July 20, 1937. E. C. BUNNELL 2,087,242

STAPLING DEVICE

Filed Sept. 14, 1934

Fig. 1.

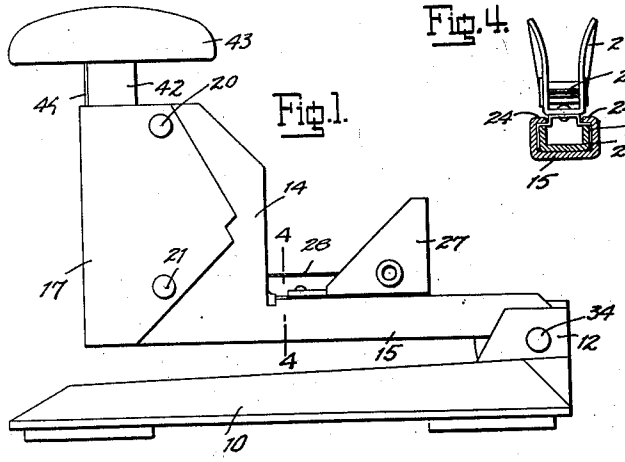


Fig. 4.

Fig. 3.

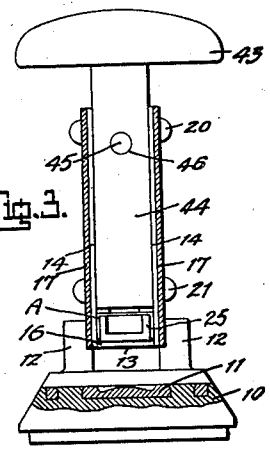


Fig. 2.

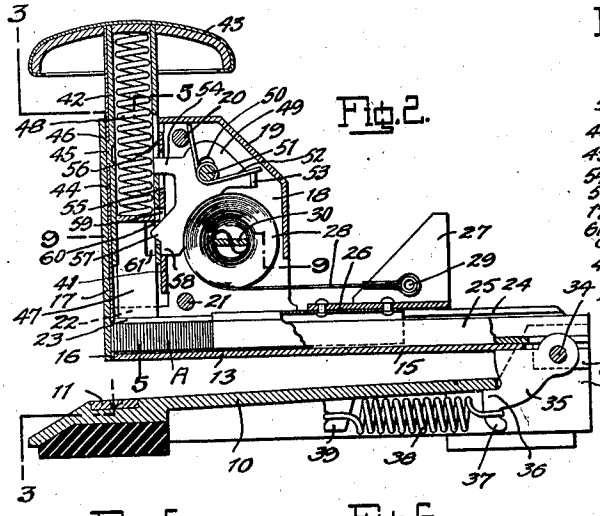


Fig. 7.

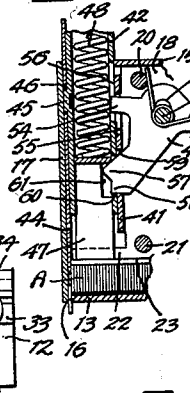


Fig. 8.

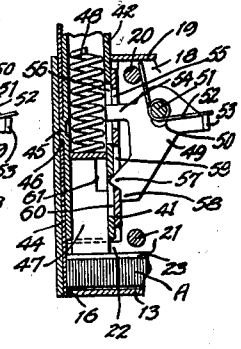


Fig. 5.

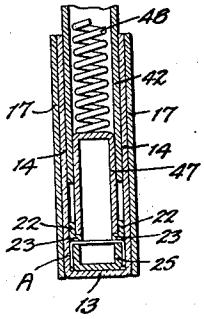


Fig. 6.

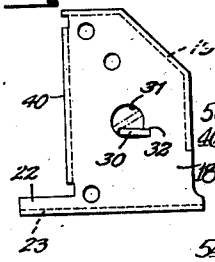


Fig. 9.

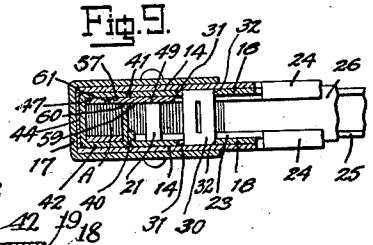


Fig. 7a.

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STAPLING DEVICE

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Application September 14, 1934, Serial No. 743,989

2 Claims. (Cl. 1—3)

The present invention relates to a stapling device, particularly of the so-called desk type, an object being to provide a device of this character in which clogging of the staples will be prevented. In stapling devices heretofore in use the clogging of the staples was due for the most part to the failure of the staples to clear the device when the driver was not completely depressed, with the result that upon attempting to drive the next staple the device would clog. It is proposed in the present invention to provide means which will prevent the successive staple driving operation of the staple driving means until the staple being driven is cleared. Another object is to provide a stapling device construction in which most of the parts are made of formed up sheet metal, and further to provide a structure which may be readily disassembled for the purpose of repair or replacement of parts.

With the above and other objects in view, an embodiment of the invention is shown in the accompanying drawing, and this embodiment will be hereinafter more fully described, with reference thereto, and the invention will be finally pointed out in the claims.

In the drawing:—

Fig. 1 is a side elevation of a desk type stapling device, according to the exemplary illustrated embodiment of the invention.

Fig. 2 is a vertical longitudinal sectional view.

Fig. 3 is a vertical transverse sectional view, taken along the line 3—3 of Fig. 2.

Fig. 4 is a transverse vertical sectional view of the staple guide channel, taken along the line 4—4 of Fig. 1.

Fig. 5 is a transverse vertical sectional view taken along the line 5—5 of Fig. 2.

Fig. 6 is a detail side elevation of the inner casing member employed.

Figs. 7, 7a and 8 are fragmentary vertical longitudinal sectional means showing various operative positions of the staple driving mechanism.

Fig. 9 is a horizontal sectional view, taken along the line 9—9 of Fig. 2.

Similar reference characters indicate corresponding parts throughout the several figures of the drawing.

Referring to the drawing, the stapling device, according to the exemplary embodiment of the invention illustrated therein, comprises a base 10 carrying a recessed anvil insert 11 at its forward end, and provided at its rearward end with upwardly projecting ears 12—12 between which the upper staple carrying and driving part of the device is pivotally and resiliently mounted, as will hereinafter more fully appear. This upper part of the device is of box-like form and comprises an outer casing member of generally U-form in cross-section consisting of a transverse base 13 and upwardly bent vertical side walls 14—14, the lower portion of this member having a rearwardly extending elongated channel extension portion 15 for receiving the staple strip and staple strip feeder. The forward edges of the side walls 14—14 are vertically disposed, and the forward edge of the transverse base 13 is slightly cut back, as at 16, to form an outlet passage for the staples, as will hereinafter more fully appear. A member 17 also of U-form in cross-section, but disposed laterally, has its side walls engaged at the outer sides of the side walls 14—14, its transverse wall abutting the forward vertical edges of said side walls 14—14 and constituting the front wall of the box. The lower edge of this member 17 is flush with the under surface of the base 14, and with the cut-back edge 16 completes the outlet passage for the staples. An inner casing member is disposed between the side walls 14—14, and comprises side walls 18—18 connected at the top and rear by an angular transverse wall 19. The three members making up the housing are secured together by means of a pair of riveted cross-pins 20 and 21.

The lower edge portions of the side walls 18—18 are provided with forwardly projecting extensions 22—22 the ends of which terminate in slightly spaced relation to the inner surface of the transverse front wall portion of the member 17 to provide a clearance space for the driver, as will hereinafter more fully appear. Inwardly bent flanges 23—23 are provided along the lower edges of the side-walls 18—18 and their extension portions 22—22 and these flanges are in line with and form continuations of inwardly bent flanges 24—24 provided at the upper edges of the side walls of the extension portion 15 of the outer casing member, these flanges 23—23 and 24—24 forming the upper wall of the staple strip feeding passage.

A staple carrier bar 25 of U-shape in cross-section is secured to the base of the extension portion 15, its forward end being flush with the inner edge of the staple passage formed by the cut-back edge 16 of the base 13. The side walls of the carrier bar are slightly spaced from the side walls 14—14 and the side walls of the portion 15, and the top edges are slightly spaced from the inwardly bent flanges 23—23 and 24—24, thereby providing an inverted right angu-

lar guide spaces at each side in which the inverted U-shape staple strip is guided, as clearly shown in Fig. 5.

The staple strip A, as seen in Fig. 2, is pressed forwardly, so that the first staple is disposed in the staple driving passage, by means of a staple pusher 26 of inverted U-shape in cross-section mounted on the bar 25 and having a handle member 27 secured to its upper transverse portion and to which the outer end of a coil spring 28 is secured, as at 29. The inner end of this spring is secured in the housing by means of a slotted bar 30 through which this inner end is threaded, the ends of the bar being disposed in holes 31—31 in the side walls 18—18. These holes are of circular form to permit rotation of the bar 30 therein as the spring is wound up and tensioned, and are provided with tangentially arranged notches 32 extending in the direction of the pull of the spring and in which one edge of the bar lockingly engages to retain it stationary after the spring is wound to the desired tension. The winding position and the locked position of the bar are respectively shown by the dot-and-dash lines and the full lines in Fig. 6. It will be understood that the spring is mounted within the inner casing member before the latter is assembled. After assembly the holes 31—31 and the ends of the bar 30 are enclosed by the side walls 14—14 of the outer casing member. The staple feeder may be pulled out of the channel extension for the purpose of inserting another staple strip.

The extension portion 15 is provided at its outer end with downwardly bent apertured ears 33 disposed between the ears 12—12 of the base and which are engaged by a pivot pin 34 mounted in and extending between the ears 12—12. A yieldable supporting lever 35 is pivotally mounted on the pin 34 between the ears 33—33 and projects beneath and engages the lower surface of the extension portion 15, being provided at its lower portion with a shoulder 36 engaging the under surface of the base 10 and a hook 37 to which one end of a spiral spring 38 is secured, the other end being secured to a hook 39 formed on the underside of the base 10. It will be seen that as downward pressure is applied to the upper staple carrying and driving part of the device the lever 35 yields to permit the material to be stapled to be gripped between this upper part and the base. The construction is also such that the upper part of the device may be swung away from the base through an arc of 180° when it is desired to drive a staple independently of the base.

The vertical forward edges of the side walls 18—18 of the inner casing member are respectively provided with inwardly bent flanges 40 and 41 these flanges being in spaced parallel relation to the transverse front wall portion of the member 17, and forming with this wall portion and the side walls 14—14 a vertical rectangularly shaped passage in which is slidably engaged the rectangularly shaped tubular driver plunger 42. A hand knob 43 is secured to the upper end of this plunger and upon its front face a staple driver 44 is secured by means of a pressed out stud 45 in the plunger face staked in a hole 46 in the strip. An inverted U-shape guide member 47 is supported at its lower edges upon the flanges 23—23 of the extensions 22—22 and extends upwardly into the passage of the plunger 42, where it supports the lower end of a coil spring 48 disposed within the plunger.

A locking member 49 is disposed within the inner casing adjacent one side wall 18, being provided with a slot 50 engaged by a pin 51 secured between the two side walls 18—18, and upon which pin is mounted the coil portion of a hair-pin spring 52 having one end engaged behind the cross-pin 20 and the other end engaged above a lug 53 bent outwardly from the end of the locking member. The action of this spring is to normally press the locking member downwardly and at the same time exert a rotary pressure thereon in clockwise direction.

The forward edge of the locking member is provided at its upper portion with a projecting finger portion 54 extending through a notch 55 cut into the flange 41 and engaged with a slot 56 provided in the rearward face of the driver plunger 42, and at its lower portion with a projecting cam portion 57 having upper and lower inclined faces, the lower inclined face extending to the vertical surface of a right angular locking end portion 58 provided at the lower end of the locking member. The cam portion 57 and its locking portion 58 normally extend through a notch 59 cut in the flange 41, the horizontal face of the locking portion 58 engaging the lower end of this notch and the vertical face engaging the inner surface of the plunger 42 at the bottom of a slot 60 provided therein and into which the cam portion 57 extends. The side wall of the guide member 47 is also provided with a notch 61 adjacent its upper transverse end portion into which the cam portion 57 is adapted to project.

The operation is as follows:—

As shown in Fig. 2 the lower edge of the staple driver 44 is directly above but slightly spaced from a staple to be driven, and the locking member is in its retracted position, in which the finger 54 is pressed upwardly by the plunger 44, through engagement of the lower end of the slot 56 therewith, and the locking portion 58 is disposed with its lower surface in engagement with the lower end of the notch 59 and its forward surface in engagement with the inner side of the plunger below the slot 60. The material to be stapled is placed upon the anvil 11 of the base and the hand knob is pressed downwardly, first bringing the upper movable part of the stapling device downwardly to grip the material, and then causing the driver 44 to sever a staple from the staple strip and drive it toward the material. As soon as the plunger is moved sufficiently to start the severing and driving of the staple the lower end of the slot 60 moves below the edge of the horizontal face of the locking portion 58 of the locking member and the latter is thereby released, so that the locking portion 58 moves into the slot 60, as shown in Fig. 7. As long as the locking portion 58 remains in the notch 59 and in the upward path of the lower end of the slot 60 the plunger will be prevented from returning to its initial position, and the driver 44 will remain in the staple passage to prevent movement of another staple into place. This condition continues until the staple being driven is entirely cleared. Fig. 7 shows the staple driven almost clear and the plunger and driver allowed to retract to the position where the locking member prevents complete retraction, making it compulsory to completely clear the staple before retraction is possible, and as will now be explained.

As the upper surface of the cam portion 57 is engaged by the upper end of the slot 60, see Fig. 7, through downward movement of the plunger the locking member is moved in retracting direction

to move the locking portion 58 inwardly toward the inner surface of the flange 41, the locking portion however remaining in engagement with the lower end of the notch 59, see Fig. 7a, until the downward stroke of the plunger is completed and the staple entirely cleared. As the staple is cleared the locking portion 58 is disengaged from the notch 59 and the locking member moves downwardly to the position shown in Fig. 8, the spring 52 snapping it into place. As the plunger returns to its normal position the lower end of the slot 56 engages the finger 54 carrying the locking member upwardly to a point where the locking portion 58 snaps into the notch 59, the lower end of the slot 50 now being above the lower end of said notch 58, so that the parts again assume the position shown in Fig. 2, ready to drive another staple.

The staple device according to my invention is extremely simple in construction and operation, clogging of the staples is effectually prevented, and the possibility of breakage and wear of the parts greatly reduced. The guide passage for the staples is accurately formed by the assembly of the members making up the housing, an extremely simple construction as compared to previous methods requiring machining of the guide passage. In order to repair or replace any of the parts, it is only necessary to remove the rivets 20 and 21 which may be readily done by a service man. At the same time all of the parts are effectually enclosed and protected, so that they cannot be readily tampered with, or damaged by rough handling.

I have illustrated and described a preferred and satisfactory embodiment of my invention, but it will be obvious that changes may be made therein, within the spirit and scope thereof, as defined in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. Detent mechanism for a stapling device having a casing, a staple driver and a vertically movable spring pressed plunger for actuating said driver, comprising a spring pressed locking member movably mounted in said casing for sliding and rotary movement adapted upon initial movement of said plunger in staple driving direction to have projecting rotary movement into the path of said plunger to block complete return movement of said plunger, cam means adapted during the staple driving movement of said plunger to rotate and retract said locking member, retaining means adapted upon completion of the ejecting movement of said driver and complete retraction of said locking member to permit sliding movement of said locking member in one direction under the pressure of its spring and through said sliding movement to retain said locking member in retracted position whereby complete return movement of said plunger is permitted, and means on said plunger adapted upon complete return movement of said plunger to engage and slide said locking member in the opposite direction to release it from said retaining means.

2. Detent mechanism for a stapling device having a casing, a staple driver and a vertically movable spring pressed plunger for actuating said driver, said plunger having a slot, a spring pressed locking member movably mounted in said casing for sliding and rotary movement normally retained in partially projected position through engagement with an unslotted portion of said plunger adapted upon initial movement of said plunger in staple driving direction to advance in said slot to have limited projecting rotary movement into the path of said plunger to block complete return movement of said plunger whereby said driver remains in blocking relation to the staple strip carried by said staple strip guide, cam means adapted during the staple driving movement of said plunger to rotate and retract said locking member, retaining means adapted upon completion of the ejecting movement of said driver and complete retraction of said locking member to permit sliding movement of said locking member in one direction under the direction of its spring and through said sliding movement to retain said locking member in retracted position whereby complete return movement of said plunger is permitted, and means on said plunger adapted upon complete return movement of said plunger to engage and slide said locking member in the opposite direction to release it from said retaining means.

EARL C. BUNNELL.