

[54] STAPLER DEVICE

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[58] Field of Search..... **227/132, 146, 131**

[56] **References Cited**

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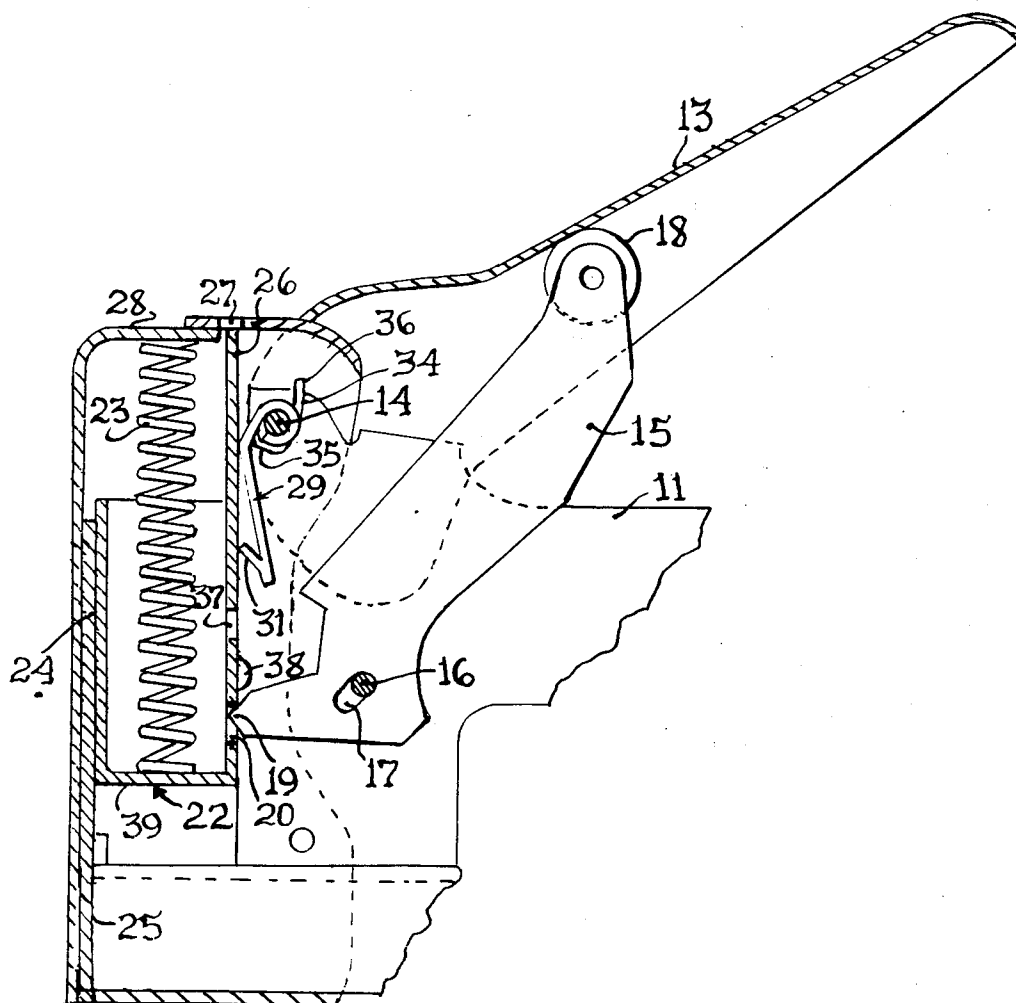
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[57] **ABSTRACT**

A hand-operated staple-driving tool having a multi-stage operating movement of the operating handle resulting in a first cocked position of the staple-driving mechanism achieved through the employment of a latch pin operable after a predetermined length of travel of the staple-driving mechanism by compression movement on the handle, and a positive releasing of the latch pin upon successive movement of the handle after operating the staple-driving mechanism; such construction and function requiring less compression force for each handle movement and thus resulting in easier yet effective operation of the tool.

9 Claims, 16 Drawing Figures



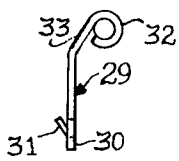
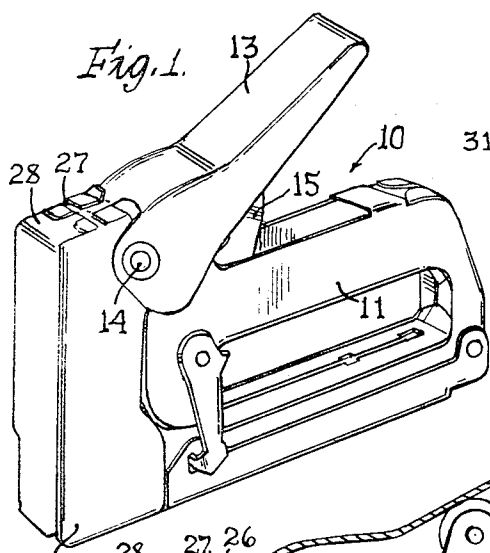


Fig. 5

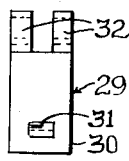


Fig. 6

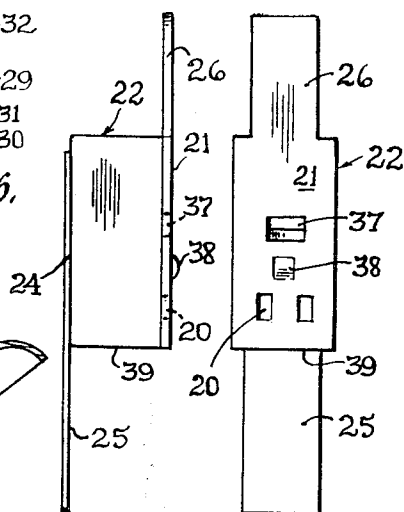


Fig. 7

Fig. 8

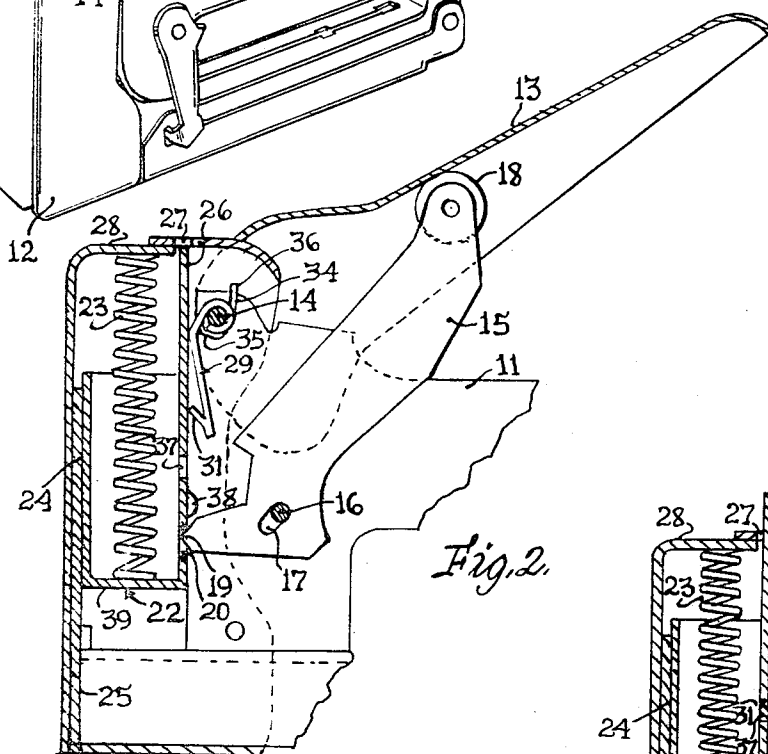


Fig. 2

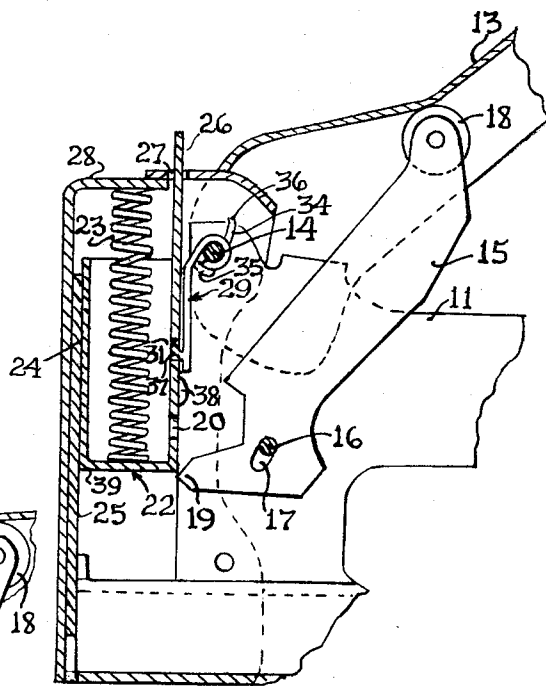


Fig. 4

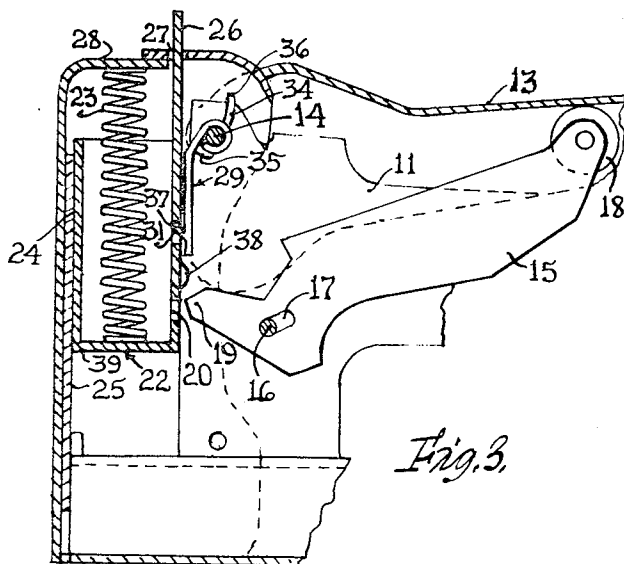
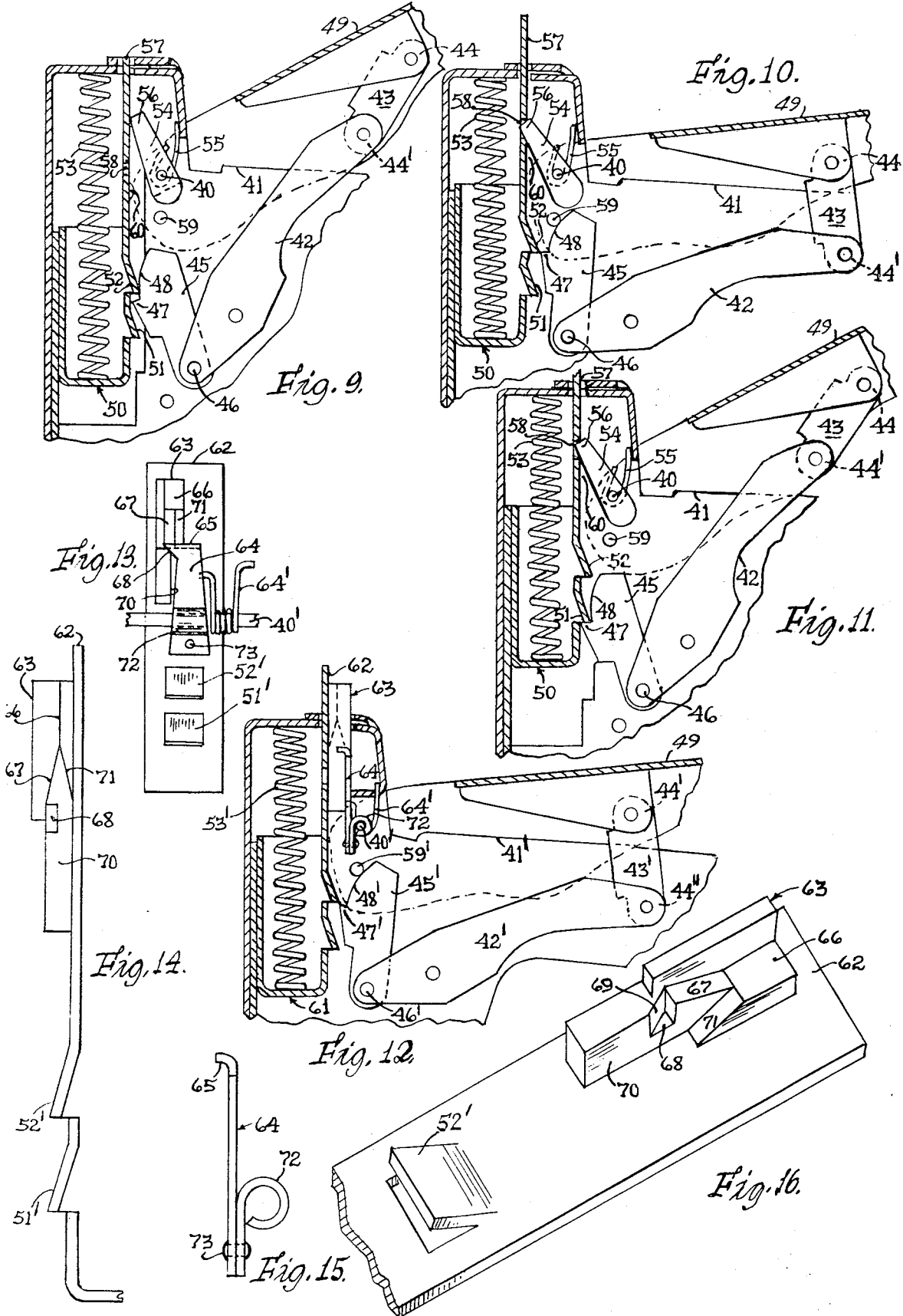


Fig. 3



STAPLER DEVICE

SUMMARY OF THE INVENTION

A hand-held and-operated staple-driving tool having a staple-driving mechanism including a spring-loaded ram and plunger, a handle which when forcibly compressed upon the hand-grip portion of the tool, pivots a trigger which moves the ram and plunger against a coil spring into a first or cocked position. The ram and plunger is provided with an opening into which projects a latch pin when such parts are brought into registration by movement of the ram and plunger by the handle and trigger, and which holds the ram and plunger in its cocked position. At the cocked position of the staple-driving mechanism, the handle and trigger are permitted to return to their original position, whereupon by subsequent compression of the handle upon the hand-grip portion the latch is released when the ram and plunger is fully spring-loaded, so that the same may move into staple-driving position. By this arrangement, the compression force needed to actuate the tool is divided between the double handle operation, resulting in a simpler and easier operation of the stapler device.

The structural embodiment of the invention is best illustrated in the preferred form as shown in the accompanying drawings, wherein:

FIG. 1 is a perspective view of the stapler device;

FIG. 2 is a fragmentary side elevational view showing the parts of the stapler device of this invention in their normal position;

FIG. 3 is a fragmentary side elevational detail view similar to FIG. 2, showing the parts moved into cocked position;

FIG. 4 is a fragmentary side elevational view similar to FIGS. 2 and 3, showing the parts of the invention in position for a subsequent movement;

FIG. 5 is a side elevational view of the latch pin utilized in the device shown in FIGS. 2 through 4;

FIG. 6 is a front elevational view of the latch pin of FIG. 5;

FIG. 7 is a side elevational view of the ram and plunger as employed in this invention;

FIG. 8 is a rear view of the ram and plunger;

FIG. 9 is a fragmentary side elevational view showing a modified form of the invention with the parts in their original condition;

FIG. 10 is a fragmentary side elevational detail view of the parts of the modified form of the invention in a first or cocked position;

FIG. 11 is a fragmentary side elevational detail view of the device of FIGS. 9 and 10, showing the parts thereof in position for a subsequent operation;

FIG. 12 is a fragmentary side elevational detail view showing another modified form of the latching arrangement employed in this invention;

FIG. 13 is a rear elevational view of the ram and plunger employed in the device of FIG. 12;

FIG. 14 is a fragmentary side elevational view of the ram of the device of FIG. 12;

FIG. 15 is a side elevational view of the latch of the device shown in FIG. 12;

FIG. 16 is a fragmentary perspective view of the latching mechanism shown in FIG. 12.

A stapler device as shown at 10 in FIG. 1 is commonly known as a "compression tacker" and is utilized as a fastening tool whereby a staple may be driven into

surfaces such as wood, plaster, wallboard, insulation, plastic and the like.

The fastener 10 shown in FIG. 1 includes a hand-grip portion 11 closed at its front end by a head 12 and utilizes a handle 13 pivoted upon a pin 14 to a portion of the stapler body. The staple storage chamber and feeding of the staple may be accomplished in any manner and constitute no part of the present invention, such parts and function being well-known in the art.

As shown in FIG. 1, the handle 13 is normally held by spring-action (not shown) in raised position relative to the hand-grip portion 11. Within the handle 13 as well as the body of the stapler device 10 is a trigger 15 loosely pivoted upon a pin 16 by having the latter freely journaled into an elongated slot 17. One end of the trigger 15 provides a roller 18 which engages the undersurface of the handle 13 as clearly shown in FIG. 2. The opposite end of the trigger 15 provides a finger 19 which normally projects into an opening 20 formed in the rear wall surface 21 of a ram 22.

The ram 22 is normally constructed of a hollow rectangular shape and is slidably positioned within the hollow head 12 of the stapler 10. The ram 22 houses a compression spring 23 which becomes the driving force for the stapler 10. The front wall 24 of the ram 22 carries a downwardly projecting plunger 25 that effectually drives the staple out of the body of the device under the expansion force of the spring 23 when the latter is compressed as hereinafter explained.

Carried by the rear wall 21 of the ram 22 and extending in an upward direction opposite to that of the plunger 25 is an indicator tab 26. This tab 26 is positioned in alignment with a slot 27 formed on the top wall 28 of the hollow head 12, as shown in the drawings. Within the confines of the body of the stapler 10 as well as the handle 13, and journaled upon the pin 14, is a latch 29 having struck from the free end 30 thereof a latch finger 31. As shown in FIG. 6, the latch 29 has one end formed into a bifurcated circular bearing 32 which by a flange portion 33 is angularly disposed with respect to the longitudinal length of the latch 29. Adapted to be journaled on the pin 14 between the bifurcated bearing 32 of the latch 29 may be a light coil spring 34, one end 35 of which bears against the underside of the latch 29, while the opposite end 36 is suitably hooked over a portion of the hand-grip portion 11.

Also formed in the rear wall 21 of the ram 22 is a second opening 37 which is separated from the opening 20 by a ramp 38 struck outwardly from the face of the rear wall 21.

When the handle 13 is compressed against the hand-grip portion 11 of the stapler device 10, the trigger 15 will be caused to pivot about the pin 16 in a clockwise direction as shown in FIGS. 2, 3 and 4. The roller 18 will move down the handle 13, while the finger 19 of the trigger 15 which has been projected into the opening 20 formed in the rear wall 21 of the ram 22, will lift the ram 22 and plunger 25 upwardly as shown in FIGS. 2 and 3 within the hollow head 12 against the expansion of the spring 23. The ram 22 will move upwardly until the latch finger 31 is projected into the opening 37. At this point the finger 19 of the trigger 15 will have become disengaged from the opening 20 in the rear wall 21 of the ram 22. This is permitted through the loose pivotal connection of the trigger 15 with the pin 16 by reason of the slot 17, the lines of force then being

on the trigger 15 so as to cause it to so move on the pivot pin 16, as shown in FIG. 3.

In this initial moved position of the ram 22 and plunger 25 the indicator tab 26 will be projected through the slot 27 in the top wall 28 to indicate that these parts of the staple-driving mechanism are in a cocked position.

By releasing the compression force upon the handle 13, it once again is permitted to assume its normal position as shown in FIG. 4, wherein the trigger 15 will return to its normal position with the trigger finger 19 now positioned beneath the bottom wall 39 of the ram 22 and in a position to once again move the ram 22 and plunger 25 upwardly through the hollow head 12 upon a subsequent compression of the handle 13 onto the hand-grip portion 11 of the stapler 10.

Upon this second or subsequent movement, the latch 29 will have its latch finger 31 moved out of the opening 37 and upon the ramp 38, so that when the trigger 15 has again been moved into the position shown in FIG. 3 where it will be released from contact with the ram 22, the ram 22 and plunger 25 under the expansion of the spring 23, will quickly move downwardly within the hollow head 12, forcibly driving a staple from beneath the head 12, as is the normal operation of a device of this type. The ramp 38, by reason of the speed of return movement of the ram 22 under the expansion of the spring 23, will flip or drive the latch finger 31 sufficiently away from the face of the rear wall 21 of the ram 22 so that it will not accidentally project back into the opening 37. Thus, from the foregoing, it is seen that there is provided a first cocked position of the ram 22 and staple-driving plunger 25 which is achieved upon the first compression of the handle 13 upon the hand-grip portion 11 of the stapler 10. Upon a second or subsequent operation of the handle 13, the ram 22 and plunger 25 are further spring-loaded and released for quick return movement to their original position as shown in FIG. 2, wherein they will have driven a staple from the device. The multiple-stage operation of the handle 13 divides the required compression force upon the handle between the two compression actions, and therefore permits an easier operation of the stapler than has heretofore been achieved through similar devices.

In FIGS. 9 through 11 there is shown a modified construction wherein the handle 49 is pivoted on a pin 40 to the handle grip portion 41 of the stapler and includes a trigger arm 42 connected to the handle by a link 43 which has one end 44 pivotally connected to a supporting flange provided by the handle 49 and its opposite end 44' pivotally connected to the trigger arm 42. A lift arm 45 is pivotally connected as at 46 to an opposite end of the trigger arm 42 and provides a lift shoulder 47 which extends into a cam surface 48.

The ram 50 of the modified structure has struck therefrom two tabs 51 and 52 which, by engagement with the lift shoulder 47 of the lift arm 45, is raised against the compression of spring 53.

A releasable latch 54 is also pivoted on the pin 40 and by a light force coil spring 55 has its free upwardly extending end 56 in contact with the indicator 57 provided by the ram 50.

In operation, when the handle 49 is compressed upon the hand grip portion 41 of the stapler, the lift arm 45, through the cooperative pivot action of the link 43 and trigger arm 42, will raise the ram 50 against the com-

pression of the spring 53. This is accomplished by having the lift shoulder 47 of the lift arm 45 in contact with the tab 52 struck from the rear wall of the ram 50, with the lift shoulder 47 raising the ram 50 into the position shown in FIG. 10.

In such position as shown in FIG. 10, the latch 54 will have its free end 56 projected into the opening 58 formed in the indicator 57. At such time the cam surface 48 of the lift arm 45 will engage a pin 59 and be cammed in a clockwise direction as shown in FIG. 10, such that the lift shoulder 47 becomes disengaged from the tab 52.

By release of the compression force upon the handle 49, the same will return to its original position wherein the lift shoulder 47 of the lift arm 45 will engage the lower tab 51 formed in the ram 50 and be in condition to further raise the ram 50 against compression of the spring 53 by a subsequent compression of the handle 49. The ram 50 will be raised until the lift arm 45 is again pivoted through the contact of the cam surface 48 with the pin 59, to a point where the lift shoulder 47 is disengaged from the tab 51. At this point in the movement the free end 56 of the latch 54 will have moved out of the opening 58 so as to release the ram 50 for swift movement in a downward direction due to the expansion of the spring 53.

To assure against having the latch 54 becoming projected into the opening 58 during this swift uncontrolled movement of the ram 50 through expansion of the spring 53, there is provided a raised portion 60 that will pivot the latch 54 a sufficient distance in a clockwise direction as shown in FIGS. 9 through 11 such that its free end 56 cannot become aligned with the opening 58 as the ram 50 moves in a downward direction.

A further modification of the construction of a stapler embodying the concept of this invention is shown in FIGS. 12 through 16. In this modified form the ram 61 is provided with an indicating tab 62 which has on its one face a guide platform 63. This guide platform 63 cooperates with a pivotal latch 64 for latching the ram in an intermediate raised position such as was described by the explanation of the device shown in FIGS. 9 through 11.

The latch 64 provides a latch tip 65 which extends laterally to one side of the longitudinal axis of the latch 64 as well as transversely thereto. This latch tip 65 in the normal inoperative position of the stapler, rests upon a raised substantially flat portion 66 of the guide platform 63. As the ram 61 is raised through the action of the handle and its associated parts as heretofore described, the latch tip 65 will ride up the inclined ramp 67 of the guide platform 63 until it drops into the latch port 68. In this position, the ram 61 has been raised against the compression of the spring 53' into its first intermediate position such as heretofore described. Upon a second actuation of the handle, the latch tip 65 will be moved out of the latch port 68 by reason of its contact and travel on the angled wall 69 of such port 68 until it rides upon the raised wall 70 of the guide platform 63. When the ram 61 has been raised a sufficient distance by the second actuation of the handle and it becomes released by disengagement of the lift arm 45', the spring 53' will expand, moving the ram 61 in a downward direction, with a swift movement, with the latch tip 65 following the raised wall 70 of the guide platform 63 until it passes beyond the latch port 68, at which time it will ride up the second inclined ramp 71,

until it once again is positioned upon the flat portion 66 of the guide platform 63.

To accomplish this particular movement, the latch pin 64 provides a pivot plate 72 which is mounted upon the pivot pin 40', with the connection between the latch 64 and the pivot plate 72 being accomplished by a pivot pin 73 which permits the latch 64 to have a limited pivotal movement about the pin 73 with respect to the pivot plate 72. The pin 64 as well as the plate 72 are yieldably mounted on pivot pin 40' and held in operative position by a coil spring 64' as shown.

From the foregoing description of the several variations of construction incorporating the concepts of this invention, it is obvious that I have provided a stapler which is readily actuated through a multiple-stage action which can best be described as a first cocked position and a second firing condition, resulting in dividing the necessary manual compression force upon the handle by the user of the stapler, resulting in ease of operation and permitting longer continuous use of the device without physical strain or fatigue.

While I have illustrated and described a preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A stapler device including a housing for a spring-driven staple-driving plunger and providing a hand-grip portion to which is pivotally connected a compressible handle, wherein the improvement comprises

- a. a plunger-carrying ram within the body of the device and movable in a predetermined path therein,
- b. a ram-moving means in contact with the handle and in releasable contact with said ram for moving the same in one direction against the spring,
- c. means for holding said ram in one position and against movement by its spring in an opposite direction after said ram has been moved a predetermined distance by said ram-moving means,
- d. means on said holding means releasing said holding means from said ram during subsequent further movement of said ram in one direction by said ram-moving means, and
- e. means for preventing engagement between said holding means and said ram when the latter is moved by its spring in a staple-driving direction after said ram-moving means is released from said ram.

2. A stapler device as defined by claim 1, wherein said ram-moving means comprises a pivotal lift finger having connections to said handle and with said ram during a portion of its pivotal movement so as to move

said ram in said one direction against its spring when the handle is compressed upon the hand-grip portion of the device and adapted to be released from contact with said ram when said holding means engages said ram after it has been moved a predetermined distance by said lift finger.

3. A stapler device as defined by claim 1 wherein said holding means comprises a latch pin pivotally carried within the housing of the device and having a free end in contact with a portion of said ram and adapted to project into an opening formed in such portion of the ram for releasably latching said ram against movement in said opposite direction by its spring.

4. A stapler device as defined by claim 2, wherein said holding means comprises a latch pin pivotally carried within the housing of the device and having a free end in contact with a portion of said ram and adapted to project into an opening formed in such portion of the ram for releasably latching said ram against movement in said opposite direction by its spring.

5. A stapler device as defined by claim 1 wherein said means for preventing contact between said holding means and said ram comprises a ramplike member carried by said ram in the path of said holding means as the latter contacts the ram during its movement in said opposite direction by its spring, with said ramplike member pivoting said holding means out of contact with said ram during such movement.

6. A stapler device as defined by claim 5, wherein said ram-moving means comprises a pivotal lift finger having connections to said handle and with said ram during a portion of its pivotal movement so as to move said ram in said one direction against its spring when the handle is compressed upon the hand-grip portion of the device and adapted to be released from contact with said ram when said holding means engages said ram after it has been moved a predetermined distance by said lift finger.

7. A stapler device as defined by claim 3, wherein said means for preventing contact between said latch pin and said ram comprises a ramplike member carried by said ram in the path of the free end of said latch pin as the latter contacts the ram during its movement in said opposite direction by its spring, with said ramplike member pivoting said latch pin out of contact with said ram during such movement.

8. A stapler device as defined by claim 1 further characterized by the inclusion of an indicator carried by said ram for visually indicating the latched position of said ram after it has been moved a predetermined distance in one direction by said ram-moving means.

9. A stapler device as defined by claim 5 further characterized by the inclusion of an indicator carried by said ram for visually indicating the latched position of said ram after it has been moved a predetermined distance in one direction by said ram-moving means.

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