

Oct. 6, 1936.

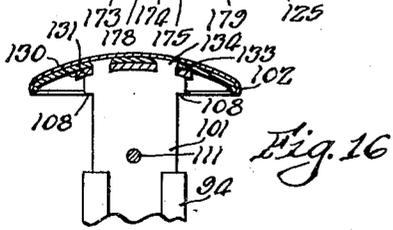
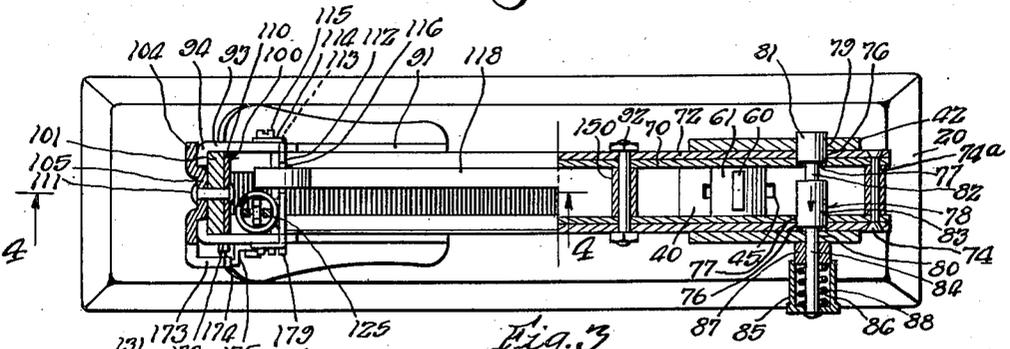
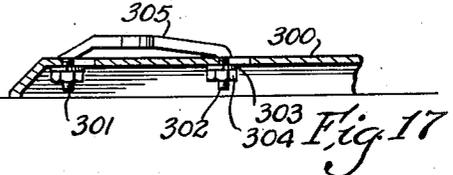
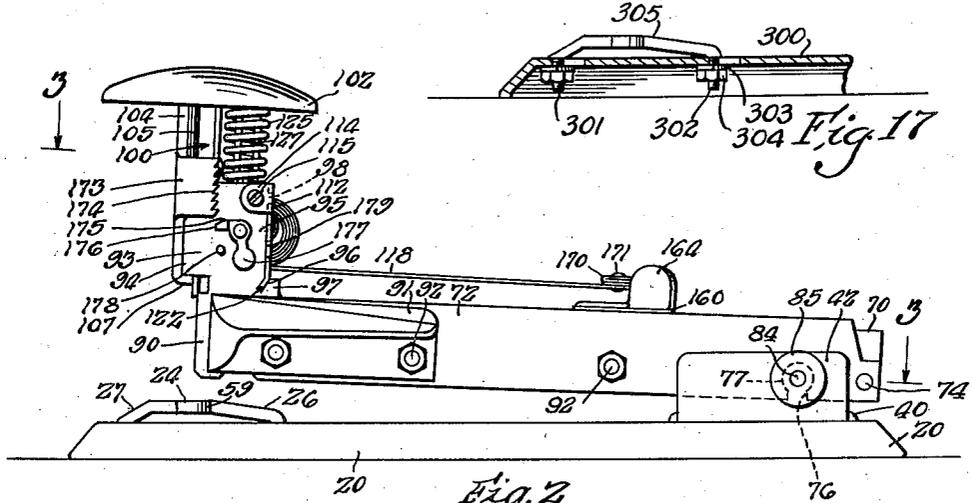
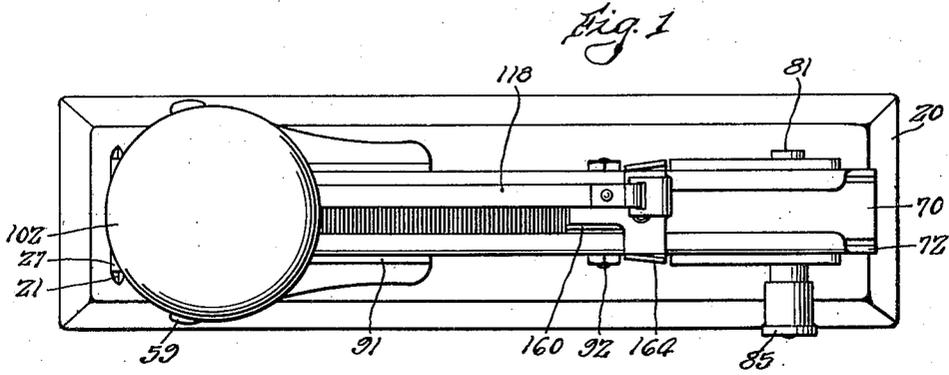
W. G. PANKONIN

2,056,480

STAPLING DEVICE

Filed Jan. 7, 1932

2 Sheets-Sheet 1



Inventor:
 William G. Pankonin
 By *Clay H. Wood*
 ATTORNEY.

Oct. 6, 1936.

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STAPLING DEVICE

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2 Sheets-Sheet 2

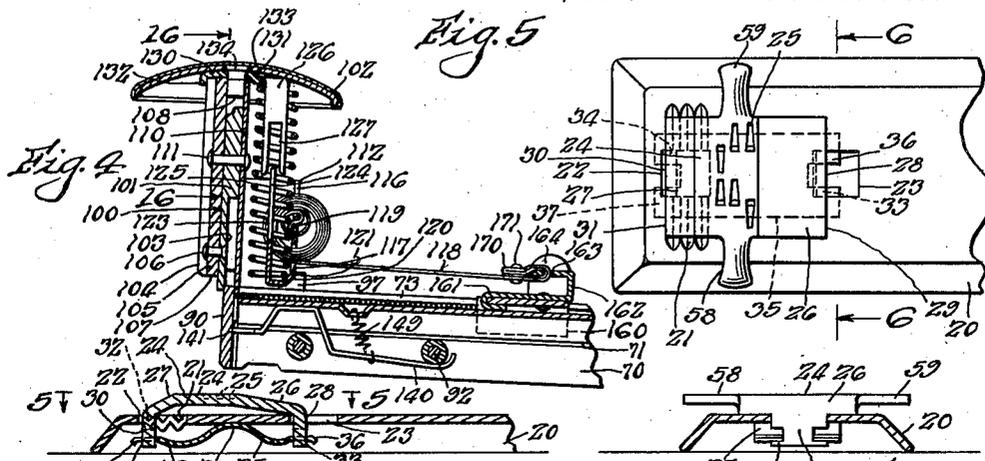


Fig. 4

Fig. 5

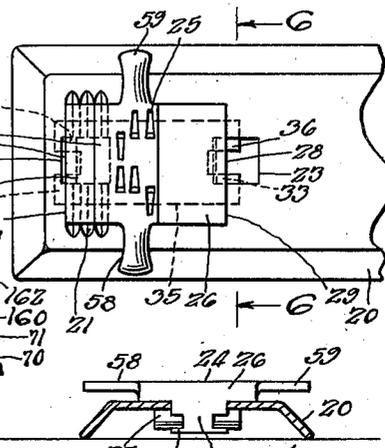


Fig. 6

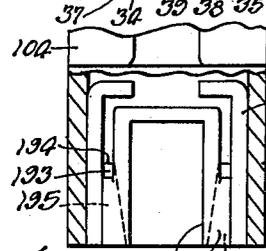


Fig. 7

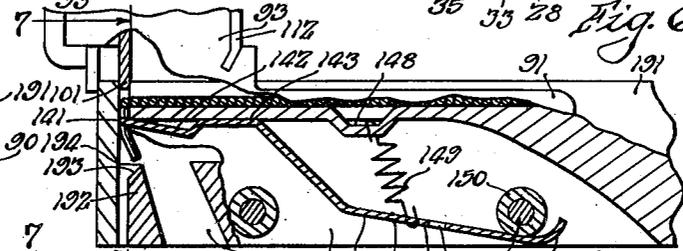


Fig. 8

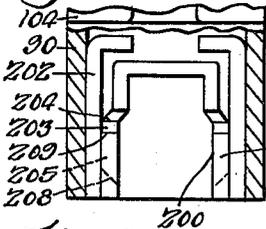


Fig. 9

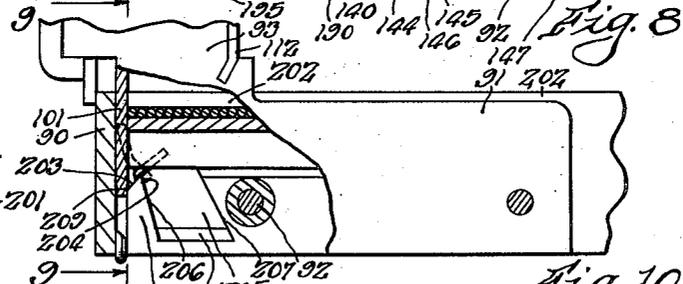


Fig. 10

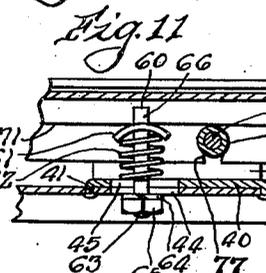


Fig. 11

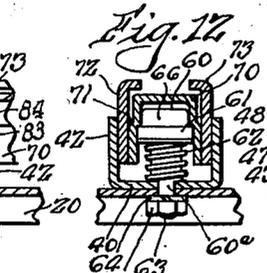


Fig. 12

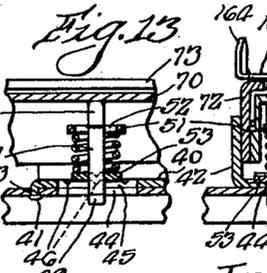


Fig. 13

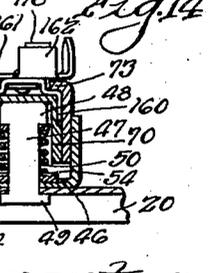


Fig. 14

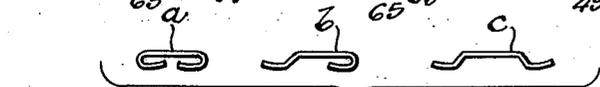


Fig. 15

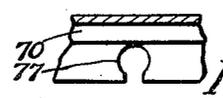


Fig. 18

Inventor: William G. Pankonin

By *W. G. Pankonin*
W.G.P.

UNITED STATES PATENT OFFICE

2,056,480

STAPLING DEVICE

William G. Pankonin, Chicago, Ill., assignor to
Ace Fastener Corporation, Chicago, Ill., a cor-
poration of Illinois

Application January 7, 1932, Serial No. 535,241

41 Claims. (Cl. 1-3)

The present invention relates to a stapling device and particularly to a stapling device suited for office use and which may be quickly partly disassembled for the purpose of employing a staple driving mechanism as a tacker, i. e., without clinching or deforming the staples.

The objects of the present invention include, among other things, the following:

A simplified base structure; a new and improved means for mounting a staple driving arm upon a base; new and improved means for the quick attachment to and detachment from a base of a staple driving part normally used therewith; an improved means for determining spring pressure to be applied to a staple driving arm for lifting it away from a base after a staple driving stroke has been delivered; a novel means for regulating spring tension between angularly disposed parts; a new and improved multiple anvil for a staple driving device; improved means for changing the position of an anvil upon a stapling device; a simplified means for attaching a staple anvil upon a base; simplified and improved structure for an anvil for use in a staple driving machine; an improved longitudinally movable staple anvil; an improved housing for a staple driver; simplified guide means for a staple driver; novel means for providing a staple driving plunger with a retractile spring; unique means for mounting a staple follower spring; improved means for preventing the bridge of a staple about to be driven from a stapling machine from buckling or bending away from the driver while entering material and being clinched; unique means for freeing a staple driving device of bent or deformed staples; a stapling device which is free from clogging; unique means for preventing partial strokes of the plunger of a stapling device; an improved housing for a staple driving plunger; and means for preventing the twisting of a staple follower block in relation to a spring secured thereto when the spring is freed from the track in which it normally operates.

Another object of the invention is to provide a new form of plunger for a stapling device; also, improved guide means for a plunger; a more open structure for a stapling device so designed that all of the staples may be removed from the rear of the staple magazine with any small tool or hook should the staples become wedged or tight or fail to feed to the staple driver; and a new and novel guide means for a plunger retractile spring.

Other objects of the invention are to provide

an improved staple machine head structure reducing the number of parts and simplifying the production and assembly costs thereof; and a still further object of the invention includes a novel assembly of parts whereby the cost of assembling a staple driving apparatus is reduced to a minimum.

These objects, and such other objects as may hereinafter appear are obtained by the novel structure, unique combination and improved arrangement of the various elements of a stapling machine illustrated in the accompanying two sheets of drawings which is illustrative of the invention.

In the drawings:

Figure 1 is a plan view of a stapling device embodying the invention;

Figure 2 is a side elevation of the machine illustrated in Figure 1;

Figure 3 is an irregular horizontal section on the line 3-3 of Figure 2;

Figure 4 is a fragmentary longitudinal section on the line 4-4 of Figure 3;

Figure 5 is a fragmentary plan view of the front end of the base on the line 5-5 of Figure 4;

Figure 6 is a transverse section through the front end of the anvil on the line 6-6 of Figure 5;

Figure 7 is a transverse vertical section of one form of head for the device, said section being on the line 7-7 of Figure 8;

Figure 8 is a longitudinal section of the form of head illustrated in Figure 7;

Figure 9 is a transverse section on the line 9-9 of Figure 10;

Figure 10 is a longitudinal section of the second form of head shown in Figure 9;

Figure 11 is a longitudinal section showing one form of means for regulating the angular displacement of the base and the staple driving arm, and means for causing the arm to rebound from the anvil;

Figure 12 is a transverse section through the parts illustrated in Figure 11;

Figure 13 is a longitudinal section of another form of device regulating angular displacement of arm and base;

Figure 14 is a transverse section of the device illustrated in Figure 13;

Figure 15 illustrates a group of staples as they are adapted to be deformed in the device herein illustrated and described;

Figure 16 is a fragmentary transverse section of a handle for the device, the view being on the line 16-16 of Figure 4;

Figure 17 is a fragmentary longitudinal section of the base showing means for attaching the anvil thereto without a spring; and

Figure 18 is a detail in elevation illustrating the key-hole slot structure employed in the magazine beam for rendering it readily detachable.

Like reference characters are used to designate similar parts in the drawings and in the description which follows.

As indicated above, one of the prime objectives of the present invention is a simplification of structure whereby a highly efficient staple driving device possessing all of the advantages of more expensive devices of the same character may be produced at a minimum cost. Each of the parts of the present device, while sturdily made, is of a design which will permit of its production at a very low cost. Assembly is a very simple undertaking.

Reference will be had first to the base of the apparatus. The base 20 comprises a rectangular member of an inverted dish type. It may or may not be supplied with rubber feet, as desired.

In the illustrated form of the device, a multiple seat anvil is adjustably secured to the front end of the base 20. This anvil is further described and claimed in a co-pending application Serial No. 78,301, filed by William G. Pankonin on May 7, 1936, for "Stapling device". When a single anvil is employed, it comprises a central raised portion in which the staple deforming die is disposed. The body of such anvil is horizontally disposed to rest upon the top of the base. At the end of the anvil are extensions at ninety degree angles which are adapted to project through longitudinal slots in the base and to be secured therein by riveting or otherwise.

When a multiple anvil is desired, as illustrated, the base 20 is provided with a plurality of teeth or grooves 21 transversely arranged. Longitudinally aligned T- and U-shaped slots 22 and 23 are arranged in the top of said base. Slot 22 traverses a part of the grooves 21. The movable anvil comprises an elevated section 24 having transversely arranged therein a plurality of parallel staple deforming dies 25. Said dies are adapted to register one at a time with a staple driver later to be described.

From the elevated section of the anvil are obliquely disposed extensions, one (26) in the rear of the device and the other (27) in front. The rearwardly extending section 26 terminates in a tongue 28 which is vertically disposed and adapted to extend through slot 23 in the base 20 to underpart of said base, but said tongue 28 is not of sufficient extent to depend below the lower horizontal edge of base 20. At the rear of the anvil is an edge section 29 adapted to ride upon the top of the base 20, the edges being so arranged that ample support for the anvil upon the base is had at the rear of the anvil.

At the front of the anvil the oblique portion 27 terminates in two sections, one a tongue 30 extending vertically through the slot 22 in base 20, but of insufficient depth to reach to the horizontal lower edge of the base. The other section 31 terminates in an edge 32 resting in the grooves 21 heretofore described.

When so seated, the anvil, according to the registry of edge 32 with a selected transverse groove 21, a particular die section 25 of the anvil 24 is in alignment with the before mentioned staple driver.

At the end of each of the tongues 28 and 30 is a lateral extension 33 and 34, respectively. The

extensions 33 and 34 are in alignment. Therebetween is a spring 35 having at its rear end sharply articulated section 36 whereby said spring, without intentional deformation, cannot be moved longitudinally relative to the rear tongue 28 except for a very slight distance, i. e., sufficient to permit of slight play incident to the movement of the anvil longitudinally of the base.

At the front end of said spring 35 is a section 37 which is adapted to project across the extension 34, the form of the section 39 being such that it may be moved slightly relative to said slot 34 but such that it cannot be readily displaced from said slot.

Intermediate the two tongues 28 and 30, the spring 35 is deformed to provide a bearing section 38 adapted to rest upon the under part of the base 20 while exerting tension at the ends of the anvil 24 to maintain said anvil tightly upon the base 20 but not so tightly as to prevent movement of the anvil along the base when it is desired to change the registry of the different staple deforming portions of the anvil upon the plunger. The spring 35 in plan view is somewhat of a squatty H shape having central slots at each of its shorter edges.

At each side of the anvil may be lateral extensions 58 which provide finger pieces 59 whereby the anvil may be readily lifted against the resistance of the spring 35 and which extensions facilitate longitudinal movement of the anvil upon base 20 to the one of the several positions which may be selected therefor. The anvil ends or tongues 301 and 302 projecting through the base 300 (see Figure 17) may be threaded and a washer 303 and nut 304 may be used on each tongue to lock the anvil 305 rigidly. The anvil 305 may be adjusted by partly loosening the nuts 304, moving its position and tightening the nuts. Such arrangement will eliminate any need for a spring. The transverse deforming members in the anvil may clinch the staple (see Figure 15a), may cause one end to be clinched and the other projected outwardly (Figure 15b), or may cause both ends to be spread rather than clinched (Figure 15c). One of the forming members in the anvil has a slot cut in the metal as shown. There is an angle on each end of the slot. Such angles and the slot prevent the staple legs from becoming curved or bent and produce a straight or flat stitch. Such an arrangement eliminates the mechanisms underneath deforming members generally found in other like machines.

At the rear of the base 20 is a U-shaped member 40 which provides a bearing for a staple discharging arm. Such U-shaped member 40 has a base portion (see Figures 13 and 14), extensions 41 therebeneath adapted to project through the material of the base 20 whereby the U-shaped member 40 may be secured upon the base by riveting or by spot welding or by other means, and wings 42 adapted to be turned vertically upward from said base 41. The vertical wings have a portion cut out of the center to provide discharging arm bearings at either end. The base 20, in addition to having transverse slots 43 to receive the under extensions 41 of said U-shaped member 40 also has a longitudinal slot 44 in registry with a similar slot 45 in the base section of the U-shaped member 40. In the upper surface of the base of the U-shaped member 40 are transverse grooves 46 arranged in spaced relation to provide stops for a spring member.

Upon a vertical shank 47 having two cross end members one (48) of greater extent than the

other (49) and resembling the letter T is a coil spring 50. Beneath the upper T-shaped member is a washer or stop 51 which has a transverse slot 52. The spring 50 engages the under side of the washer 51 to force the washer into close engagement with the transverse top member 48.

At the other end of the spring 50 is a washer 53 having aligned depressions 54 adapted to register in one of the pairs of transverse grooves 46 at the edges of the slot 45 in the base of the U-shaped member 40. The action of the coil spring 50 is to urge the washer 53 away from the member 51 and in so doing the spring 50 forces the T-shaped member 47 upwardly as far as the material of the base 20 will permit, the movement, of course, being arrested at the upper side of the lower cross member 49.

A number of positions are provided for the tensioning device. The top of the broader T-shaped member 48 is above the level of the axis about which the staple carrying arm revolves. Therefore, the proximity of the tensioning device to the axis of the staple driving arm determines the height to which the staple carrying arm will be lifted when not in use.

Another form of tensioning device is shown in Figures 11 and 12. In such a form, there is provided a guide member, 40, with a base, and with wings 42. There is a T-shaped member 60 having a lower threaded shank, an arcuate top piece 61, and a spring 62. No washers are required above the U-shaped member 40. The threaded shank 63 of the member 60 extends through the two slots 45 and 44 and beneath the top section of the base 20. Upon the threaded shank is a lock washer 64 and a nut 65.

In this form of the device not only may the angular portion of the tensioning device be adjusted by movement longitudinally of the slot, but said device may be further adjusted by the tightening of the nut upon the shank. The washer 63 is a lock washer to prevent an adjustment once obtained from being disturbed. A section (60a) of the shank of member 60 is square to prevent turning of the member 60 in the slot, a part of the remainder being circular and another part threaded as described. The T head of the member 60 is designated 66.

The staple carrying arm comprises a U-shaped internal member 70 upon which staples are adapted to ride. Said member beneath the lower end of the staples is shouldered at 71 and outwardly expanded. Over the staple carrying member 70 are two complementary L-shaped members 72 which are secured to the U-shaped member 70 at its flaring sides beneath shoulder 71, the short leg 73 of the L extending partly over the top of the staple carrying member 70 to provide a housing for the staples and a track for a staple following block intermediate said U-shaped member 70 and said two L-shaped members 72. The L-shaped members 72 and the U-shaped member 70 are joined together by rivets or pins 74 or in any other suitable way, there being a spacer 74a on the shank of the pin or rivet. At the front of and extending through a U-shaped housing member are other pins or rivets.

The outer L-shaped members 72 adjacent their rear end have vertical keyhole slots 76 opening from beneath. The U-shaped member 70 has complementary slots 77 therein the width of the slots 77 coinciding with the widest section of the keyhole slots 76 but otherwise being U-shaped and of slightly more vertical extent than slots

76 in the L-shaped member 72. Through the U-shaped member 40 upon the base 20 is a bearing 78 for the staple carrying arm.

For mounting said bearings 78, aligned apertures are arranged in the wings 42 of said U-shaped member 40. The aperture 79 on one side is larger than the aperture 80 upon the other side. The bearing 78 comprises a member having a head 81 of the diameter of the larger aperture 79, said head being bounded by a reduced portion 82 of the depth of the wall of the U-shaped member 70 and an L-shaped member 72, a central portion 83 of the same diameter as the head 81, a second reduced portion 84 of the diameter of the aperture 80 in the wing 42 and also of the diameter as the said other reduced portion 82 and of the width equal to the depth of the material of said U-shaped member 70 and an L-shaped member 72.

Upon the opposite end of said bearing member is an enlarged head 85 which is hollow as shown at 86 and within which is disposed a plunger 87. Said plunger 87 may be hollow or solid, as preferred. It is urged out of said head 85 by a coil spring 88 disposed in said head 85 so that at all times the bearing member 78 is forced in the direction of the arrow in Figure 3. The diameter of the body 83 of said bearing member 78 and of said head 81 is such that they will occupy the upper or enlarged portion of the keyhole slot 76 in the L-shaped members 72, the lower narrower portion of such slot 76 being less than the diameter of the body 83 and head 81 of said bearing member 78 so that if the head 81 and body 83 are inserted through the keyhole slot 76 they will prevent displacement from the bearing member and the horizontal base of the staple carrying arm.

For ready detachment and attachment, the bearing member 78 is movable transversely of the base 20 through said U-shaped member 40 until the reduced portions 82 and 84 of said bearing member 78 are adapted to register with the material of the U-shaped member 70 and of the L-shaped members 72, in which position the staple carrying arm may readily be attached or detached for the narrower portion of the keyhole slots 76 is slightly greater than the diameter of the reduced portion 82 and 84.

In assembly the device, after registering the slots 76 and 77 with the reduced sections 82 and 84 of the bearing 78, the bearing member 78 is allowed to move, on the urge of its spring 88, until the head 81 and body 83 project through the enlarged sections of the keyhole slots 76 in which position a firm joinder between the base 20 and staple carrying arm is had, the sides 42 of the U-shaped member 40 being of sufficient longitudinal extent to prevent more than slight lateral movement of the staple carrying arm relative to the horizontal base. By a simple arrangement, the keyhole slots may be disposed in the members 72 and the U-shaped slots in the member 70. This requires a slightly different structure for the transverse pin. The operation of the means, however, remains the same.

At the front end of the staple carrying arm is a staple driving housing. Said housing comprises a lower part 90 which is U-shaped in configuration, there being wings 91 thereon which extend back over the L-shaped track members 72. Through said L-shaped extensions 91 the transverse rivets or bolts 92 are disposed for maintaining the U-shaped member 90, the two L-shaped

members 72 and the U-shaped track member 70 in assembled relation.

From the U-shaped housing 90, there is an upward extension 93 and extending therefrom forwardly are two extensions 94 of material which are inwardly turned and which are offset from the front of the U-shaped member 90 where the latter surrounds the L-shaped and U-shaped members 72 and 79.

Intermediate the upper extension 93 and the longitudinal extension 91 of the housing 90 is a curved section 95 which terminates in an inwardly projecting slot 96, there being a finger 97 intermediate the slot 96 and the exterior periphery of the U-shaped housing member 90. Higher upon the housing member 90, two ears 98 project rearwardly of the upper extension 93.

The plunger 100 comprising a T-shaped member 101 which is secured substantially diametrically of a mushroom top 102. The lower section 103 of said member is cut away to reduce its thickness, the reduced part being adapted to project slightly below the ears 94 at the front of the U-shaped housing 90 and to bear against the solid wall at the front of said U-shaped member 90. Secured to said member 101 in spaced relation thereto is a guide member 104 which has a central depressed section 105 which is adapted to ride between the parallel vertical edges of the ears 94 and be guided thereby.

Said guide member 104 is adapted to be attached to said centrally affixed member by a screw 106 or in any other suitable way. The lower end of said guide member 104 has inwardly turned lips 107 which lips 107 are in alignment at their vertical edges with the inner wall of the material forming the center section of said guide part, thus forming stops adapted to impinge the under side of wings 94 when the plunger 100 is at its topmost position, the wings 94 providing guides for the plunger 100 as well as stop members both for the upward and downward movement of the plunger, for the under surface of the cross part 108 of said member 101 engages the top of the wings 94 to provide an absolute limit to downward movement of the plunger 100.

Upon the back wall of said member 101 is a staple driver 110 which is normally a flat piece of material of the character of a clock spring. When the plunger 100 is in the uppermost position, the lower end of said driver 110 is below the level of the top wall of the U-shaped housing 90 and just above the foremost staple in the staple carrying track heretofore described. Rivets 111 are used to maintain said driver in position.

In the present device, the staple driver plunger 100, instead of being surrounded on its sides for guidance, is provided with laterally opposed tracks in which guide members are adapted to be positioned to insure movement of the staple driving mechanism perpendicularly to the staple carrying arm. A much simplified construction and one possessing great advantage in cheapness of construction is thus obtained.

Back of the U-shaped housing 90 and particularly back of the upper extensions or ears 94 thereof is a cover member 112 for the rear of the housing 90 which member 112 comprises a transverse section of sheet material. The main body thereof is provided with two punched out sections 113 adapted to register with the ears 98 upon the vertical rear portion of the extensions 93. Adjacent said slots 113, the cover 112 has ears 114 with apertures to receive screws 115 to extend into extensions 93.

In addition, two opposed vertical slots 116 and 117 are arranged to provide a track or guide for a coil spring 118. In the solid material intermediate said slots 116 and 117 is a narrow rectangular slot 119 adapted to receive the end of the spring 118 which is guided by the two adjacent slots 116 and 117 which extend to the transverse edges of the material.

The under portion 120 of the main body of said cover is obliquely bent inward and at each side thereof are shoulders 121 terminating in projections 122, the shoulders and projections forming an interlock with the slots 96 and fingers 97 in the U-shaped housing 90 so that the material of the cover projects in the slots 93 in the housing 90 with the projections 122 upon the cover projecting between the inner walls of the side portions 91 of the U-shaped housing 90.

As will be noted, the slots 116, 117 and 119 for the spring which are parallel and in alignment 20 are off-set from the center of the cover. Immediately adjacent the under slot 117, there is an extension 123 of the material of the cover member. Said extension 123 is adapted to be bent inwardly and then vertically upward parallel to the vertical section of the main body of the cover. It is furcated at its inner end 124 and forms an additional guide member and an anchor for one end of a coil spring 125 adapted to force the plunger 100 into its uppermost position.

The ears 114 in cover 112 which are adapted to be bent normally to the main body of said cover to fit over the exterior of the housing extensions 93 to be secured by rivets or screws, are the only fastening members required to maintain the cover 112 on housing 90 in view of the interlock of slots and ears heretofore described. The cover maintains the upper side of the U-shaped housing in accurate spaced apart relation.

Upon the plunger 100, there is a spring guide member 126, which has a solid body at that portion thereof which is secured to the handle 102, the lower end being bifurcated at 127 to permit of the spring guide member 124 on the housing closure member 112 being inserted therebetween. The coil spring 125 which is anchored at its lower end against the bottom of the vertical extension 124 of the housing closure member 112 is adapted to surround the bifurcated member 127 with its upper end beneath the plunger handle 102 so that at all times there is an urge upon the plunger 100 to retract it from any position to which it may be manually moved in the course of its manipulation. The type of the guide member forming a part of the closure is adapted at all times to be within the bifurcations of the spring guide members, such bifurcations having inclined surfaces at their contiguous extremities to facilitate assembly and smooth operation.

To facilitate the joinder between the mushroom top 102 of the plunger and the parts heretofore described, a single unitary member 130 may be employed. This comprises a relatively wide body 131 having at one end a downwardly turned lip 132 which downwardly turned lip is adapted to extend over the vertical guide member 104 heretofore described. Centrally said main body has a pair of aligned rectangular slots 133 to receive the end of the main plunger member 101 which end has extensions 134 adapted to extend through said slots.

At its other side, as already indicated, the material of said member is in the form of the bifurcated vertical member 127 articulated away from the main body 126 to reciprocate within the com-

plementally disposed vertical member 124 upon the housing closure part 112 heretofore described, said two members forming a continuous telescoping means keeping the spring 125 from buckling at its middle.

Beneath the U-shaped staple carrying arm 70 is a staple holder preventing the accidental displacement or the shaking out of a staple as it is discharged from the arm 70. Said arm 70 also supports the body of the staple from buckling or bending while the staple is being driven into material on the anvil. Said holder comprises a trigger 140 terminating in a relatively wide blunt point 141, and having an angular body 142 adjacent thereto, a camming section 143 adjacent to said body section, and an elongated section 144 extending toward the rear of the machine, there being in such elongated body portion 144 a cutaway section 145 which provides a spring hook 146.

The rear end of section 144 at 147 extends under the second of cross members 92. Depending upon the under side of the U-shaped member 70 is another spring hook 148 and between said spring hook 148 and that in the staple holder 140 is a coil spring 149.

The position of the spring 149, is such, and is made so by the two hooks just mentioned, that it is not truly vertical. In addition to exerting a vertical pull upon the staple holder 140 from about the rear transverse member 92 in the housing 90, said spring 149 also maintains a constant forward urge upon the trigger. The staple holder is secured within the member 70 only by said coil spring 149 which urges it forwardly and upwardly as indicated, the rear end 147 of the staple holder 140 being adapted to slidingly engage and rotate upon a roller bearing surface in the form of a spacing sleeve 150 about said rear housing transverse member 92. The forward transverse member 92 about which is also disposed a similar sleeve 150 is adapted to provide a rolling cam whereby the staple holder 140 may be moved rearwardly as and when said staple holder is moved downwardly with a staple driven by the driver 110 until the camming surface of the holder engages the sleeve 150 surrounding the front transverse member. Downward movement of the staple holder is had whenever the staple driver 110 forces a staple which is resting upon the staple holder tongue 141, downwardly.

Such movement is against the urge of the staple holder spring 149. During the downward movement of the staple holder, the tongue is urged forwardly against the front wall of the housing 90 by the coil spring 149. Just before the staple is discharged, the camming surface of the staple holder engages the forward sleeve 150 of the spacer member 92 and is by the further movement of the staple driver, because of the camming action indicated, moved out of the path of the staple and staple driver whereupon said holder 140 snaps upwardly under the urge of spring 149, the tongue 141 resting against the staple driver 110 where it continues to rest until the staple driver is retracted above the level of tongue 141 at which instance the coil spring 149 forces the staple holder 140 forwardly against the front wall of the housing 90. Each of the transverse members 92 in the staple driving arm includes a pin having a threaded shank at each end or a rivet. A sleeve 150 is arranged about the body portion thereof, said sleeve 150 providing a spacer element in relation to the U-shaped member 70.

The staple supports shown in Figures 4 and 8 are the same save that the tongue 141 thereof in Figure 4 is at a lower level than the tongue 141 shown in Figure 8. Such lower position of the tongue 141 causes the support to engage the staple later in its downward course from the machine but does not reduce the effectiveness of the support for the purposes described.

The spring 118 which is threaded into the middle slot 119 in the housing closure 112 and coiled is guided by the slots 116 and 117 in said staple housing cover 112 and extends rearwardly to a staple follower block. Said staple follower block comprises an inverted U-shaped member 160 which is adapted to ride upon the track 15 formed by the U-shaped member 70 and the two L-shaped members 72. In one form of the block, there is a spring anchor 161 secured to the follower member 160 in the following manner.

Such anchor comprises an extension 162 from the member 161 attached to the follower block 160 and has a section bent upwardly and then forwardly, the forward extension having at its front end a rectangular transversely arranged slot 163 through which the spring 118 or spring fastening means may be inserted. Such anchoring means 161 may include a body adapted to be riveted to said follower block 160 and there may be wings 164 at the side thereof which are adapted to be turned upwardly to provide parallel finger pieces between which the spring anchor extension 162 may be readily disposed. The placing of the rectangular slot 163 as far forwardly as possible reduces the tendency of the spring 118 which is disposed at one side of the housing closure to twist the follower block and facilitates movement of said follower block in an even manner the full length of the staple track.

The spring 118, when desired, may be folded upon itself to provide a reinforced end, the folded back section 170 being adapted to be secured to double thickness of spring therebeneath as is shown in the Figure 4, the rivet 171 extending through four thicknesses of the spring 118 and thus providing sufficient strength and possessing sufficient bearing surface to prevent ready buckling of the spring. Such an arrangement does away with the necessity of providing a spring shoe or similar reinforcing part for the spring 118.

In the present form of invention, it is a simple expedient to provide a full stroke mechanism. For example, as shown in Figures 2 and 3, the guide member 104 may have intermediate its length a rearwardly extending right angle extension 173 the vertical edge 174 of which is offset toothed. Said extension 173 preferably is offset slightly from the side of the housing 90. Upon the side of said housing is pivoted pawl 175. Said pawl 175 has a part thereof and depending therefrom at one side a tooth 176, the tooth of said pawl normally being in a horizontal plane.

At its bottom, said pawl has a weight 177. At each side of said weight 177 in the side 93 is a stop, that limiting the clockwise movement of the pawl being in a form of a stud 178 in the housing 93 and that stopping the counterclockwise movement thereof being in the form of an ear 179 projecting from the body of the housing closure 112.

The teeth 174 in said guide member extension 173 are of a limited vertical extent. Normally the plunger 100 is at its uppermost position. In such position the pawl 175 is beneath the toothed extension. As the plunger 100 is moved downwardly, the pawl 175 is moved to an angular posi-

tion against the urge of the weight 177. In such angular position, the plunger 100 may be forced downwardly, but instantly the moving force is released from the plunger 100 and the plunger 5 attempts to move upwardly under the urge of spring 123, the pawl tooth 176 engages in one of the teeth 174 in the extension 173 and prevents such movement.

When the plunger 100 has reached its downmost position, the teeth 174 will have passed below the point 176 and the pawl 175 will have assumed its normal position with the tooth 176 horizontally disposed. As the plunger retracts upwardly, the teeth 174 on extension 173 force the pawl 175 in a clockwise direction. The upward movement must be continued until the plunger 100 has reached its topmost position. Any interruption of such upward movement will be resisted by the pawl tooth 176 engaging with the teeth 174 of the extension 173. As there is insufficient space for the teeth 174 to pass the pawl 175, the plunger 100 can be said to jam the pawl, such jamming preventing reversed motion once the plunger stroke has been started in either direction.

Much difficulty is had in certain forms of stapling devices due to clogging. Clogging results from bent, deformed or defective staples. In many devices, such clogging may be overcome only by taking the machine apart and removing the defective staple. The present device is intended to be an improvement over other devices in that if a mutilated staple is caught therein the device may be forced to cut the staple into parts and discharge the parts from the apparatus.

To provide an inexpensive means for preventing the clogging of the present device two constructions are employed. One of these is illustrated in Figures 7 and 8.

In this form of the device, there is an internal or lower magazine member 190 having a shoulder 192. The usual L-shaped outer members 191 are employed. At the front of the device, the shouldered section 193 has a milled or formed sloping face 193. The face of the member 190 beneath the edge of the face 193 forms with the housing a staple track. The sloping wall or face 193 directs the leg of a staple downwardly into such track leading to the object into which the staple is to be inserted. Such sloping wall is effective to straighten slightly bent staples by straightening them in their course into the material on the anvil.

The sloping wall 193 terminates at its upper end in an edge 194. To the rear of the edge 194, there is a milled or otherwise formed slot 195. Said slot 195, as the rear of the device is approached, is enlarged. The wedge shape of the slot is to prevent jamming of staple parts. As the lower section of the slot is reached, the slot 195 also widens as shown by the dotted lines in Figure 7.

When a badly deformed staple is discharged from the magazine onto the staple track, one or both of its deformed legs will extend over an edge 194 as the staple driver forces the staple downwardly. If the staple leg does not project over the edge 194, it will be straightened out by having its end forced downwardly in the staple track because of the obliquity of the face 193.

But if one or both of the legs of the staple project over the edge 194, then the staple driver will press the staple against the face 193, the lower edge 196 thereof breaking the staple into parts in the manner shown in Figure 10. The separated portion of the staple either will be discharged down the track when the driver is re-

tracted or will fall from the device through the slot 195. The cross portion of the staple and the depending section of its leg or legs will be driven from the machine by way of the staple track coincidentally with the severing stroke of the driver. As a staple is effectively deformed by the driver and face 193 in the manner described, normally it will not penetrate any object on the anvil.

As previously stated, a second arrangement for ridding the device of deformed staples is shown in Figures 9 and 10. In this form, an opening replaces the slot of the just described form of the invention.

In Figures 9 and 10, the internal magazine forming member is designated 200. It has the usual shoulder 201. About the shoulder are disposed the two side members 202 which complete the magazine.

In the shoulder section 201, there is a rearwardly sloping face 203 which terminates in edges 204 and 209. To the rear of the edge 204, there is an opening 205 which has downwardly diverging walls 206 and 207. The bottom 208 of the opening 205 preferably has an inwardly sloping wall to facilitate rapid discharge of staple ends from the aperture.

The action of straightening and of breaking staples into parts in this form of the device is the same as in the previously described form of the invention. So also is the behaviour of deformed staples, save that the cut-off end of the staple is discharged from the opening 205 rather than from the milled slot 195.

What I claim is new and desire to secure by Letters Patent in these United States is:

1. A stapling device comprising a base, a U-shaped member opening upwardly therefrom, a pin in said U-shaped member, and a staple carrying arm in said U-shaped member and pivotally mounted on said pin, movement of the pin transversely of said base and while retained by said member releasing said arm.

2. The device described in claim 1, and in which said pin has spaced apart sections of different diameters, parts of selected diameters when registering with said arm providing means for freeing said arm.

3. The device described in claim 1, and in which the said arm comprises a plurality of longitudinal members, one of said members having a key-hole slot and the other a U-shaped slot in partial registry, said pin having sections of different diameters, the larger sections thereof being seated in the circular part of the key-hole slots to hold said arm on said base and moved out thereof to release said arm from said base.

4. A stapling device comprising a base having a slot arranged longitudinally thereof with notches at its edge, an arm pivoted to said base, and means for urging said arm away from said base, said urging means comprising a standard having a cross member under said arm, a spring intermediate said cross member and said base, means beneath said base for limiting the movement of said standard relative to said base, and means associated with said standard and having teeth seatable in said notches in said base to maintain an adjusted relation between said standard and said base.

5. In a stapling device, a magazine formed of a U-shaped member having guide members in combination with a housing, and a staple driving plunger, the housing and said U-shaped member forming a track for the discharge of staples, said U-shaped member having formed in the ma-

terial thereof a shoulder with an upwardly and rearwardly sloping surface arranged at the front thereof, and a discharge channel formed in the sides of said U-shaped member to the rear of said upwardly sloping surface, the top of said shoulder being in a level beneath the path of travel of staples in said magazine.

6. In a staple driving machine, a U-shaped magazine member having a shouldered part and an aperture therethrough, side members attached thereto, a housing at the front thereof, and a staple driving member in said housing, said housing and said U-shaped member providing a track for the discharge of staples, said U-shaped member at its front end and in its shouldered part having an upwardly and rearwardly sloping face, the plunger co-acting with said sloping face to cut bent or crooked staples into parts to be discharged through said aperture.

7. The combination in a stapling device having a magazine, a housing, and a staple driver, of staple holding means, a spring intermediate said holder and said magazine and urging said holder upwardly and toward said housing, there being beneath said magazine and transversely thereof a plurality of camming faces, one of said faces always providing an axis for the movement of said holder, and said other face engaging said holder to move it from the path of a staple when a predetermined angular position is attained.

8. A staple driving device comprising a U-shaped housing closed for a portion of its front and having an open section, the material of the housing at said open section being offset from the closed section, and a plunger guided by the material of said closed front and of said offset sections.

9. A housing for a staple driver comprising a sheet of material bent to form a narrow U, there being extensions of material from the legs of said U-portion having edges parallel to but offset from the base of said U-portion, and a plunger between said extensions and said closed base portion.

10. A stapling device comprising a U-shaped housing having a base and extensions in parallelism with the base and offset therefrom, a plunger between said base and said offset parts, and a guide secured to said plunger and extending exteriorly of said extensions.

11. A stapling device as described in claim 10, and in which said plunger and said guide member have lateral portions, one of said portions cooperating with said offset section of the housing to limit movement of the plunger in one direction, and the other lateral portions cooperating therewith to limit movement of the plunger in the opposite direction.

12. In a stapling device, a housing having an opening for a plunger, a plunger comprising a main member, a staple driver thereon, a guide member for said main member, a handle, and an assembling member for said main member and guide member, said assembling member being secured to said handle, extending about said guide member, and engaging said main member.

13. The stapling device described in claim 12, and in which said staple driver at one end engages said assembling member.

14. The stapling device described in claim 12, and in which said housing has a cover provided with a plunger spring guide, said assembling member having an extension forming a complemental guide for said spring.

15. In a stapling device, a staple magazine, a

housing at the end of said magazine, a follower in said magazine, a plunger in said housing, a cover for said housing, and a spring for said follower threaded into and coiled about said cover.

16. In combination, a staple driving plunger, a housing therefor, a magazine, a staple follower therein, a cover for said housing having a seat, a spring on said seat, said housing and said cover having interlocking and interfitting sections, and a single opposed fastening means intermediate said cover and said housing.

17. In a stapling device including a base and a staple carrying arm, means for detachably and pivotally securing said arm to said base comprising a mounting on said base and a bearing member providing a pivotal interconnection between said arm and said mounting, there being means whereby limited transverse movement of said bearing member with respect to said arm permits disengagement of said pivoted interconnection, and spring means for urging said bearing member into pivotal interconnection position.

18. In a stapling device including a base and a stapling arm, means for detachably and pivotally securing said arm to said base comprising spaced vertical upright wings secured to said base, a bearing extending between said wings, said arm being provided with an aperture for receiving said bearing whereby said bearing pivotally supports said arm between said wings, and interfitting means between said bearing and arm whereby longitudinal movement of said bearing while supported by both said wings permits disconnection of said arm from said bearing.

19. In a stapling device, a base, a mounting member secured to said base, a staple driving member movably related to said base and a locking part for holding said members in operative pivotal relationship, said part being movably carried by one of said members and in one position thereof in said member effective to lock said members in said operative relationship and in another position thereof in said member effective to permit said members to be disengaged from operative relationship, there being spring means to urge said part into one of said positions.

20. In combination with a movable staple driving arm member and a mounting member therefor, a bearing part carried by one of said members, said part in one position thereof being effective to lock said members in operative pivotal relationship, a slot in the other of said members, said part in another position thereof being co-operable with said slot to release said members from operative relationship, said part being relatively movable with respect to both of said members to either of said positions.

21. In a stapling device, a staple driving arm member and a support member for said arm, apertures in said members, a bar movably carried in said apertures and locking said members in operative pivotal relationship, a slot in one of said members, said bar when moved into another position within said apertures being co-operable with said slot to permit said members to be disengaged from operative relationship.

22. In a stapling device, a base, an arm pivotally mounted to said base, and means mounted upon said base to maintain said arm in spaced relation to said base, said means being shiftable along said base to change the spaced relation between said arm and said base.

23. In a stapling device, a base, a staple driving arm pivoted to said base, and means resil-

iently maintaining said arm in angular relation to and spaced from said base, said means being adjustable longitudinally of said base to vary the spacing between said arm and base.

24. In a stapling device, a base, a staple driving arm mounted on said base, and means for urging said arm away from said base including a spring, said means being shiftable along said base to vary the space between said arm and said base, said spring frictionally securing said means to said base in selective position.

25. In a stapling device, a magazine for staples comprising a hollow core upon which staples ride, an ejection chute at the forward end of said core, a driving tool for driving staples through said ejection chute, and means formed on the forward edge of the side of said core and associated with said ejection chute and cooperating with said driving tool to sever crooked staple legs, said core having an opening in the side thereof spaced from said means and forming a passageway to the interior of said hollow core, said openings being positioned to receive the severed portions of staples.

26. In a stapling device, an ejection chute through which staples are driven including a wall, a staple supporter having a part projecting into said chute and abutting said wall, said supporter being guided by said wall as staples are driven through said chute.

27. In a stapling device, an ejection chute through which staples are discharged, a staple supporter having a part extending into said ejection chute and in the path of the staples being discharged, said supporter being slidably and rotatably mounted, and camming means cooperating with said supporter to slidably move said supporter out from the path of the staples.

28. In a stapling device, a staple carrying arm, an ejection chute through which staples are discharged, a staple supporter mounted on said arm and having a portion extending into said chute, means flexibly urging said portion forwardly and upwardly in said chute, and means on said arm and cooperating with said supporter to suddenly and completely withdraw said portion from said chute when said supporter has reached a predetermined position adjacent the bottom of said chute.

29. In a stapling device, a reciprocally mounted staple driving plunger comprising a plurality of parallel pieces including a main member having an extension forming a rivet end, a cap piece mounted on said rivet end, an offset member having a center portion abutting said main member, said offset member forming grooves to guide said plunger, a staple driving tool carried by one of said members, and fastening means holding said members in operative relation.

30. In a stapling device, a plunger for driving the staples, said plunger being constructed of a plurality of pieces including a driving tool, a cap piece for hand operation, a turned down flange extending from said cap piece, said turned down flange snugly overlapping said pieces to aid in securing said pieces in operative relation.

31. In a stapling machine, a reinforced staple driving tool, a spring for urging said tool to elevated position, and a plurality of guiding members within said spring, one of said members being mounted to move with said tool, said members being inter-related throughout the full movement of said tool.

32. In a stapling machine, a movable arm, staple driving mechanism at the forward end of said

arm, a housing for said driving mechanism comprising side plates and a rear wall, the adjacent edges of said wall and said side plates being formed with interfitting lugs and recesses for positioning and maintaining said parts in a predetermined assembled relationship.

33. In a stapling device, an arm, a housing having walls at the front end of said arm, a reciprocal staple driving tool guided by said housing, a spring for urging said tool in raised position, an opening at the rear of said housing and between said walls, and a removably mounted plate positioned over said opening, said plate having a seat for supporting one end of said spring.

34. In a stapling device, a staple carrying arm, a staple driving tool, a guide for a staple driving tool, a spring for urging said tool to operative position, a follower for advancing staples along said arm, a spring for advancing said follower, and a plate mounted on said arm providing a seat for said first mentioned spring and a mounting for said second mentioned spring.

35. In a stapling device, a staple carrying arm, a housing having opposite walls, a reciprocal staple driving tool carried by said housing, a spring for operating said tool, and a spring for advancing staples along said arm, said first mentioned spring being mounted adjacent one of said walls and said second mentioned spring being mounted adjacent the other of said walls, said springs being positioned in side by side relation and between said walls.

36. In a stapling device including a magazine and a volute coiled spring, a unitary detachable mounting for said spring comprising a core and spaced side members, said core having means engaging one end of said spring, said side members providing lateral guides for said spring.

37. In a stapling device, a housing, a reciprocally acting plunger constructed of a plurality of parallel members operable in said housing, one of said members having a formed part extending laterally therefrom and out of said housing, teeth formed on said part and a detent on the outside of said housing cooperable with said teeth and forming therewith a full stroke mechanism for said plunger.

38. In a stapling machine, a magazine for staples, an ejection chute including a staple guide member through which staples are driven from said magazine, a staple supporter having a staple engaging portion adapted to project into and be movable in said ejection chute to engage staples being driven therethrough, said supporter being slidably and swingably mounted, and spring means for urging said supporter upwardly and forwardly whereby said portion is urged into said ejection chute and into supporting contact with staples being driven therethrough, said supporter being slidable along said guide member to aid in guiding the movement thereof.

39. In a stapling machine, a magazine for staples, an ejection chute including a staple guide member through which staples are driven from said magazine, a staple supporter having a staple engaging portion adapted to project into and be movable in said ejection chute to engage staples being driven therethrough, said supporter being slidably and swingably mounted, spring means for urging said supporter upwardly and forwardly whereby said portion is urged into said ejection chute and into supporting contact with staples being driven therethrough, said supporter

being slidable along said guide member to aid in guiding the movement thereof, and camming means coacting on said supporter when said portion has reached a predetermined position in said chute to overcome the forward urge of said spring means thereon.

40. In an implement of the type indicated, the combination of a staple driver, a staple supporter projecting beneath the driver to support a staple being driven thereby, means for mounting the staple supporter to adapt it to slide bodily with its forward end swinging downwardly during the descent of the driver, and means to accelerate the sliding movement of the supporter to cause

its end to be withdrawn from the staple as the driver reaches the end of its descent.

41. In an implement of the type indicated, the combination of a staple driver, a staple supporter projecting beneath the driver to support a staple being driven thereby, said supporter having an inclined lip at its end for engagement beneath the head of the staple, and means for mounting said supporter for sliding and swinging movement whereby said supporter slides bodily as it swings downwardly with the driver to maintain said lip in non-slidable contact with the head of the staple until it has been partially driven.

WILLIAM C. PANKONIN.