May 5, 1953 H. W. MARANO 2,637,029

STAPLE SUPPORT SLIDE AND FEED MEANS FOR STAPLING MACHINES

Filed Aug. 29, 1950 2 SHEETS—SHEET 1

Fig. 1.

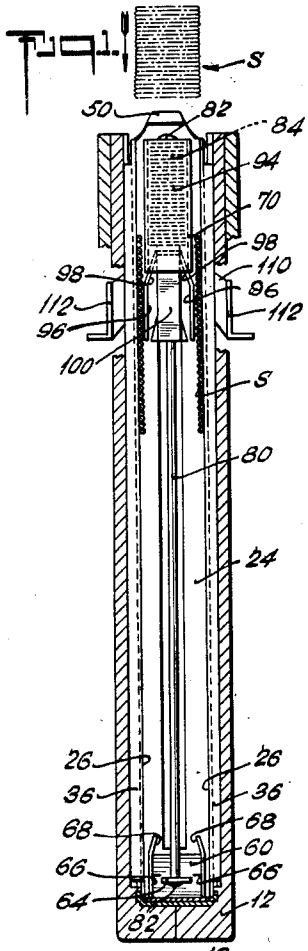


Fig. 2.

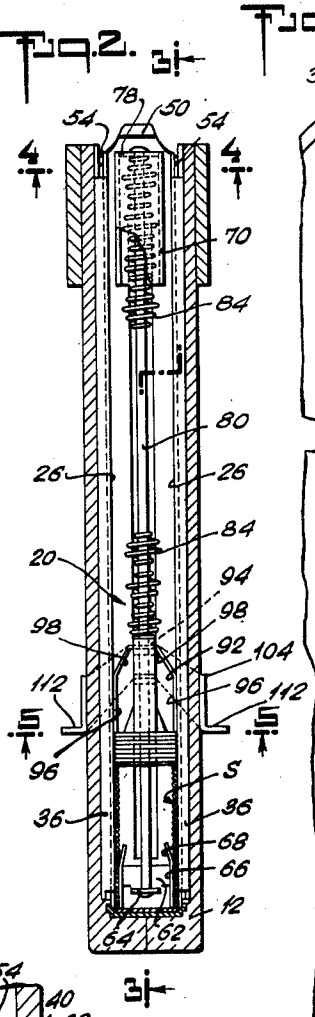


Fig. 3.

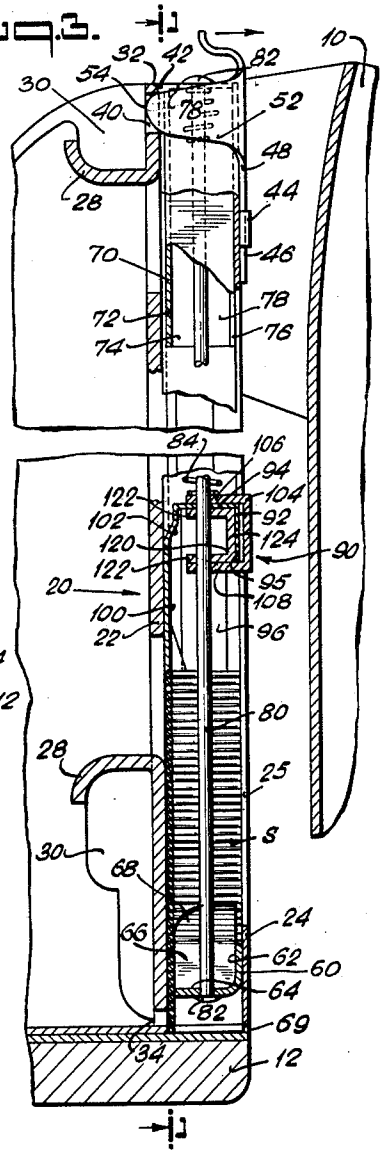


Fig. 4.

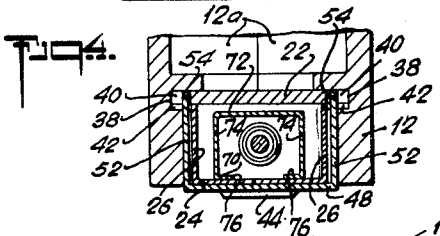


Fig. 5.

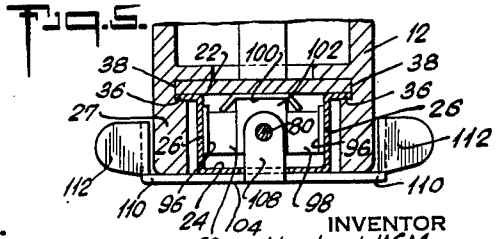
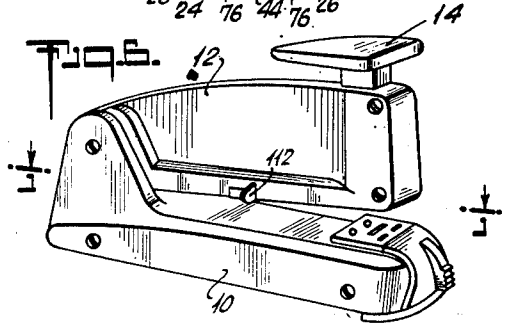


Fig. 6.



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Filed Aug. 29, 1950 2 SHEETS—SHEET 2

Fig. 7.

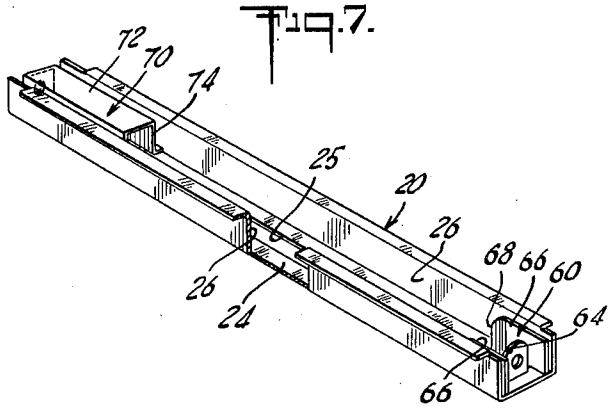
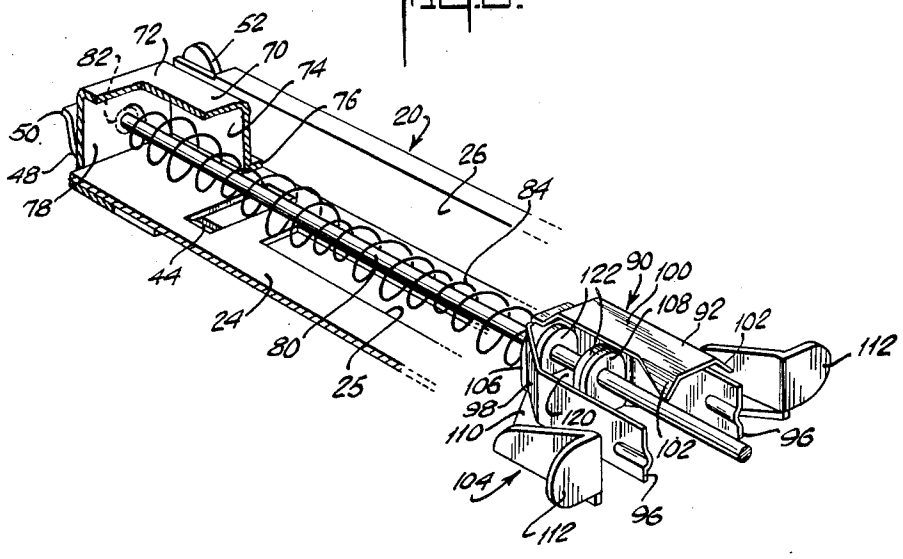


Fig. 8.



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STAPLE SUPPORT SLIDE AND FEED MEANS FOR STAPLING MACHINES

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11 Claims. (Cl. 1—3)

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The present invention relates to devices for driving staples; that is, inverted U-shaped fasteners which consist of a generally flat body portion and a leg at each end extending therefrom at right angles thereto. Specifically, the present invention relates to new and improved means for loading a clip of staples into the driving mechanism and for pushing the staples towards the driving end of the mechanism.

The main object of the present invention is the provision, in a staple driver, of a body portion having a staple support member reciprocably slidable therewithin, said support having staple pusher means operative on all parts of the staple, to urge same towards the driving end of the mechanism.

Another object of the present invention is the provision of a staple pusher which comprises a plurality of fingers normally biased to bear against not only the body of the staple but also against the leg components thereof.

Another object of the present invention is the provision of a staple pusher comprising a plurality of spring fingers normally spread apart into staple engaging position, means normally operative to urge the pusher towards the delivery end of the mechanism, and means automatically operable on retraction of the pusher against its normal biasing to contract the fingers so as to permit staples to slide thereover whereby, on release of the pusher into normal position, the fingers will spread automatically into staple engaging and advancing position.

Still another object of the present invention is the provision in a staple driver, of a staple support member which is reciprocably slidable within the body of the mechanism and which, as a unit, is readily removable from the staple body and reinsertable thereinto.

Still another object of the present invention is the provision of a staple driver including a staple clip storage magazine having a roof as a separate component, and an integral floor and side walls assembly as another component thereof, within which latter component are mounted the staple pusher means, the latter component being readily removable, as desired, from the body of the device.

Other and further objects of the present invention will, in part, be specifically pointed out hereinbelow, and still others will be obvious from the following description of an illustrative embodiment.

In the drawings annexed hereto and forming a part hereof,

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Figure 1 is a horizontal section on the lines 1—1 of Figures 3 and 6, partly in plan, looking down on the slidable staple support below the level of the staple magazine roof, the parts being arranged during the loading operation;

Figure 2 is a similar view illustrating the stapler in loaded condition, and the relationship of the operative components in staple advancing position;

Figure 3 is a longitudinal vertical section on the broken line 3—3 of Figure 2;

Figure 4 is a transverse vertical section on the line 4—4 of Figure 2;

Figure 5 is a transverse vertical section on the line 5—5 of Figure 2;

Figure 6 is a perspective view of the completed staple driver of the present invention, incorporating the slidable staple support and pusher of the present invention, and

Figures 7 and 8 respectively are a perspective view of the staple support member removed from the body of the device, and an enlarged perspective view, with parts broken away to show interior details, of the upper portion of the staple support showing the rod, spring and staple pusher.

The device as a unit includes a base or anvil portion 10, a body 12 pivoted thereto at an end thereof, and a ram head 14, mounted for vertically reciprocating movement at the front of the body, all as in conventional devices of this character. The staple magazine and slidable staple support assembly is indicated generally by reference numeral 20, and includes magazine roof 22, the staple slide floor 24, and staple slide side walls 26, 26, formed integrally with floor 24 as a single stamping of suitably formed and treated metallic material. Roof 22 is of similar material, slightly thicker in section as shown, and is provided with a pair of upwardly stamped and curved fingers 28, 28 (Figure 3) which fit over and engage suitably shaped bosses 30, 30 cast as integral parts of body 12. Body 12 is formed as by casting or otherwise of two complementary portions 12a, 12a. As illustrated in Figure 3, roof 22 is flat and extends the full length of the stapler body from the entrance end 32 to the staple exit gate 34. The slide floor 24 and walls 26 are similarly elongated and flat, all in order to align the clip of staples, indicated by reference letter S, during its insertion into the magazine and its passage therethrough. As seen in Figure 5, the upper edges of side walls 26, 26 are shouldered outwardly, as at 36, 36, and the transverse distance between the

outermost edges of shoulders 36, 36 is equal to the width of roof 22.

The inner aspects of the halves of body 12 are longitudinally channeled as at 38, 38, to receive and retain roof 22 and slidably retain shoulders 36, 36, therewithin, in the relative position illustrated in Figures 4 and 5. Notches 40, 40 are formed along the side edges of the roof, spaced inwardly thereof, and the ends of shoulders 36, 36, in vertical alignment with notches 40, 40, are similarly notched, as indicated at 42, 42 (Figure 1), for reasons to be developed below.

Floor 24 has a transverse strap 44 (Figure 3) punched downwardly therefrom, to receive and secure one end 46 of a slide lock member 48. Lock 48 comprises a flat, elongated strip of spring metal, the front end 46 of which is received and fastened by strap 44 to floor 24. The rear end of lock strip 48 is curved upwardly and rearwardly, as at 50, to serve as a finger piece to flex the strip about the end thereof engaged by strap 44. A pair of integral wings 52, 52 are provided, near finger piece 50, extending upwardly at right angles to strip 48, the wing ends being tapered, as at 54, 54. When slidable staple support bar 24, 26 is slid into body 12, riding along channels 38, 38, wings 52, 52 ride under the solid end of roof 22, at 32, and spring-extend through notches 42, 42 and into the notches 40, 40, to lock the assembly to body 12. When it is desired to remove the slidable staple support bar from the stapler body, finger piece 50 is depressed, in the direction of the arrow in Figure 3, disengaging wing tips 52, 52 from notches 40, 40, thereby permitting the sliding withdrawal of the said support member.

A staple guide 60 is provided for the front of the slide, immediately adjacent the exit gate, guide 60 comprising a metal stamping having a flat base 62, an upturned lip 64 at the front thereof, and upturned side walls 66, 66, inwardly angled at the rear thereof, as at 68, 68. Guide 60 is spot welded or otherwise secured to floor 24 of the slide 26, 26, and is so dimensioned and positioned as to permit the movement of staple clip S between the sides 66, 66 and slide walls 26, 26 (see Figure 2). The movement of staple clips past guide 60 is directed by the inwardly angled walls 68, 68 thereof, and the forward ends of sides 66, 66 are spaced a staple's thickness from the staple exit as at 34, 69 (see Figure 3).

A member 70 is provided and secured to slide floor 24 at the rear, said member 70 comprising a hollow, rectangularly shaped tube, having a top 72, sides 74, 74 and inturned bottom edges 76, 76 by which the member is secured as by spot welding to the floor 24. The clip of staples slide over member 70 on insertion of the clip into the magazine. Top 72 is extended rearwardly and downwardly to form a rear, vertically extended wall 78. An elongated rod 80 is provided, disposed within and lengthwise of the slide, threaded through horizontally aligned apertures in wall 64 of staple guide 60 and in rear wall 78 in member 70, the ends 82, 82 of rod 80 being upset to secure same in the position shown in Figures 1, 2, 3.

A barrel shaped compression spring 84 is threaded onto rod 80, prior to its location within the slide. The structure and functioning of this spring is more specifically disclosed and claimed in my co-pending application Serial No. 83,750, filed March 26, 1949, and issued as U. S. Patent 2,528,444, dated October 30, 1950, wherein its particular advantages are described in detail. While the barrel shaped spring illustrated is preferred, it is not essential to the operation of the device of the present invention. Spring 84 is trapped on rod 80 between rear wall 78 and staple pusher 90, so that it normally functions to urge pusher 90 towards the staple delivery or exit end of the apparatus.

Pusher 90 comprises a fingered member, a reset yoke and a spacer clip, all threaded on rod 80 for reciprocating movement lengthwise thereof. The fingered member is indicated by reference numeral 92 and is formed of thin section springy material having a vertical wall component 94, transversely apertured for threading on rod 80, a short, flat forwardly extended base leg 95, a pair of elongated vertically and forwardly extended fingers 96, 96 angled at 98 from wall 94, and a similarly elongated forwardly and horizontally extended finger 100, angled at 102 from rear wall 94. Wall 94, as seen in Figure 2, is of width less than the transverse distance between slide walls 26, 26, and the angled portions 98, 98, 102 thus provide a spring action which normally urges the fingers 96, 96, 100 outwardly against slide walls 26, 26 and roof 22 respectively (see Figures 3 and 5).

Reset yoke 104 consists of a flat V-shaped stamping of metallic material having a pair of vertically upstanding and transversely extending walls 106, 108 spaced apart longitudinally at the juncture of the arms 110, 110. Slide floor 24 is centrally slotted lengthwise thereof, as at 25, and yoke walls 106, 108 extend upwardly therethrough into the space between slide walls 26, 26. Registering apertures are provided transversely through walls 106, 108 whereby yoke 104 is also threaded on rod 80 for reciprocating movement lengthwise thereof, and is thereby trapped inside the slide. The forwardly extended arms 110, 110 terminate in upwardly and outwardly bent finger pieces 112, 112, whereby the yoke can easily and conveniently be manipulated from without the stapler. As seen in Figure 5, arms 110, 110 are of such length that the bent-up finger pieces 112, 112 are spaced from slide walls 26, 26 sufficiently to receive the staple body walls therebetween, as at 27.

A spacer clip 120 is provided having a pair of longitudinally spaced walls 122, 122 connected by bottom 124, walls 122, 122 being transversely apertured for threading on rod 80. The relative dimensioning and positioning of the pusher components is shown most clearly in Figure 3, wherein it is seen that the fingered member 92 nests within reset yoke 104, and that spacer 120 nests within the fingered member. The base leg 95 of fingered member 92 is thus held flatly between the reset yoke and spacer base 124.

The device of the present invention, as above described, can be loaded in several ways. For instance, as shown in Figure 1, finger pieces 112, 112, are manually retracted against the pressure of spring 84, and compressing same. As the fingers 112 are pulled rearwardly, the angled portions 98, 98, 110 of the pusher 90 are also retracted, and the angled portions 98, 98 and 102 of the fingers engage the sides of the tube 70 to cam them within the aperture of the tube, as illustrated in Figure 1. The camming action thus produced, causes the front ends of the fingers 96, 96, 100 to be swung inwardly, and away from walls 26, 26 and roof 22, leaving space for staple clip S to be inserted into the slide, past tunnel 70 and over the contracted ends of fin-

gers 96, 96, 100 which are components of fingered member 92. Said clip S must be shorter in length than the distance between staple exit 69 and tube 70. Thus, when the reset yoke is released from the retracted position shown in Figure 1, spring 80 will expand and shift fingered member 92 forwardly and against the rear of the clip of staples. Fingers 96, 96, 100, moving out of tunnel 70 and released from the constriction thereof by the tunnel sides and roof, will spring outwardly to lie flatly against slide walls 26, 26 and roof 22, bearing against the staple body and legs simultaneously.

Another way to load the stapler of the present invention with a fresh clip, without removing the slidable staple support bar from the body, involves merely inserting a clip S while the parts are in the position of Figure 2. The entrance end is manually blocked, to trap the clip S therewithin, and reset yoke drawn to the rear of the device against the expansile tendency of spring 80. As fingers 96, 96, 100 are sprung inwardly on engagement with tunnel 70, the staple clip will slide forwardly past the fingered member 92, whereupon the reset yoke may be released with device ready for operation.

The device may also be loaded by removing the slidable staple support bar from the body, and inserting the staples therewithin, but as noted above this is unnecessary, the slidable staple support bar being removable merely for convenience or to make the operative parts more readily accessible for cleaning etc.

Having now described the invention, what is claimed and desired to be secured by Letters Patent is:

1. In a staple driver, a body member, an elongated staple support member reciprocably slidable into and out of the body, said support having staple discharging and staple receiving ends, a staple pusher on the support, spring means tensioned normally to urge the staple pusher towards the discharge end of the support, the pusher having a plurality of spring fingers normally biased divergently into staple-engaging position, a hollow member adapted to receive the pusher disposed adjacent the staple receiving end of the slide, movement of the pusher into the hollow member causing converging movement of the pusher fingers towards each other against their normal biasing and out of staple engaging position.

2. In a staple driver, a body member, an elongated staple support member reciprocably slidable into and out of the body, said support having staple discharging and staple receiving ends, a staple pusher on the support, spring means within the support tensioned normally to urge the staple pusher towards the staple discharge end of support, the pusher having a plurality of spring fingers normally biased divergently into staple-engaging position, pusher receiving means disposed in the support adjacent the staple-receiving end of the support, automatically operated on engagement of the pusher therewithin, to bear against the spring fingers and cause them to converge against their normal biasing into staple-disengaging position.

3. In a staple driver, a body member, an elongated staple support member reciprocably slidable into and out of the body, said support having staple discharging and staple receiving ends, the support comprising a base and a pair of depending side walls, a cover for the support, a staple pusher disposed within the support, spring means disposed within the support normally biased to urge the pusher towards one end of the support, said pusher having wing portions secured thereto and extending outwardly therefrom on opposite sides of the support whereby the pusher may be manually shifted towards the opposite end of the support and against the normal biasing thereof.

4. In a staple driver, a staple support comprising a flat, elongated floor and a vertically upstanding side wall along each lateral edge of the floor, a staple guide at each end of the support, secured to the floor and spaced from the sides, and a staple pusher and spring means within the support urging the pusher towards an end thereof, said guides having means thereon to trap the pusher and spring within said support.

5. In the device of claim 4, wherein the pusher comprises a fingered member all of which fingers are flat and certain ones thereof extend at right angles to others thereof.

6. In the device of claim 4, wherein the pusher includes a fingered member, which fingers are of spring material and normally divergent to engage the rear of a staple, said fingers remaining in the staple-engaging divergent position on movement of the pusher towards one of said guides, said fingers converging into staple disengaging position on movement of the pusher against the other of said guides.

7. A device for driving staples, each of which staples has a substantially straight body portion and a substantially straight leg at each end thereof and at right angles thereto, said device comprising a body member, an elongated staple support member reciprocably slidable into and out of the body, the support comprising a base and a pair of side walls, a staple pusher within the support for engaging the rear of the staple, the pusher having a finger in line with the body of the staple and a finger in line with each leg portion of the staple, and means normally urging the pusher into staple-engaging position.

8. A device as in claim 7, having a hollow tube at an end of the staple support, the tube being of such size as to receive the pusher fingers therewithin to shift certain thereof inwardly of and spaced from the side walls of the support member.

9. A device for driving staples each of which has a substantially straight leg at each end thereof and depending therefrom, the device comprising a hollow body member, an elongated stable support member reciprocably slidable into and out of the body, the support having a floor portion and side walls, a roof disposed within the hollow body over the staple support member, a staple pusher disposed within the staple support member, spring means within the staple support member normally urging the pusher towards an end thereof, a hollow pusher receiving tunnel at the opposite end of the staple support member, the pusher comprising a member having a plurality of normally diverging flat spring fingers one of which bears against the roof and two others of which fingers bearing against the side walls of the staple support member to engage the rear of a staple body and legs respectively, movement of the fingered member towards and into the tunnel constricting the fingers against their normal biasing towards each other and out of engagement with the roof and side walls of the staple support and with the body and legs of the staple.

10. A device as in claim 9, wherein the tunnel is of rectangular cross section, and has side walls spaced from the staple slide side walls more than a staple's distance, and has a top spaced from the staple slide roof more than a staple's distance.

11. A device as in claim 10, wherein the fingers are angled rearwardly and inwardly of their staple contacting ends whereby, as the fingers enter the tunnel, a camming action causes the ends to shift away from the roof and side walls of the staple slide.

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