

2,714,209

2 Sheets-Sheet 1



Fig. 1.

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CLOSURE MEANS FOR STAPLE DRIVEWAY

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2 Sheets-Sheet 2

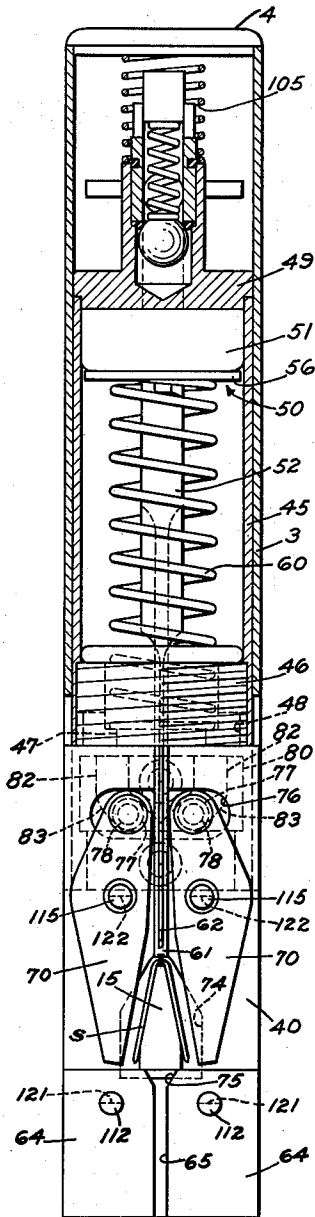


Fig. 2.

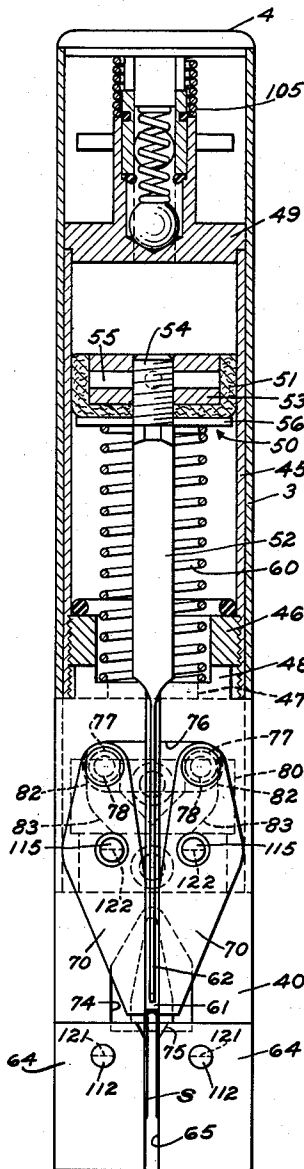


Fig. 3.

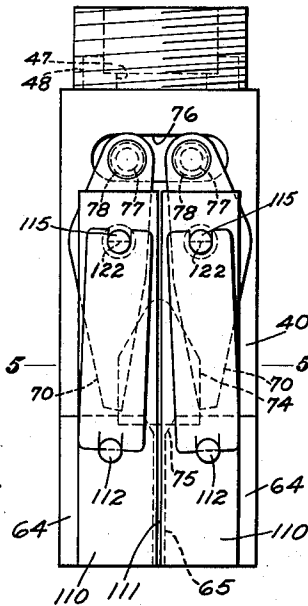


Fig. 4.

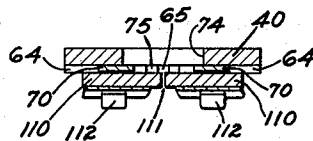


Fig. 5.

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CLOSURE MEANS FOR STAPLE DRIVEWAY

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7 Claims. (Cl. 1—48)

This application is a division of United States application for patent, Serial No. 298,055, filed July 10, 1952. The present invention relates to fastener-applying or stapling implements for use in applying a particular type of staple to different kinds of work and consists more particularly of improvements in the means for mounting the bender-levers which preform the staples before they are driven into the work.

One object of the invention is to provide an implement for preforming and driving staples of inverted V-shape for use in attaching upholstery fabrics to furniture, fastening plywood and other sheet-materials to different articles and for many other uses with various kinds of materials.

A particular object of the invention is to provide an improved mounting for the bender-levers so constructed and arranged that their retaining means may be readily removed and the parts exposed for clearing the throat through which the staples are driven when the machine becomes clogged and prevented from operation.

Another object is to provide a form of construction by which the parts of the mounting may be easily and quickly reassembled after the throat has been cleared of an obstruction.

The invention is herein described as embodied in a preferred form of construction, by way of example, as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a vertical sectional view of the complete implement;

Fig. 2 is an enlarged vertical sectional view showing the operating parts of the device in normal relationship prior to preforming a staple and driving it into the work;

Fig. 3 is a similar view showing the piston of the device as being operated by fluid-pressure to drive the staple into the work;

Fig. 4 is a partial front elevational view of the present improved mounting for the bender-levers showing the parts in assembled relationship;

Fig. 5 is a transverse sectional view of the same on line 5—5 of Fig. 4; and

Fig. 6 is a composite perspective view showing the several parts of the mounting for the bender-levers in disassembled relationship to provide for clearing the staple-throat when it becomes clogged.

As fully described in the application from which the present one is divided, the improved machine is controlled manually and operated by a pneumatically-reciprocated piston for driving the fasteners or staples into the work. It differs from the construction and arrangement of standard machines in that it is adapted for driving staples of peculiar form, for example, of inverted V-shape, and embodies means for initially bending the legs of the staple into parallel relationship so that they may be driven straight into the work.

The present improvement provides a pair of opposite pivoted levers actuated to engage the legs of the staples to bend them toward each other into parallel relationship

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and thereafter rigidly guide them down into the relatively narrow throat through which they are driven.

Referring now to the drawings, the present stapling implement in general comprises two main elements, namely a horizontal magazine 2 for holding a supply of staples in stick form and a vertical cylinder 3 at the forward end of the magazine in which the mechanism for preforming and driving the staples is contained. The cylinder 3 is provided with a closed top 4 for receiving the palm of the hand by which it is forced downwardly for initially severing the staple from the stick or refill and preforming its legs. The magazine 2 is generally of conventional form comprising a U-shaped or trough-like member having vertical sides 6 and an integral bottom 7.

Extending longitudinally within the hollow magazine 2 is a core 15 for slidably supporting the staples *s* in straddled relation thereon to adapt them to be fed forwardly to the staple-driving means. Supported on the core 15 is a staple-pusher 20 formed substantially to the shape of the staples *s* with side strips 21 adapted to overlie the inclined sides of the core 15 to slide thereon. Helical springs 25 extending longitudinally on opposite sides of the core 15 have their forward ends engaging the pusher 20 with their rearward ends held by a cross-strip 26 abutting a transverse pin 27 projecting across the wider portion of the interior of the magazine 2. Through this arrangement the staple-pusher 20 is adapted to be resiliently advanced along the core 15 to feed the staples *s* forwardly for delivering them singly to the staple-driving means.

The forward end of the magazine 2 is mounted in a U-shaped stirrup 37 having its sides and bottom welded thereto and fastened to a vertical plate 40 forming the standard for mounting the cylinder 3 at the front of the magazine. The cylinder 3 is supported from the interior by its walls slidably engaging the periphery of an inner cylinder 45 which forms an air-chamber containing the pneumatically-operated piston for reciprocating the staple-driver. As shown in Fig. 1, the lower end of the cylinder 45 is screwed onto a cup-shaped hub or bearing element 46. The lower portion of the hub-like bearing 46 has a circular axial opening at 47 and suitable lugs 48 at the top of the plate 40 project into slots in the annular rim of the opening and are welded thereto to rigidly support the bearing. The upper end of the cylinder 45 is supported on a cylindrical member 49 with the rim of the cylinder fitted to an external recess therein, the outer cylinder 3 enclosing this latter element and being adapted to slide vertically thereon. The member 49 is formed to provide an air-ingress and valve-means for controlling the pneumatic pressure for sliding the piston 50 which operates the staple-driver.

The piston 50 may be provided with a cup-shaped head 51 mounted at the upper end of a plunger which is formed as, or has attached thereto, a driver 52 for applying the staples to the work. As shown in Fig. 1, the piston head 51 may be constructed of flexible material surrounding a cylindrical metal filler-piece or disk 53 screwed onto a threaded stud 54 at the upper end of the driver 52 and locked in place by a transverse pin 55 inserted therethrough. A disk or washer 56 held on the stud 54 against a shoulder at the upper end of the driver 52 supports the head 51. Referring to Fig. 1, a helical spring 60 seated in a recess in the bearing member 46 surrounds the driver 52 with its upper end bearing against the washer 56 to normally maintain the piston 50 raised in the position represented in Figs. 1 and 2. As herein shown, the piston 50 is of maximum thickness towards its upper end and therebelow is reduced on its sides to form a T-shaped section constituting the staple-driver 52. This portion of the piston 50 forming the staple-driver 52 is shaped with a relatively thin section

61 engageable at its end with the head of a staple and a central projecting flange 62 for guiding the driver in its downward stroke in the throat through which the staple is driven.

It will be noted by reference to Fig. 1 that the standard or plate 40 extends down below the bottom of the magazine 2 to provide a foot or rest adapted to be placed against the work when applying the staples thereto. Secured fast on the front of the plate 40 are two metal strips or smaller plates 64, see Figs. 2 and 6, which have their opposed edges spaced apart to form a vertical slot 65 for receiving the wider portion 61 of the staple-driver 52 while also providing a throat through which the staples are driven. The plates 64 may be welded or otherwise fixedly secured to the front of the plate or standard 40.

The plate 40 serves as the mounting for the flat bender-levers 70 which are shaped with their widest portions at the approximate center and tapered toward both ends. The bender-levers are pivotally mounted at their centers on the plate 40 by means of studs 115 to be later described. The plate 40 is formed with an opening 74 above the throat 65 through which the end of the staple core or rail 15 projects, see Fig. 2. Preferably the upper end of the throat 65 is beveled on its sides to form a reentrant opening 75 for receiving and guiding the ends of the legs of the staple after they have been bent toward each other as shown in Fig. 3. The plate 40 also has an elongate slot or opening 76 opposite the upper ends of the bender-levers 70 adapted to receive a pair of rollers 77 which are journaled on studs 78 projecting rearwardly from the levers, see Fig. 6. The rollers 77 are employed for rocking the bender-levers 70 by the action of a cam 80 shown in Fig. 1. The cam 80 is fitted within the lower end of the cylinder 3 and secured fast to the wall thereof by screws 81 or other suitable means.

The forward portion of the cam 80 is formed with parallel vertical slots 82 at the top and oppositely-inclined angular portions 83 at the bottom as shown by dotted lines in Fig. 3. The rollers 77 on the studs 78 of the levers 70 normally engage in the lower inclined portions 83 of the slots as indicated in Fig. 2 to maintain the levers positioned with their lower arms inclined away from each other to clear a space for the staples *s* to enter therethrough as they feed off from the end of the core 15 above the throat 65. When the cylinder 3 is slid downwardly the rollers 77 are forced outwardly in the inclined portions 83 of the slots in the cam 80 to enter the vertical portions 82 as shown in Fig. 3, whereby to swing the lower arms of the levers 70 toward each other with their opposed edges impinging against the legs of a staple *s* to bend the legs into parallel relationship. During this operation of the bender-levers 70 the foremost staple fed off from the core 15 is separated from the staple-stick by a shearing action of its legs.

Application of pneumatic force to the piston 50 is effected by the final downward movement of the cylinder 3 which acts to open the valve for the ingress of air to the upper part of the cylinder 45 by means described in my prior application above referred to. Suffice it to state herein that one side of the cylinder 3 is provided with a slotted opening 106, shown in Fig. 1, to accommodate a suitable nipple (not shown) screwed into the threaded opening 85 in the side of the valve-member 49 and connected to a hose communicating with a source of compressed air or other fluid-pressure.

The perspective view of Fig. 6 illustrates the parts of the present improved construction of the throat at the front of the plate or standard 40 and the mounting for the bender-levers 70. The plate 40 is constructed to receive a pair of overlying strips or rectangular plates 110 arranged with their opposed edges spaced apart and overlying the sides of the throat 65 to provide a narrower slot 111 for the flange 62 on the driver 52 to slide therein, see Fig. 4. A pair of studs or pins 112 project

from the front of the plates 64 on the plate 40 and engage through holes 113 in the plates 110. A second pair of studs 115 project from the front of the plate 40 above and in alignment with the studs 112 with their ends engaging through holes 116 in the plates 110. The upper set of studs 115 have enlarged shouldered portions 117 abutting the front face of the plate 40 and adapted to engage through holes 120 in the levers 70 to provide pivotal bearings therefor. As shown in Fig. 6, the lower pins 112 are formed on the top with transverse slots 121, while the upper pins 115 have similar slots 122 cut through their under sides, these slots in the two sets of pins providing means for fastening the plates 110 in place.

After the levers 70 have been seated on the bearing portions 117 of the studs 115 with the rollers 77 on their studs 78 engaged in the slots of the cam 80 the pair of relatively long rectangular plates 110, see Figs. 4 and 6, are placed over the assembly for holding the levers 70 in position. The plates 110 overlie the fixed plates 64 on the plate 40 and provide means for holding the levers 71 in place on their pivot-studs 115 between the front face of the plate 40 and the rearward faces of the plates 110.

The plates 110 are held in place at the front of the plate 40 by a pair of relatively flat leaf-springs 125 having their ends engageable with the slots 121 and 122 in the respective studs 112 and 115. The upper end of each spring 125 is formed with a rectangular notch 126 while the bottom end is slitted to form a tab 127 bent inwardly at a slight angle, these portions of the springs being used for frictionally engaging the slots 121 and 122 in the pins 112 and 115, respectively. After the plates 110 have been placed in position with the pins 112 and 115 projecting through the holes 113 and 116 therein each spring 125 is snapped into place by first engaging its slotted upper position 126 with the slot 122 in the pin 115 and then by sliding the lower end of the spring laterally the inclined tab 127 can be slid into the slot 121 of the lower pin 112 to provide a firm connection between the parts; it being noted by reference to Fig. 6 that the springs 125 are bowed at the center to adapt them to bear against the face of the plates 110 with considerable pressure. By means of this improved form of construction the front plates 110 may be easily disassembled to expose the staple-throat 65 so that any dirt or particles of adhesive lodged therein can be cleaned therefrom or, in case the staple becomes jammed in the opening, the throat can be readily cleared from the obstruction; whereafter the parts may be quickly and conveniently reassembled.

The method of operation of the improved device is explained as follows: The implement is first connected to a source of fluid-pressure, for example compressed air, through the means of the hose, previously mentioned as connected by a nipple in the threaded inlet 85 in the valve member 49. Normally, air-pressure in the air-chamber at the top of the cylinder 45 will maintain the valve closed as explained in my prior application hereinbefore referred to. The parts of the device will then be in the position illustrated in Figs. 1 and 2 with the cylinder 3 raised on the cylinder 45 under the tension of the spring 105; it being understood that the magazine 2 has been filled with staples *s* placed in straddled relationship on the core 15. With the magazine 2 loaded the springs 25 act to slide the pusher 20 forwardly to advance the staples *s* into position with the foremost one abutting the rearward face of the plates 110 above the throat 65 at the bottom of the plate 40.

The operator may operate the implement with one hand by grasping the cylinder 3 and placing the foot at the bottom of the plate 40 against the work to be stapled. Manual pressure is then applied to the cylinder 3 to slide it downwardly on the cylinder 45. The cam 80 at the lower end of the cylinder 3 will thus be moved down-

wardly to cause the rollers 77 on the bender-levers 70 to ride upwardly in the inclined portions 83 of the cam-slots, see Fig. 3, to enter the vertical portions 82 of the slots where they dwell to hold the levers operative as the staple is driven down into the throat 65. The cam 80 acts on the rollers 77 to cam the upper ends of the levers 70 apart, thereby causing them to rock on their pivots 115 and swing their lower arms toward each other. The lower arms of the levers 70 are thus brought together to engage against the divergent legs of the staples *s* and bend the legs into parallel relationship, thereby preforming the staple for driving it down through the throat 65. This method of bending the legs of the staple into parallel relationship breaks the film of adhesive attaching it to the stick, thereby separating the foremost staple therefrom and holding it rigidly both at the sides, front and rear while driving it down through the throat 65 as the staple-driver 52, driven by the piston 50, descends therein. After the staple *s* has first been separated from the stick and preformed in the manner above explained, it is held rigidly between the solid end of the core 15 and the rearward faces of the plates 110 with its bent legs also rigidly supported by the bender levers as it is driven by the descent of the driver 52. As the cylinder 3 is depressed it operates to open the air-valve for applying pressure to the piston 50. The piston 50 is thus driven downwardly with a quick sharp action to slide the driver 52 downwardly, whereby its lower end engages the top of the staple *s* to drive the latter down through the throat 65 and into the work. It will be understood that the downward stroke of the driver 52 is of sufficient extent to cause it to pass clear to the end of the throat 65 to drive the staple outwardly therefrom and set it in the work.

After a staple has been driven in to the work in the manner explained above, manual pressure on the upper end of the cylinder 3 is released, thereby permitting the spring 60 to slide the cylinder upwardly. As the cylinder 3 rises it operates to close the air-valve in the manner explained in the prior application referred to above. The pressure on the head 51 of the piston 50 will therefore be relieved so that the spring 60 will return the piston to its initial upward position illustrated in Fig. 2 as the air is exhausted from the cylinder through the means provided therefor. The device is then prepared for another operation to apply a staple to the work, the staple-pusher 20 being slid forwardly to advance the next succeeding staple *s* into position above the throat 65 and beneath the driver 52. In this way the appliance may be operated continuously and rapidly to apply the staples in series as required for any particular type of work.

It will be observed from the foregoing specification that my invention provides a particularly efficient fastener-applying device adapted for convenient operation and capable of being used for many purposes with different forms of fasteners. The present improvement illustrated and described herein further provides a convenient and readily operated means for disassembling certain parts of the mechanism for exposing the narrow throat through which the staples are driven so that any obstruction may be cleared therefrom; while also permitting easy reassembling of the parts. While the invention is herein shown and described as embodied in a preferred form of construction, it is to be understood that modifications may be made in the form and arrangement of the parts of the device without departing from the scope of the following claims. Therefore, without limiting myself in this respect, I claim:

1. In a staple-applying implement having a slot-like throat through which the staples may be driven, said throat open on its forward side, a pair of plate-like members disposed with their opposed edges overlying the edges of the slot forming the throat to substantially close its open side, and means for releasably securing

said plates in fixed relationship while adapting them to be detached to expose the throat for clearing an obstruction therefrom.

2. In a staple-applying implement, the combination of a standard having a projecting portion at the front slotted to provide a throat through which the staples may be driven, closure-means overlying said projecting portion of the standard across the open front of the throat therein, means for mounting said plate-like means on the standard comprising studs projecting therefrom, and means releasably engaging the ends of said studs to secure the parts in assembled relationship while permitting removal of the closure-means to uncover the throat for removing obstructions therefrom.

3. In a staple-applying implement, a vertical standard having a pair of relatively flat pad-like projecting portions at the front formed with a slot between their adjacent edges to provide a throat through which staples may be driven, a pair of studs extending forwardly from the projecting portions of said plate, a second pair of studs projecting from the face of the standard above and in alinement with said first-named studs, said studs formed with peripheral slots, a pair of cover-plates overlying the front of the standard and provided with holes through which said studs engage to mount said plates with their opposed edges overlying the side edges of the throat, and springs overlying the front of said cover-plates and engaging the slots in the studs to releasably hold said cover-plates in place on the standard.

4. In a staple-applying implement having a vertical standard, rectangular projections at the bottom of said standard having their opposed edges spaced apart to provide a slot-like throat through which staples may be driven, a pair of studs projecting from the front of the standard above the throat, levers pivoted on said studs, means for rocking said levers to preform a staple by bending its legs before it is driven through said throat, a second pair of studs projecting from the standard at the sides of the throat, relatively narrow cover-plates formed with holes for receiving the studs to mount said plates at the front of the standard with their edges overlying the opposed edges of the slot and substantially closing the open side of the slot, and means engageable with the studs for releasably holding said cover-plates in assembled relationship on the standard.

5. In a stapling device having a throat through which the staples may be driven, said throat formed by plate-like members fixedly mounted with their edges in spaced apart relationship to provide an opening therebetween, a pair of plates overlying the first-named plates and positioned with their opposed edges overlapping the opposed edges of the first-named plates to form a T-shaped slot, and means for releasably securing said second-named plates in fixed relation to the underlying plates to adapt them to be detached for exposing the throat for clearing a jammed staple therefrom.

6. In a staple-applying implement, the combination of a pair of plates fixedly secured in position with their opposed edges spaced apart to form a slot-like throat through which the staples may be driven, a second pair of plates overlying the first-named plates with their edges in parallel spaced relationship overlapping the edges of the first-named plates to form a narrower frontal slot, said second-named plates formed with holes, studs projecting forwardly from the first-named plates and engaging through the holes in the second-named plates, said studs provided with slots intersecting their peripheries, and leaf-springs having their ends adapted to engage the slots in the studs to hold said springs under tension bearing against the second-named plates to releasably maintain them in cooperative relation to the first-named plates.

7. In a staple-applying device, a vertical back plate having projections on its front face formed with parallel spaced faces providing a slot-like throat through which the staples may be driven, a staple-driver slidable in the

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throat, said driver comprising a blade with a narrow flange projecting forwardly therefrom, upper and lower pairs of studs projecting forwardly from the back plate, said upper pair of studs formed with peripheral slots on their under sides and said lower pair of studs formed with similar slots on their upper sides, a pair of cover-plates shaped to overlie the back plate with their opposed edges in parallel relation overlapping the sides of the throat whereby to form a T-shaped slot for guiding the flange on the staple-driver to slide therein, said outer plates formed with holes for receiving the studs on the back plate, and bowed leaf-springs having slotted upper

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ends engageable with the slots in the upper pair of studs and angular portions at their lower ends engageable with the slots in the lower pair of studs to mount the springs bearing against the plates to hold the latter in place while adapting them to be detached to open the staple-throat for cleaning.

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