the staple and hold the same in position to be driven, rigid means on the support against which the legs of the staple are adapted to engage while in position to be driven, and rigid means on the jaw in which the support is positioned against which the legs of the staple are adapted to engage while in position to be driven and while being driven.

In testimony whereof I hereunto affix my signature this 16th day of April, 1919.

ALBERT D. TIBBALS.