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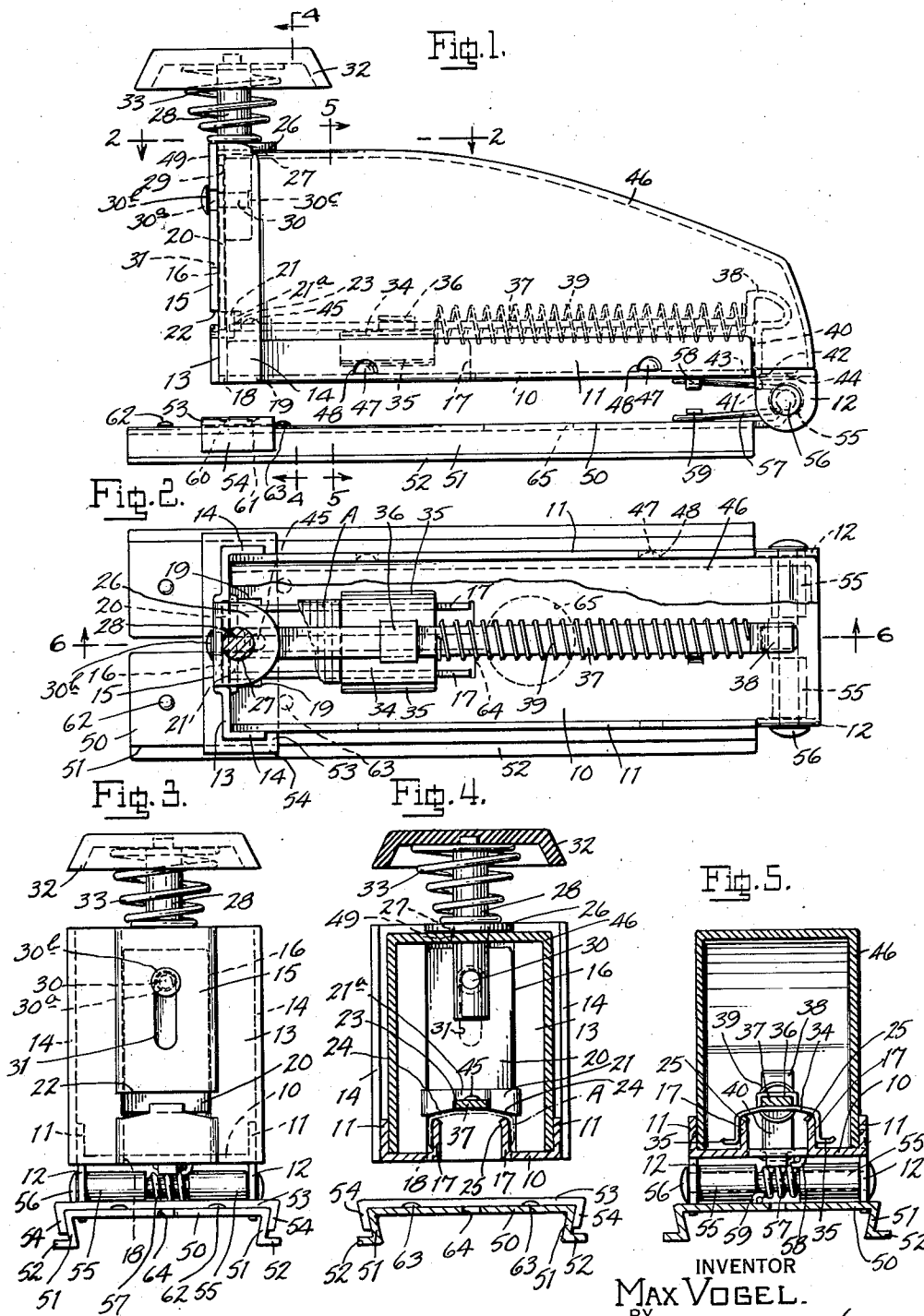
M. VOGEL

2,298,520

STAPLING MACHINE

Filed Aug. 29, 1939

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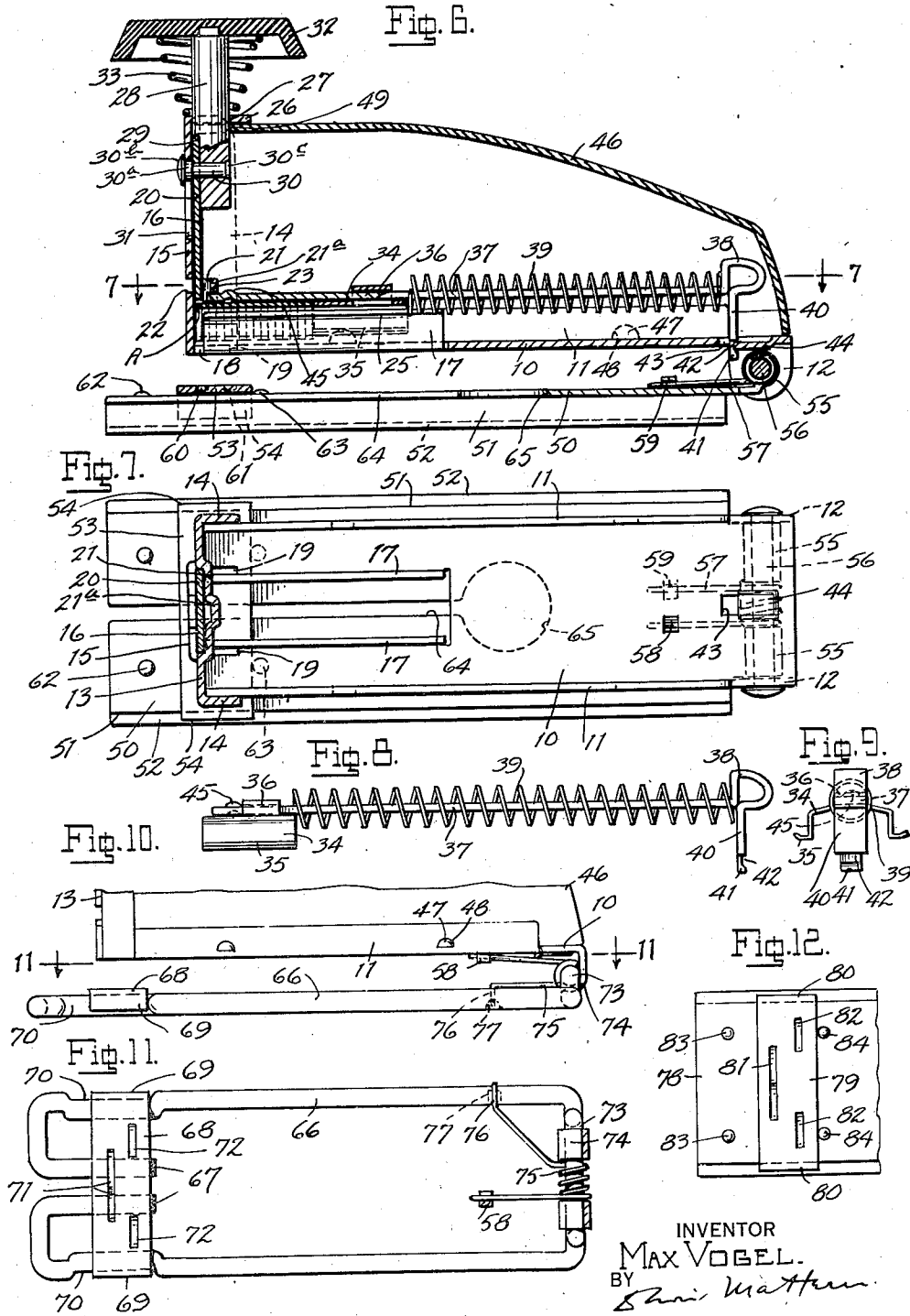
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Fig. 13.

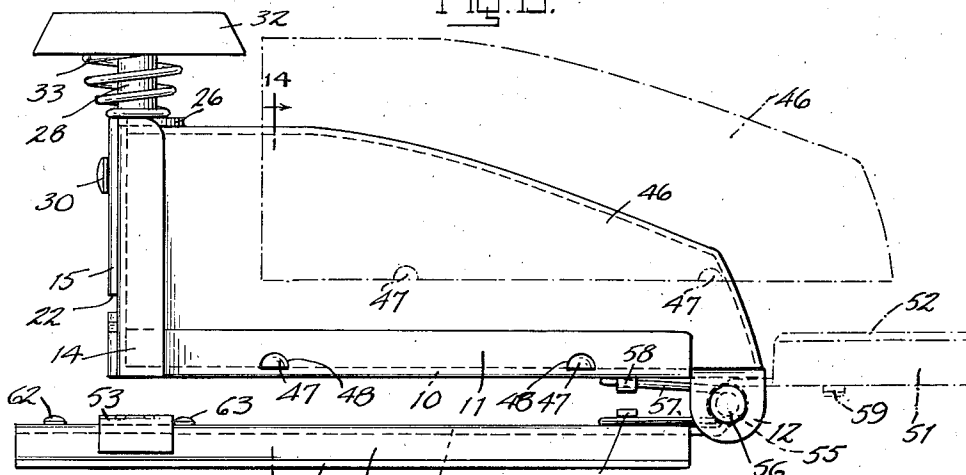


Fig. 14.

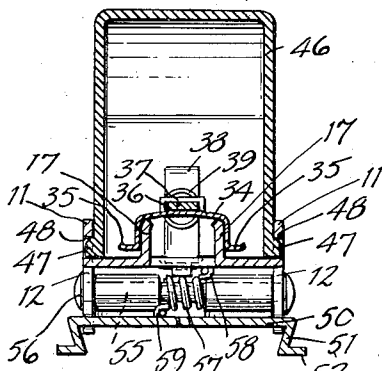


Fig. 15.

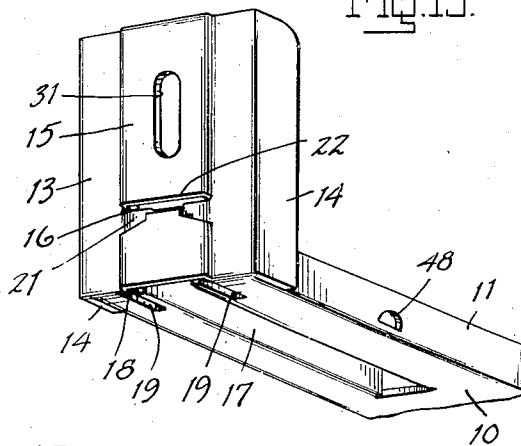
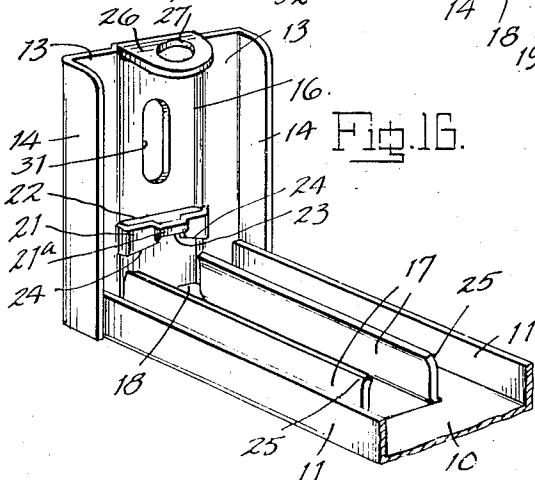


Fig. 16.



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STAPLING MACHINE

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10 Claims. (Cl. 1—3)

The present invention relates to an improvement in stapling machines, and has for an object to provide a stapling machine of extremely simple and inexpensive construction in which the major parts are formed of sheet metal bent to shape, and in which such parts may be assembled with a minimum of operations.

It is a further object to provide a stapling machine of sturdy construction which will withstand rough usage, and in which the operating parts will be effectually maintained in proper working relation so as to insure the proper feeding and driving of staples.

It is particularly proposed to provide the staple carrying rail and ejecting passage as integral parts of a sheet metal frame member consisting of a bottom and a front wall bent at right angles thereto, the rail being in the form of a pair of flanges blanked and bent from the bottom and the ejecting passage being formed by a slot in the bottom contiguous to the bend so that the front wall forms one side of the passage. It is further proposed to provide cooperating side flange means upon the bottom and front walls for the purpose of providing rigid reinforcing means, and for accurately securing the bent relation of the bottom and front walls.

A further object is to provide staple driving means associated with the front wall, and to provide a staple driver passage formed in said front wall by means of oppositely offset guide portions which both vertically guide and laterally retain the staple driver. It is proposed to provide improved plunger means for driving the staple driver, and a unitary connection means connecting the staple driver rigidly to the plunger and slidably to the front wall.

Another object is to provide improved housing or cover member which may be readily removed and replaced for the purpose of loading the machine with staples, and which lends itself to manufacture from plastic material of different colors so that in addition to its function of enclosing the operating parts it will give to the stapling machine an extremely attractive appearance.

A further object is to provide an improved pusher means including a guide rod for the pusher, which guide rod is adapted to be secured in relation to the front wall, providing a limit guide above the staple strip to retain the latter against upward displacement from the staple carrying rail.

A further object is to provide improved base and anvil means, the anvil adapted to be adjustably moved between two operative positions to bring different anvil recesses into line with the staple driver passage, these recesses being respectively adapted to bend the staple legs inwardly in one case and outwardly in the other.

It is proposed to provide a one piece base member having inherent resiliency, such resiliency being utilized to yieldably retain the anvil in its operating positions while permitting it to be readily moved back and forth between such positions.

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 machine, according to one exemplary embodiment of the invention.

Fig. 2 is a horizontal sectional plan view, taken along the line 2—2 of Fig. 1, the housing or cover being partially broken away.

Fig. 3 is a front elevation.

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

Fig. 5 is a vertical sectional view, taken along the line 5—5 of Fig. 1.

Fig. 6 is a longitudinal vertical sectional view, taken along the line 6—6 of Fig. 2.

Fig. 7 is a horizontal sectional view, taken along the line 7—7 of Fig. 6, the staple pusher and the housing member being removed.

Fig. 8 is a side elevation of the staple pusher.

Fig. 9 is a rear elevation thereof.

Fig. 10 is a fragmentary side elevation, on a slightly reduced scale, of a modified form of the invention.

Fig. 11 is a horizontal sectional plan view, taken along the line 11—11 of Fig. 10.

Fig. 12 is a fragmentary plan view of the forward end of another modified form of base member and anvil, according to the invention.

Fig. 13 is a side elevation of the stapling machine, as shown in Fig. 1, and showing in dot-and-dash lines the cover member disengaged from the frame member, and also showing in dot-and-dash lines the extended position of the base member with reference to the frame member when the stapling machine is used as a tacker.

Fig. 14 is a vertical sectional view taken along the line 14—14 of Fig. 13.

Fig. 15 is a fragmentary perspective view of the forward end of the frame member from the front.

Fig. 16 is a fragmentary perspective view of the forward end of the frame member from the rear.

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

Referring to the drawings and more particularly to Figs. 1 to 9 and 13 to 16 thereof, the

stapling machine according to the exemplary illustrated embodiment of the invention shown therein comprises an upper frame member 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 at its rearward end for the purpose of hingedly mounting the upper frame member to the base, as will hereinafter more fully appear.

A front wall 13 is bent upwardly at right angles from the forward end of the bottom 10 and is provided with rearwardly bent side flanges 14—14, which engage at the outer sides of the side flanges 11, the forward vertically disposed edges of the side flanges 11 being abutted by the inner surface of the front wall 13 to thus rigidly support the front wall in vertical position. The overlapping portions of the flanges 11 and 12 are preferably secured together by spot welding, although other suitable means for rigidly securing them may of course be employed.

The front wall 13 is provided with an outwardly pressed vertically disposed channel forming portion 15 forming a staple driver guide channel 16 upon the inner surface of the front wall. In longitudinal line with the lower end of the channel 16 are a pair of staple rail flanges 17—17 blanked from the bottom 10 and bent upwardly therefrom at right angles, the forward ends of these flanges being spaced inwardly from the inner surface of the outwardly pressed staple driver channel portion 15 a distance corresponding to the width of a staple and thus providing a staple driving passage 18 in the bottom 10 at the lower end of the channel 16. This passage 18 is provided at each end with a longitudinally extending slot 19 extending rearwardly along the outer sides of the rail flanges 17 a distance substantially corresponding to the length of a staple leg, the plan outline of the passage 18 and the slots 19 being such that a staple may pass through the same in substantially horizontal position, thus preventing any possibility of buckling or jamming of the staples in the stapling machine, as might be caused for instance by contact of the staple legs with impenetrable material.

The staple driver 20 in the form of a rectangular steel plate is engaged for vertical sliding movement in the channel 16, and is retained against lateral displacement by means of a rearwardly bent retaining band portion 21, blanked from the portion 15 of the front wall and forming therein a slot 22 which corresponds in contour to the shape of the band 21. This band 21 is provided with a horizontal upper edge, while its lower edge is provided with an upwardly extending rectangular notch 23 adapted to receive the staple pusher carrying bar, as will presently more fully appear, the lower edges at each side of the notch 23 being inclined downwardly, as at 24 (Fig. 4). The intermediate notched portion of the band is rearwardly offset, as at 21^a. This lower edge shape is designed to correspond to the shape of the staples A, which as illustrated in dot-and-dash lines in Fig. 4, have a crowned bridge. The upper edges of the rail flanges 17 are curved in slightly, as at 25, to provide smooth supporting corners for the corners of the staple strip, also as illustrated clearly in Fig. 4.

At the upper end of the front wall channel forming portion 15 there is provided a rearwardly

bent horizontal plunger bearing portion 26, having a circular aperture 27 therein engaged by the cylindrical plunger 28, which is shouldered and flattened, as at 29, to engage flatly with the inner surface of the staple driver plate 20, and to bear upon the upper edge thereof, so that vertical pressure upon the plunger is directly applied in a vertical direction against the upper edge of the driver plate. The plunger is secured to the driver plate by means of a stud 30, having a shoulder 30^a and a head 30^b at its forward end, the shoulder being slidably engaged in a vertical slot 31 in the portion 15 to guide and limit the vertical movement of the plunger and staple driver plate, and the head, which is wider than the slot 31, being disposed upon the outer surface of the portion 15 to cooperate with the band portion 22 to maintain vertical alignment of the staple driver plate. The stud 30 is secured to the plunger by riveting, as at 30^c, this being the only assembly operation required to connect the operative parts of the machine.

Upon the upper end of the plunger there is secured a flanged head 32 preferably formed of a moulded plastic material, which may be moulded directly upon the plunger, and between the under surface of this head and the bearing portion 26 there is provided a tapered spiral spring 33 which normally presses the staple plunger and driver plate upwardly to its upper limit position determined by the upper end of the slot 31.

The staple strip pusher comprises a sheet metal pusher member 34 of inverted U-shape cross-section, the upper bridge portion corresponding to the crown shape of the bridge of the staples A and the lower ends of the side portions being provided with outwardly bent flanges 35, which provide finger grip means, as well as stop means for limiting the forward movement of the pusher through abutment with the inner sides of the front wall 13 at each side of the staple driver channel 16. A strap portion 36 is blanked and pressed upwardly from the upper portion of the pusher and is slidably engaged with an elongated bar 37 which not only provides a guide for carrying the pusher and its actuating spring, but also acts as an upper limit guide for the staple strip to retain it against upward displacement on the rail flanges 17. At its forward end the bar 37 is adapted to be engaged in the notch 23 in the bar 21, and at its rearward end it is bent upwardly and looped rearwardly, downwardly and forwardly, as at 38, to provide a finger grip portion and an abutment for the rear end of the spring 39, the forward end of the spring being engaged with the rearward end of the pusher 34.

A vertical downwardly extending portion 40 is bent from the portion 38 and at its lower end is provided with a shouldered reduced width portion 41 having a locking notch 42 extending transversely across its rearward face. A slot 43 is provided in the bottom 10, and rearwardly of this slot the bottom is recessed, as at 44, so that the rearward edge of the slot 43 is downwardly offset. This rearward edge is adapted to be lockingly engaged by the notch 42 upon engaging the lower end portion 41 in the slot 43, the rearward pressure of the spring 39 maintaining this locked position.

At the forward end of the bar 37 there is provided an upwardly pressed boss 45 which retains the pusher upon the bar when the latter is removed from the machine, as shown in Fig. 8. In assembling the spring and pusher upon the bar

they are slid into place thereon and thereupon the boss 45 is produced in the bar and retains the parts in assembled relation.

In the assembled relation of the pusher with the machine, as shown in Figs. 1, 2 and 6 there is sufficient forward clearance between the forward end of the bar and the lower end of the staple driver plate 20, and between the locking portion 40 and the forward wall of the slot 43, so that by slight forward pressure exerted upon the bar the notch 42 will be disengaged from the rearward wall of the slot 43 and the rod and pusher assembly may be removed for the purpose of loading the machine with a staple strip.

The machine is provided with a housing or cover 46, open at its lower and forward ends and which may be formed of metal, or moulded plastic material. The side walls of this housing are engaged with the inner sides of the flanges 11 and releasably connected thereto by means of semi-circular shaped rounded lugs 47—47, formed upon each side of the housing at its lower edge and engaged in semi-circular shape holes 48—48 in the respective flanges 11. The sides of the housing are slightly resilient, so that by pressing inwardly upon them the housing may be readily engaged and disengaged. The upper wall of the housing is notched at its forward edge, as at 49, to embrace the plunger 28 beneath the bearing portion 26.

The base member 50 of the machine is formed from sheet metal and is provided with downwardly bent side walls 51—51 and outwardly bent foot flanges 52—52, the side walls 51 being inclined inwardly so that they provide under-cuts for retaining the anvil member 53 in place, this anvil member being provided with downwardly bent inwardly inclined side flanges 54 which form both retaining means for the anvil and finger grip means to slide it upon the base. At its rearward end the base is provided with curled and spaced bearing extensions 55—55 engaged by a hinge pin 56 engaged at its ends in the apertured ears 12—12 of the housing member to thus hingedly connect the housing member to the base.

A spring 57 is coiled about the pin 56 between the bearing portions 55 and has one end engaged in a hook member 58 lanced and bent from the bottom 10, and its other end engaged in an oppositely disposed hook member 59 lanced and bent from the base 50. This spring is adapted to normally maintain the upper frame member in spaced parallel relation to the base, while permitting it to be depressed into engagement with the material being stapled. The spring also prevents the base and frame member from swinging away from each other when the machine is lifted. By unhooking an end of the spring from either the frame member or the base, the frame member may be swung through 180° with respect to the base so that the machine may be used without the anvil as a tacker, the staple legs being driven into the material being tacked without bending.

The anvil is provided with two sets of staple bending grooves, one set 60 adapted to bend the staple legs inwardly, and the other set 61 adapted to bend them outwardly, the respective anvil grooves being brought into line with the staple driver passage by sliding the anvil back and forth upon the base. Stop bosses 62 and 63 are provided upon the base to limit this sliding movement and to accurately determine the respective operative positions of the anvil. In order to frictionally retain the anvil in place, while permit-

ting it to be readily moved back and forth the base is rendered resilient by slotting it longitudinally along its center line, as at 64, this slot preferably terminating in an enlarged aperture 65, which may be circular or of any other suitable shape.

In Figs. 10 and 11 I have illustrated a modified form of the invention in which a resilient base member 66 is provided which is formed from heavy bent wire. This wire is bent into substantially rectangular form, and at its forward end the ends of the wire are bent rearwardly in parallel spaced relation, as at 67—67, to provide supporting means for the intermediate portion of the anvil member 68, the ends 69—69 of which are curled to engage about the sides of the base member within inwardly offset portions 70—70 thereof, which are adapted to limit the movement of the anvil back and forth to bring the respective sets of anvil grooves 71 and 72 into their operative positions. The resiliency of the wire base member frictionally retains the anvil member in its operative positions. The rearward end portion of the base is upwardly offset, as at 73, and forms a hinge pin for hingedly connecting the frame member to the base, the frame member being provided at its rearward end with a pair of spaced downwardly extending and curled bearing extensions 74—74 engaging about the portion 73. A spring 75 is coiled about the pin portion 73 between the bearing portions 74—74, one end of this spring being engaged with the retaining hook 58 of the frame member, while the other end is looped about one side of the base member 66, as at 76, the lower portion of the loop being engaged in a notch 77 provided upon the under surface of the side of the base member.

In Fig. 12 I have illustrated a further modification in which the base 78 is of rigid non-resilient form as distinguished from the resilient base members illustrated in the other embodiments. In this case the anvil member 79 is provided at its ends with springy side flanges 80 which frictionally retain the anvil in its operative positions while permitting it to be readily moved back and forth to bring its respective sets of anvil grooves 81 and 82 into operative positions, the stop bosses 83 and 84 determining the operative positions.

I have illustrated and described preferred and satisfactory embodiments of the 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. In a stapling machine, a frame member comprising a bottom wall having spaced parallel longitudinal upward bends disposed in a horizontal plane and constituting a pair of longitudinal side walls integrally connected to said bottom wall, and having transversely spaced and aligned upward bends at its forward end each in the same horizontal plane with and at right angles to said parallel longitudinal upward bends constituting a transverse front wall integrally connected to said bottom wall, there being a transverse staple driving passage formed in said bottom wall at its forward end intermediate said transverse upward bends, the front side of said passage being defined by the inner surface of said front wall intermediate said transverse upward bends and having its ends inwardly spaced from said longitudinal side walls, and staple driving means carried by said front wall in vertical alignment with said staple driving passage.

2. In a stapling machine, a frame member comprising a bottom, staple rail means carried by said bottom, a front wall connected to and extending upwardly from the forward edge of said bottom, the forward end of said staple rail means and the inner side of said front wall being spaced to provide a staple driving passage, staple driving means carried by said front wall, a guide bar, means on said front wall arranged to be removably engaged by the forward end of said bar, interlocking means cooperating between the rearward end of said bar and said bottom for removably connecting said bar to said bottom, said bar extending in parallel relation above said staple rail means to constitute retaining means to retain the staple strip upon said rail, and pusher means slidably engaged upon said rail means below said bar.

3. In a stapling machine, a frame member comprising a bottom, staple rail means carried by said bottom, a front wall connected to and extending upwardly from the forward edge of said bottom, the forward end of said staple rail means and the inner side of said front wall being spaced to provide a staple driving passage, staple driving means carried by said front wall, a guide bar, means on said front wall arranged to be removably engaged by the forward end of said bar, interlocking means cooperating between the rearward end of said bar and said bottom for removably connecting said bar to said bottom, said bar extending in parallel relation above said staple rail means to constitute retaining means to retain the staple strip upon said rail, pusher means slidably connected to said bar disposed beneath said bar and adapted to slidably engage said rail means, and a spring carried by said bar between its rearward end and said pusher means to urge said pusher means forwardly.

4. In a stapling machine, a frame member comprising a bottom, staple rail means carried by said bottom, a front wall connected to and extending upwardly from the forward edge of said bottom, the forward end of said staple rail means and the inner side of said front wall being spaced to provide a staple driving passage, staple driving means carried by said front wall, a guide bar, means on said front wall arranged to be removably engaged by the forward end of said bar, interlocking means cooperating between the rearward end of said bar and said bottom for removably connecting said bar to said bottom, said bar extending in parallel relation above said staple rail means to constitute retaining means to retain the staple strip upon said rail, pusher means slidably connected to said bar disposed beneath said bar and adapted to slidably engage said rail means, a spring carried by said bar between its rearward end and said pusher means to urge said pusher means forwardly, and a retaining projection contiguous to the forward end of said bar adapted to limit the forward movement of said pusher means upon removal of said bar from said housing member.

5. In a stapling machine, a frame member comprising a bottom having upwardly extending side flanges, a front wall integrally formed with said bottom and extending vertically from its forward end, vertically disposed rearwardly extending side flanges on said front wall overlapping and rigidly connected to said flanges of said bottom, said bottom having a staple driving passage formed therein adjacent the inner surface of said front wall, staple rail means carried by said

bottom, and staple driving means carried by said front wall.

6. In a stapling machine, a frame member comprising a bottom, side flanges extending upwardly from said bottom, a front wall connected to and extending upwardly from the forward edge of said bottom, staple rail means carried by said bottom, staple driving means carried by said front wall, and a housing member comprising a top wall and side walls, said housing member being open at its lower and front ends and adapted to engage said bottom and front of said frame member inwardly of said side flanges, said side walls of said housing member being flexible, and interlocking means cooperating between said side walls and said flanges adapted to be engaged and disengaged through the flexing of said side walls.

7. In a stapling machine, a frame member comprising a bottom, a front wall, staple rail means carried by said bottom, said front wall having an outwardly embossed vertically disposed intermediate portion forming a vertical staple driver channel upon the inner surface of said front wall, an inwardly embossed band portion lanced from said front wall, and a staple driver engaged in said channel and retained therein by said band portion.

8. In a stapling machine, a frame member comprising a bottom, a front wall, staple rail means carried by said bottom, said front wall having an outwardly embossed vertically disposed intermediate portion forming a vertical staple driver channel upon the inner surface of said front wall, a staple driver engaged in said channel, and a spring pressed pusher member engaged upon said rail having outwardly bent base flanges adapted to abut the inner surface of said front wall at each side of said channel to limit the forward movement of said pusher member.

9. In a stapling machine, a frame member comprising a bottom, a front wall, staple rail means carried by said bottom, said front wall having an outwardly embossed vertically disposed intermediate portion forming a vertical staple driver channel upon the inner surface of said front wall, an inwardly embossed band portion lanced from said front wall, a staple driver engaged in said channel and retained therein by said band portion, an apertured plunger bearing portion extending rearwardly from the upper end of said front wall, a plunger engaged in said bearing portion, and connection means between said plunger and said staple driver.

10. In a stapling machine, a frame member comprising a bottom, a front wall, staple rail means carried by said bottom, said front wall having an outwardly embossed vertically disposed intermediate portion forming a vertical staple driver channel upon the inner surface of said front wall, an inwardly embossed band portion lanced from said front wall, a staple driver engaged in said channel and retained therein by said band portion, said intermediate portion of said front wall having a slot, an apertured plunger bearing portion extending rearwardly from the upper end of said front wall, a plunger engaged in said bearing portion, and connection means between said plunger and said staple driver comprising a riveted stud having a projecting portion engaged in said slot.

MAX VOGEL.