June 30, 1942.

K. M. VOGEL

2,288,500

STAPLING DEVICE

Filed Sept. 18, 1940

2 Sheets-Sheet 1

Fig. 1.

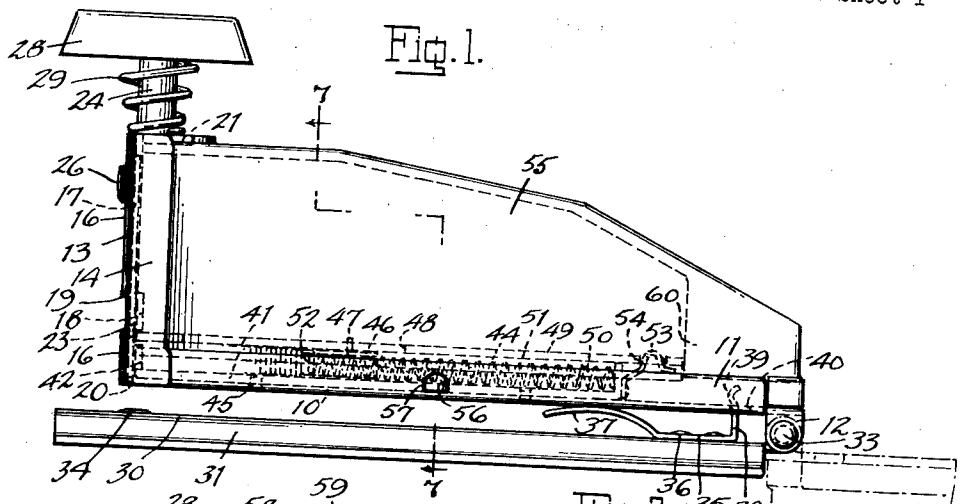


Fig. 3.

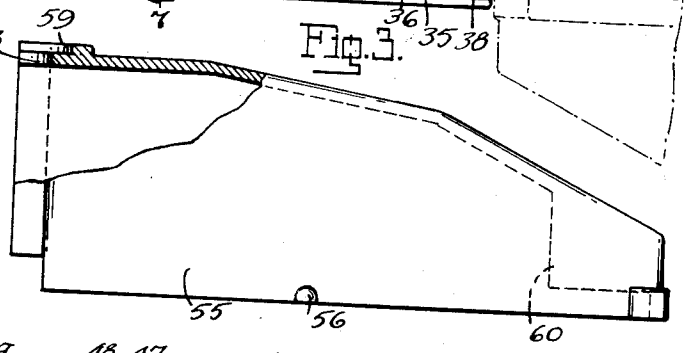
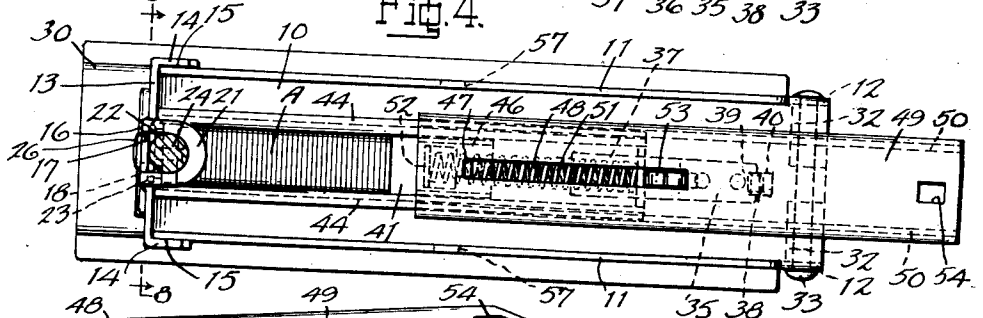


Fig. 2.

Fig. 4.



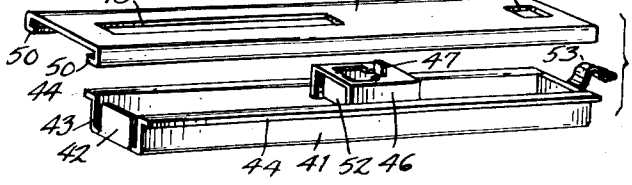


Fig. 5.

INVENTOR
KURT M. VOGEL.
BY
ATTORNEY

June 30, 1942. K. M. VOGEL 2,288,500

STAPLING DEVICE

Filed Sept. 18, 1940 2 Sheets-Sheet 2

Fig. 6.

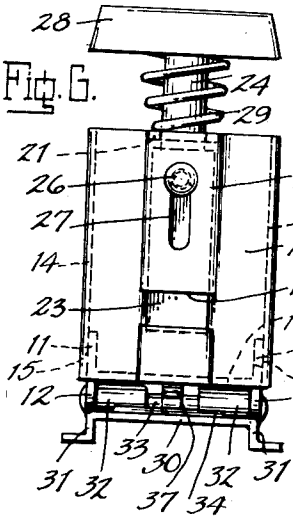


Fig. 7.

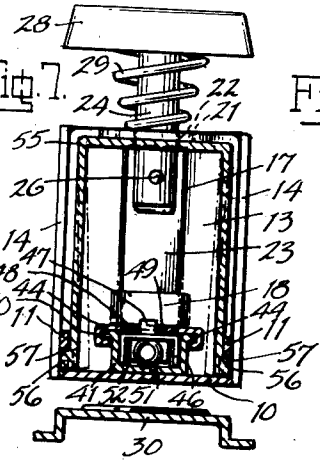


Fig. 8.

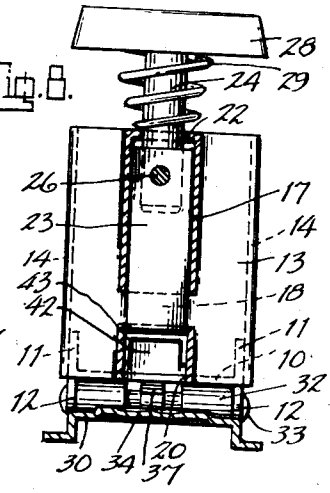


Fig. 9.

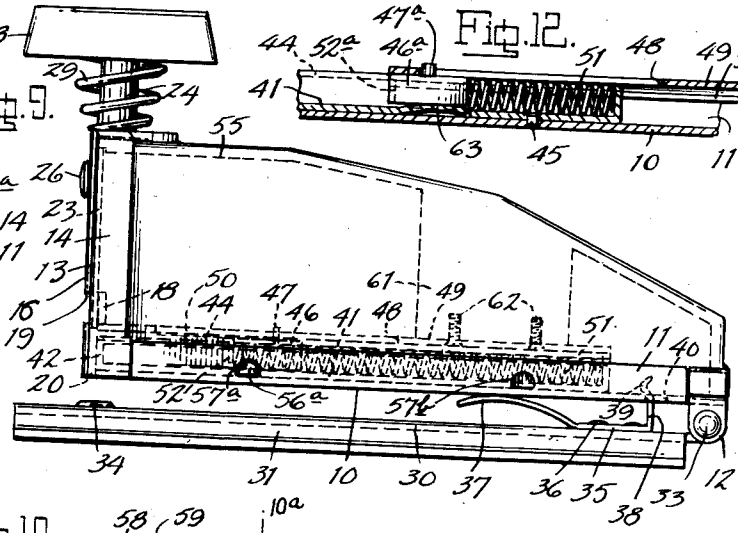


Fig. 11.

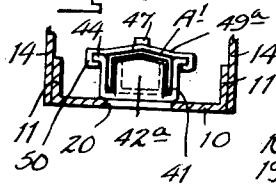


Fig. 12.

Fig. 10.

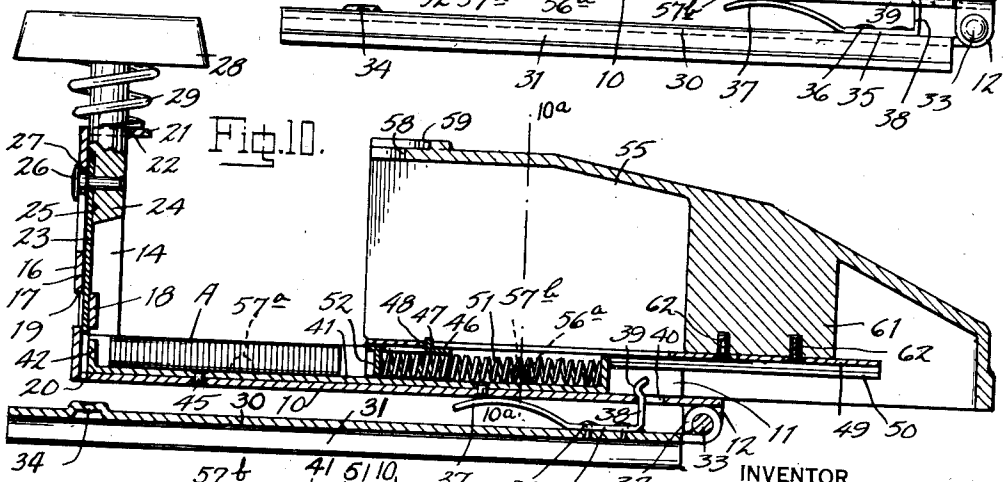
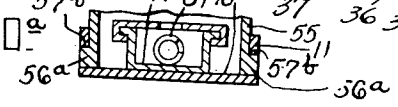


Fig. 10a.



INVENTOR
KURT M. VOGEL.
BY
ATTORNEY

Patented June 30, 1942 2,288,500

UNITED STATES PATENT OFFICE

2,288,500

STAPLING DEVICE

Kurt M. Vogel, Bridgeport, Conn.

Application September 18, 1940, Serial No. 357,222

10 Claims. (Cl. 1—3)

The present invention relates to an improvement in stapling devices, and has for an object to provide a device of this character in which the operation of loading the device with staple strips is greatly simplified, and in which the staple strip magazine or carrier and the cooperative staple driving means are of extremely simple and economical construction, which at the same time lend itself to greater accuracy and strength. While the device may therefore be produced at relatively small cost it will at the same time be efficient in operation and not likely to get out of order readily, and such as is the case with the usual type of inexpensive stapling device where strength and accuracy are sacrificed to cheap production. It is particularly proposed to provide a staple magazine or carrier in the form of an elongated box-like member having a slidable cover, and which is adapted to have the staple strip placed therein with the cover in open position, the cover being thereupon moved to closed position to constitute an upper limit abutment for the upper side of the staple strip to maintain it in properly aligned relation within the magazine or carrier. It is further proposed to provide a stapling device in which all parts of the staple driving channel including the staple driver will remain in unseparated and aligned relation during the opening of the staple magazine, so that there will be no likelihood of these parts becoming mis-aligned.

It is further proposed to provide improved spring pressed staple pusher means arranged to be retracted through the opening of the cover, and further to provide improved retaining means for releasably retaining the pusher in retracted position while the staple strip is being placed in the stapling device. It is a further object to provide such retaining means which will be gradually released through the manual closing of the cover so that the pusher will not be engaged with the strip under sudden impact, as is the case of the usual type of pusher retaining means which upon release permits the pusher to forceably shoot forward into engagement with the staple strip with resultant damage to the strip, as well as to the structure of the stapling device.

With the above and other objects in view, embodiments of the invention are shown in the accompanying drawings, and these embodiments will be hereinafter more fully described with reference thereto, and the invention will be finally pointed out in the claims.

In the drawings:

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

Fig. 2 is a longitudinal vertical sectional view showing the housing member removed and the staple strip magazine member in its open position to receive a staple strip.

Fig. 3 is a view partially in side elevation and partially in vertical section of the housing member, removed from the stapling device.

Fig. 4 is a horizontal sectional plan view, taken along the line **4—4** of Fig. 2.

Fig. 5 is a perspective view showing the staple strip magazine removed from the device, the cover and staple strip pusher being shown in separated relation.

Fig. 6 is a front elevation of the device.

Fig. 7 is a vertical sectional view, taken along the line **7—7** of Fig. 1.

Fig. 8 is a vertical sectional view, taken along the line **8—8** of Fig. 4.

Fig. 9 is a side elevation of a stapling device according to a modified form of the invention.

Fig. 10 is a view, partially in vertical section and partially in side elevation, of the modification shown in Fig. 9, and showing the same in its open position to receive a staple strip.

Fig. 10^a is a fragmentary vertical sectional view, taken along the line 10^a—10^a of Fig. 10.

Fig. 11 is a forward end view of a modified form of staple strip magazine for receiving a crowned staple strip.

Fig. 12 is a fragmentary sectional view illustrating a modified form of retainer for the staple strip pusher.

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

Referring to the drawings, and more particularly to Figs. 1 to 8 thereof, the stapling device according to the exemplary illustrated embodiment of the invention shown therein comprises an upper frame member, preferably formed from a single piece of sheet metal, blanked, pressed and bent to shape, and consisting of a horizontal bottom portion **10** of rectangular shape provided with side flanges **11—11** bent upwardly at right angles and with a pair of downwardly bent apertured ears **12—12** at its rearward end for the purpose of hingedly connecting the upper frame member to the base, as will presently more fully appear.

A front wall **13** is bent upwardly at right angles from the forward end of the bottom por-

tion 10, and is provided with rearwardly bent side flanges 14—14, which engage at the outer sides of the forward ends of the side flanges 11—11, the forward vertically disposed edges of the flanges 11 being abutted by the inner surface of the front wall 13 to thus rigidly support the front wall in fixed position. The overlapping portions of the flanges 11 and 14 are preferably secured together by spot-welding, as at 15, although other suitable fastening means for rigidly securing them may be employed.

The front wall 13 is provided with an outwardly pressed vertically disposed channel forming portion 16 providing a parallel sided staple driver guide channel 17 upon the inner surface of the front wall, the staple driver adapted to be retained at its rearward face by means of a rearwardly offset retaining band portion 18, blanked from the portion 16 of the front wall and forming therein a slot 19. At the lower end of the channel 17 there is provided in the bottom portion 10 a slot 20 through which the individual staples are pressed downwardly through actuation of the staple driver. At the upper end of the channel forming portion 16 there is provided a rearwardly bent horizontal plunger bearing portion 21 having an aperture 22 therein adapted to be slidably engaged by the staple driver plunger, presently to be more fully described.

The staple driver 23 is in the form of rectangular steel plate, and is engaged for vertical sliding movement in the channel 17, its forward face being slidably engaged with the inner surface of the forwardly offset channel forming portions 16, its rearward surface being engaged by the inner surface of the rearwardly offset retaining band portion 18, and its vertical edge surfaces being engaged by the parallel side wall surfaces of the forwardly and rearwardly offset portions 16 and 18.

The cylindrical driver actuating plunger 24 is provided with a flattened surface 25 which is engaged by the upper end of the driver 23, which is secured thereto by means of a headed shouldered rivet 26, the headed shoulder portion of which is engaged in a slot 27 in the forwardly offset wall portion 16, and which limits the up and down movement of the plunger and driver. The plunger is slidably engaged in the aperture 22 of the bearing portion 21, and is provided at its upper end with a flanged head 28, a spring 29 being disposed about the plunger between the underside of the head 28 and the bearing portion 21, this spring normally retaining the plunger and driver in their upper position, which is limited by the upper end of the slot 27 and returning the plunger and driver to this position after they have been depressed to drive the staples.

The base member 30 of the device is formed from sheet metal and is provided along its side edges with downwardly bent side walls 31—31, and at its rearward end with curled bearing portions 32 engaged by a hinge pin 33 mounted at its ends in the apertured ears 12—12 of the frame member, to thus hingedly connect the frame member to the base. The base member is provided near its forward end with an anvil formation 34 in line with the slot 20, and which is adapted in the usual way to clinch the staple legs when the staples are driven by the driver. A spring member secured at its intermediate base portion 35 by rivets 36 to the base member includes a forwardly projecting convex leaf spring portion 37, which engages and yieldably supports the underside of the frame member to permit the frame member to be depressed during the stapling operation, and at its rearward end an upwardly extending spring portion 38 having a rounded nose end 39 engaged through a slot 40 in the base portion 10 of the frame member, and which yieldably retains the frame member against upward swinging movement from the normal operative position as indicated in Figs. 1 and 2, but which permits the frame member to be forceably released so that it may be swung to a position 180° removed from the normal operative position, as shown by dot-and-dash lines, for the purpose of being used without the anvil as a tacker.

The staple strip receiving magazine consists of an elongated box-like receptacle 41 having a right angularly bent front wall portion 42 spaced at its side edges from the side walls of the receptacle and having its upper edge downwardly spaced from the upper edges of the side walls to provide an inverted U-shaped ejection space 43 through which the forward end of the staple strip A moves. The side walls of the receptacle are provided at their upper edges with outwardly bent flange portions 44—44 for sliding engagement therewith of the cover member presently to be more fully described. The staple strip receptacle 41 is rigidly secured to the base member 10 by means of rivets 45 with the forward surface of the front wall portion 42 aligned with the rearward wall of the staple ejection slot 20.

The staple strip pusher is in the form of an inverted U-shaped channel member 46 slidably engaged between the side walls of the receptacle 41 and provided at its upper side with an upwardly projecting lug 47 which is engaged in a slot 48 in the slidable cover member 49 which is provided upon its longitudinal edges with downwardly and inwardly bent flange portions 50—50 which slidably engage the flanges 44 of the side walls. A helical spring 51 is provided between the rearward surface of a lug 52 bent downwardly from the upper side of the pusher and the rearward wall of the receptacle and normally exerts forward pressure on the pusher to force the staple strip A forwardly so that the forward staple in the strip is disposed in the staple driving passage. The forward surface of the lug 52, which is rearwardly offset from the forward edge of the pusher constitutes a recessed abutment against which rearward surface of the front wall portion 42 engages when the last staple in the strip is in the staple driving passage, the forward edge of the pusher being aligned with the forward surface of the front wall portion 42 in this position.

In the normal closed position of the cover member 49 its forward end engages beneath the rearwardly offset band portion 18 and constitutes an upper limit guide surface for the staple strip to prevent its upward displacement in the staple strip magazine. When all of the staples of a staple strip have been used, in which case the pusher 46 is in its extreme forward position against the forward wall portion 42 and its lug 47 is in engagement with the forward end of the slot 48 of the cover member, a new staple strip may be inserted by moving the cover member to the open position as shown in Fig. 2, the opening movement of the cover member simultaneously causing the pusher 46 to be retracted. The cover is releasably retained in this retracted

position by means of a detent spring member 53, secured to the rearward wall of the receptacle 41, which snaps into engagement with the rearward end of the slot 48, and thus the cover and the staple strip pusher are releasably retained in retracted position against the force of the spring 51. The staple strip may thereupon be placed in the receptacle 41 and thereupon the cover may be released by depressing the detent spring member 53 and slid to closed position, the forward movement of the cover, which may be restrained and controlled by the operator, allowing the pusher to move forward gradually into engagement with the staple strip under pressure of the spring 51. In the closed position of the cover the detent spring member 53 snaps into engagement with a slot 54 in the rearward end of the cover and releasably retains it in closed position.

While the mechanical operative parts of the invention are complete as above described, I preferably provide the device with a removable housing 55, both for the purpose of protection and appearance, this housing being open at its lower side and forward end and being formed of metal, moulded plastic material or other suitable substance which will permit of a slight flexing of the side walls. The side walls of the housing are engaged with the inner sides of the flanges 11—11 and are releasably connected thereto by means of lugs 56—56 formed upon the respective outer sides of the housing at its lower edge and engaged in apertures 57—57 in the respective flanges 11—11. The side walls of the housing being slightly flexible or resilient enables them to be pressed inwardly so as to disengage the lugs 56 from the apertures 57, as indicated in dot-and-dash lines in Fig. 7, to thus permit the cover to be readily removed or engaged. The upper wall of the housing is notched at its forward edge, as at 58, to embrace the plunger 24 beneath the bearing portion 21, the upper side of the housing being recessed in surrounding relation to the notch, as at 59, to receive the bearing portion 21. An abutment formation 60 formed interiorly upon the housing at its rearward portion abuts the rearward end of the cover 49 in the closed position and serves to press the cover to completely closed position in the event that the operator has failed to completely close it.

In Figs. 9 and 10 I have illustrated a modified form of the invention in which the cover member 49 of the receptacle 41 is adapted to be moved to open and closed positions by means of the housing member, and in which the detent spring member 53 for retaining the staple strip pusher 46 in retracted position is dispensed with. For this purpose the housing member 55 is provided interiorly with a supporting formation 61 at its rearward portion, and to the lower surface of which the cover member 49 is secured by means of screws 62. The flanges 11—11 of the frame are provided with apertures 57^a—57^a near their forward ends and similar apertures 57^b—57^b near their rearward ends, the forward apertures adapted to be interlockingly engaged by lugs 56^a—56^a upon the side walls of the housing member in the forwardly moved closed position of the housing member, as indicated in Fig. 9, and the apertures 57^b—57^b adapted to be engaged by these lugs in the rearwardly moved open position, as indicated in Figs. 10 and 10^a, this latter engagement acting as a detent to retain the pusher member 46 in retracted position against the force of the spring 51. The sliding engagement of the cover member 49 with the flanges 44 of the receptacle maintains the housing member in parallel relation to the receptacle as it is moved between its closed and open positions.

In operation the housing member is pressed inwardly at the sides to release the lugs 56^a from the forward apertures 57^a and the cover is slid rearwardly to the point where the lugs spring into engagement with the rearward apertures 57^b, the cover of the receptacle and pusher block being simultaneously moved to open and retracted positions, so that the staple strip A may be conveniently placed within the receptacle. In order to close the housing member its sides are pressed inwardly to release the lugs 56^a from the rearward apertures 57^a, and it is thereupon slid to its forward closed position where the lugs 56^a snap into engagement with the apertures 57^a to releasably retain the parts in this closed position. During the forward movement of the housing the staple strip pusher member moves forwardly under the pressure of the spring to the point where it engages and presses the staple strip A forwardly, being restrained in this engaging movement by the forward manually controlled movement of the housing and cover members, to thus prevent the pusher block member from engaging the staple strip with a sudden forcible impact.

In Fig. 11 I have illustrated a modified form of staple strip receptacle adapted for receiving a special shaped crowned staple strip A^1, the upper edge of the front wall portion 42^a and the cover member 49^a being shaped to conform to the crowned bridge of the staple strip. It will be understood that the receptacle and its cover may be shaped to conform to any desired form of staple.

In Fig. 12 I have illustrated a further modified form of the invention in which the staple strip pusher is adapted to be releasably retained in retracted position by means of a wedging springy tongue 63 formed in the base of the receptacle 41, the pusher sliding upwardly upon this tongue as it is retracted by opening of the cover and being thus tightly pressed between the tongue and the underside of the cover, the flanges 50 of the cover at the same time being tightly pressed upwardly against the undersides of the flanges 44 to retain the cover in retracted position. In this embodiment the pusher is shown as being in the form of a solid rectangular block 46^a provided with a pin 47^a engaged in the slot 48 of the cover and having in its forward face a recess 52^a in which the front wall portion 42 of the receptacle is engaged in the fully projected position of the pusher. After a staple strip has been placed in the open receptacle the cover member is closed by pushing it forwardly with sufficient force to overcome the frictional resistance created by the wedging tongue 63. The modification shown in Fig. 12 is to be used with the stapler shown in Fig. 1, the cover member 49 being retained in closed position by means of the abutment formation 60 of the housing member 55.

I have illustrated and described preferred and satisfactory embodiments of the invention, but it will be understood 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. In a stapling machine including a frame member and staple driving means at one end of said frame member having a staple driving passage, a staple magazine carried by said frame member comprising an elongated receptacle having side walls and an open upper side extending to said staple driving passage, a cover member slidably engaged with said side walls of said receptacle adapted in the closed position to extend to said staple driving passage to constitute a limit abutment to prevent upward displacement of the staples in said receptacle and in the open position to expose the interior of said receptacle for insertion of staples therein, a staple pusher member disposed in said receptacle, a spring disposed in said receptacle and normally pressing said pusher member forwardly against the staples therein, and connection means between said pusher member and said cover member whereby upon rearward opening movement of said cover member said pusher member is retracted against the force of said spring.

2. In a stapling machine including a frame member and staple driving means at one end of said frame member having a staple driving passage, a staple magazine carried by said frame member comprising an elongated receptacle having side walls, a cover member slidably engaged with said receptacle adapted in the closed position to constitute a limit abutment to prevent upward displacement of the staples in said receptacle and in the open position to expose the interior of said receptacle for insertion of staples therein, a staple pusher member disposed in said receptacle, a spring disposed in said receptacle and normally pressing said pusher member forwardly againstt the staples therein, said cover member having a longitudinal slot therein, and a lug carried by said pusher member adapted to be engaged by the forward end of said slot during opening movement of said cover member to retract said pusher member, said slot permitting relative longitudinal movement of said pusher member in said receptacle in the closed position of said cover member.

3. In a stapling machine including a frame member and staple driving means at one end of said frame member having a staple driving passage, a staple magazine carried by said frame member comprising an elongated receptacle having side walls, a cover member slidably engaged with said receptacle adapted in the closed position to constitute a limit abutment to prevent upward displacement of the staples in said receptacle and in the open position to expose the interior of said receptacle for insertion of staples therein, a staple pusher member disposed in said receptacle, a spring disposed in said receptacle and normally pressing said pusher member forwardly against the staples therein, connection means between said pusher member and said cover member whereby upon rearward opening movement of said cover member said pusher member is retracted against the force of said spring, and means arranged to releasably retain said cover member in retracted position.

4. In a stapling machine including a frame member and staple driving means at one end of said frame member having a staple driving passage, a staple magazine carried by said frame member comprising an elongated receptacle having side walls, a cover member slidably engaged with said receptacle adapted in the closed position to constitute a limit abutment to prevent upward displacement of the staples in said receptacle and in the open position to expose the interior of said receptacle for insertion of staples therein, a staple pusher member disposed in said receptacle, a spring disposed in said receptacle and normally pressing said pusher member forwardly against the staples therein, connection means between said pusher member and said cover member whereby upon rearward opening movement of said cover member said pusher member is retracted against the force of said spring, and detent means adapted to be releasably engaged by said cover member in its respective closed and retracted positions to respectively restrain opening and closing movement thereof.

5. In a stapling machine including a frame member and staple driving means at one end of said frame member having a staple driving passage, a staple magazine carried by said frame member comprising an elongated receptacle having side walls, a cover member slidably engaged with said receptacle adapted in closed position to constitute a limit abutment to prevent upward displacement of the staples in said receptacle and in the open position to expose the interior of said receptacle for insertion of staples therein, a staple pusher member disposed in said receptacle, a spring disposed in said receptacle and normally pressing said pusher member forwardly against the staples therein, connection means between said pusher member and said cover member whereby upon rearward opening movement of said cover member said pusher member is retracted against the force of said spring, and wedge means in the base of said receptacle adapted to be engaged by said pusher member in its retracted position to wedge said pusher member against said cover member to restrain forward movement thereof.

6. In a stapling device, a frame member, and staple driving means at one end of said frame member having a staple driving passage, a staple carrying magazine comprising an elongated receptacle carried by said frame member, a cover member slidably engaged upon said receptacle for longitudinal opening and closing movement, and a housing member for said frame member secured to said cover member, said housing member adapted to be longitudinally moved between open and closed position and to simultaneously open and close said cover member.

7. In a stapling device, a frame member, and staple driving means at one end of said frame member having a staple driving passage, a staple carrying magazine comprising an elongated receptacle carried by said frame member, a cover member slidably engaged upon said receptacle for longitudinal opening and closing movement, and a housing member for said frame member secured to said cover member, said housing member adapted to be longitudinally moved between said open and closed position and to simultaneously open and close said cover member, and detent means for yieldably retaining said housing member in its respective open and closed positions.

8. In a stapling device, a frame member, and staple driving means at one end of said frame member having a staple driving passage, a staple carrying magazine comprising an elongated receptacle carried by said frame member, a cover member slidably engaged upon said receptacle for longitudinal opening and closing movement, and a housing member adapted to be longitudinally

moved between open and closed position and to simultaneously open and close said cover member, a spring pressed staple strip pusher member carried by said receptacle, connection means between said pusher member and said cover member whereby movement of said cover member to open position retracts said pusher member against the force of its spring, and means arranged to yieldably retain said housing member in its open position.

9. In a stapling device, a frame member and staple driving means at one end of said frame member having a staple driving passage, a staple carrying magazine comprising an elongated receptacle carried by said frame member, a cover member slidably engaged upon said receptacle for longitudinal opening and closing movement, and a housing member for said frame member secured to said cover member, said housing member adapted to be longitudinally moved between open and closed position and to simultaneously open and close said cover member, said housing member having a flexible portion including detent means and means carried by said frame member for interlocking engagement of said last named means in the respective open and closed positions of said housing member.

10. In a stapling device, a frame member, and staple driving means at one end of said frame member having a staple driving passage, a staple carrying magazine comprising an elongated receptacle carried by said frame member, a cover member slidably engaged upon said receptacle for longitudinal opening and closing movement, and a housing member for said frame member secured to said cover member, said housing member adapted to be longitudinally moved between open and closed position and to simultaneously open and close said cover member, said frame member having side flanges, and said housing member having resilient flexible side walls engaged within said flanges and cooperative detent means on said flanges and side walls for interlocking engagement in the respective open and closed positions of said housing member adapted to be engaged and disengaged through the inward flexing of said side walls.

KURT M. VOGEL.