

Oct. 27, 1936.

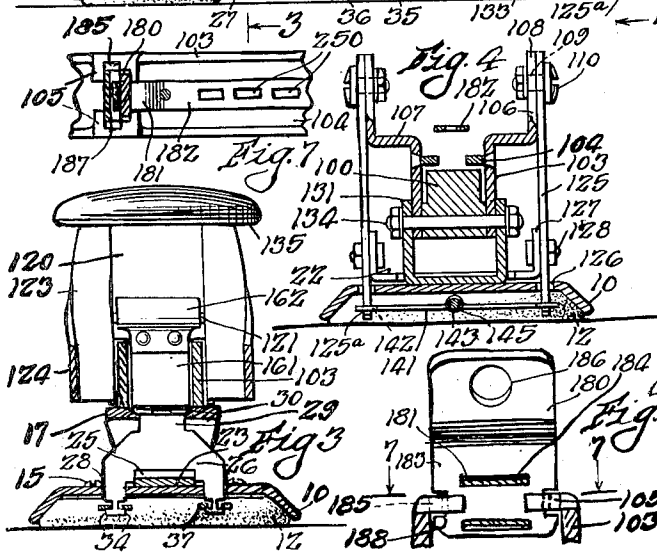
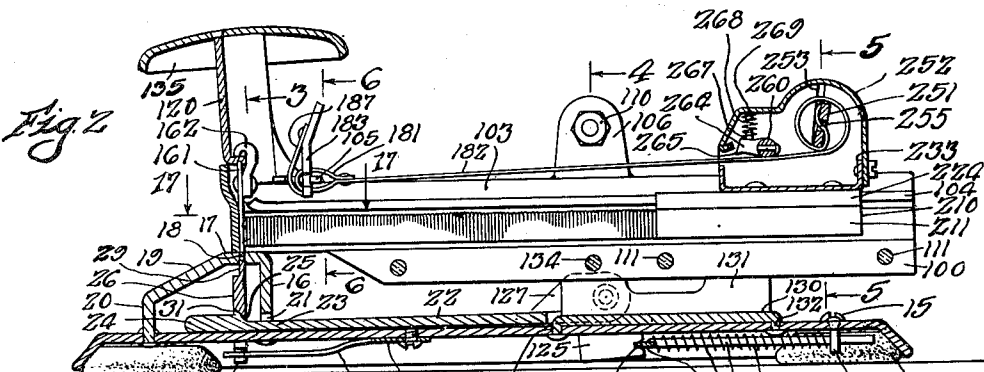
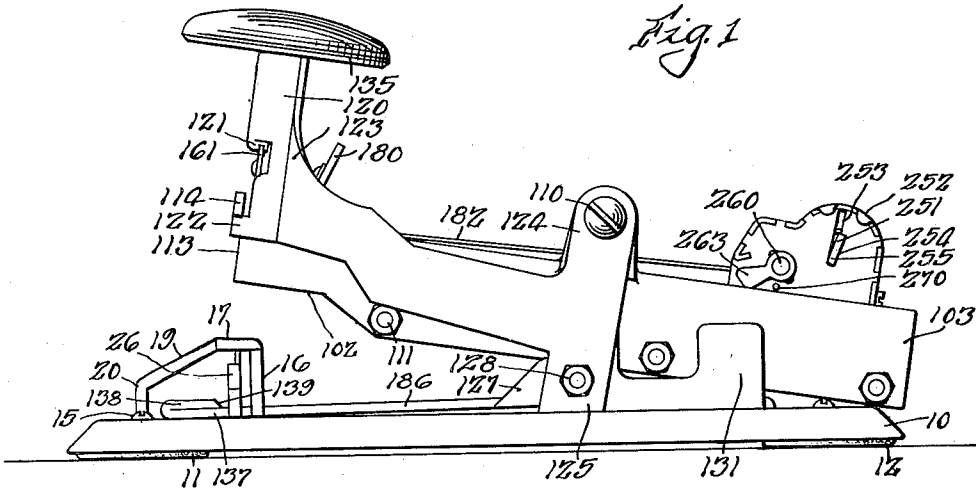
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2,059,020

STAPLING DEVICE

Original Filed Jan. 15, 1932

3 Sheets-Sheet 1



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 4/22/36

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2,059,020

STAPLING DEVICE

Original Filed Jan. 15, 1932 3 Sheets-Sheet 2

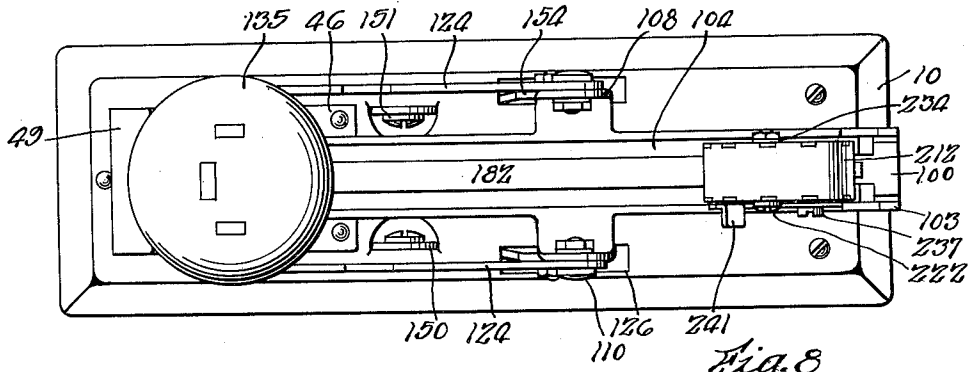


Fig. 8

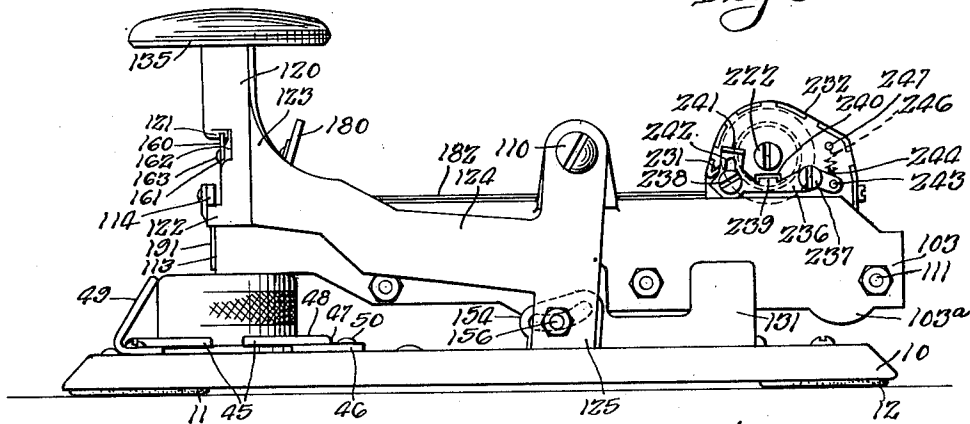


Fig. 9

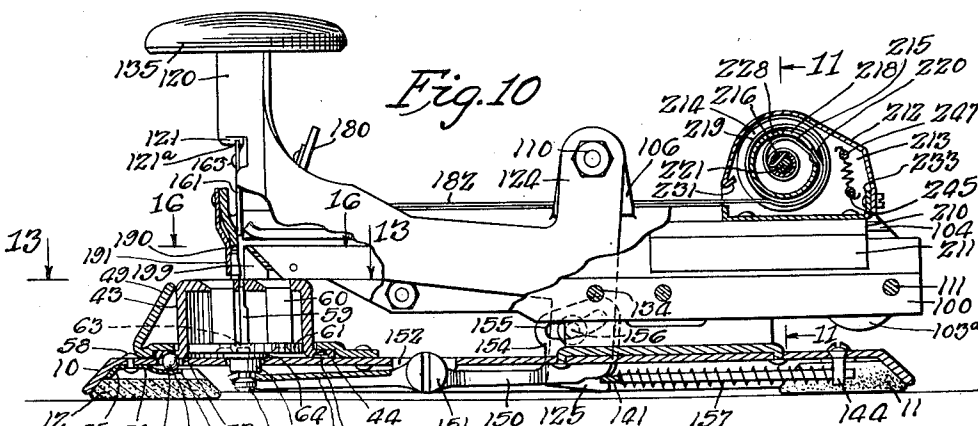


Fig. 10

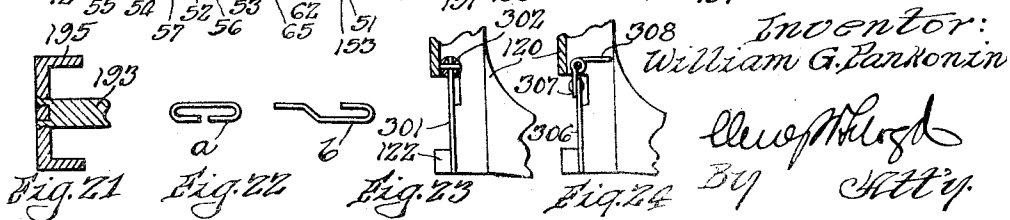


Fig. 21

Fig. 22

Fig. 23

Fig. 24

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STAPLING DEVICE

Original Filed Jan. 15, 1932 3 Sheets-Sheet 3

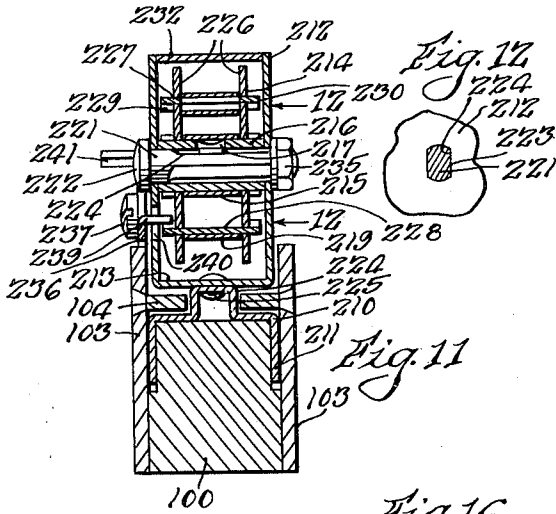


Fig. 11

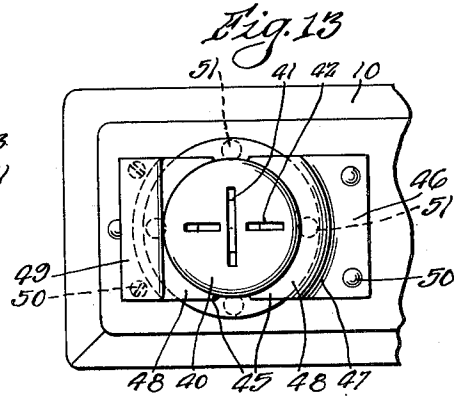


Fig. 13

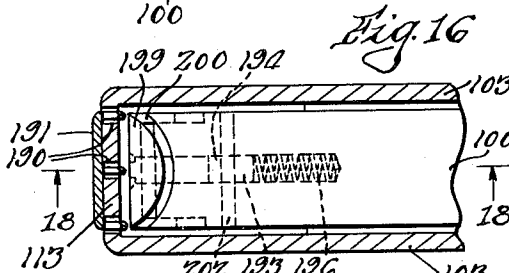


Fig. 16

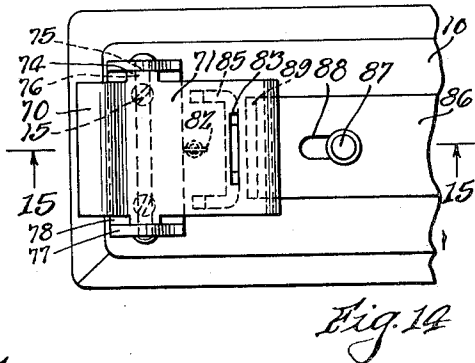


Fig. 14

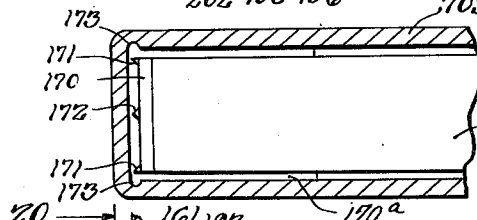


Fig. 17

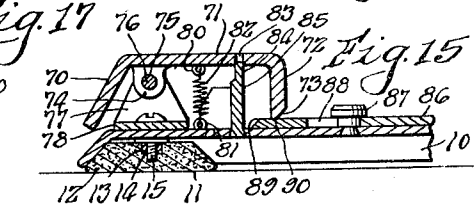


Fig. 15

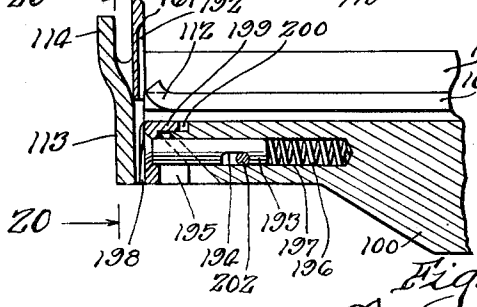


Fig. 18

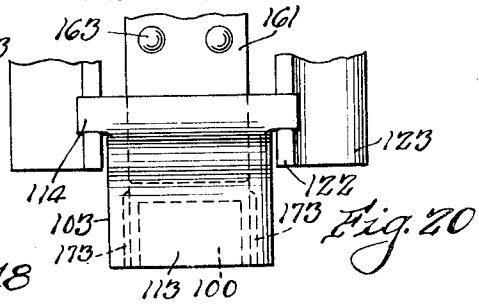


Fig. 20

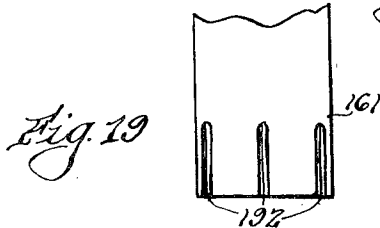


Fig. 19

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## UNITED STATES PATENT OFFICE

2,059,020

## STAPLING DEVICE

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Ace Fastener Corporation, Chicago, Ill., a cor-  
poration of Illinois

Application January 15, 1932, Serial No. 586,914  
Renewed October 27, 1934

79 Claims. (Cl. 1—3)

Among the objects of the present invention are the following:

A new and improved form of staple clinching anvil; a unique multiple staple clinching anvil; a novel combination of upper and lower staple clinching members; unique means for the operation of such over and under staple deforming members; a new and improved floating staple driving member; an improved magazine for staples; an improved structure for obtaining the discharge of broken or bent staples; the provisions of an improved lever arm or driver for a staple driving member; a unique driver arm of open structure and comprising primarily only supporting means for the staple driving member; an improved lever for holding a driving blade; novel means for securing to a staple magazine a staple follower and the mechanism for the actuation thereof; improved staple follower means; a staple follower having its own propelling power; actuating mechanism within a staple follower; unique means for preventing mechanical activity of the staple follower propelling means when removed from the device; an independent and removable staple follower possessing means for its own propulsion; novel means for suspending a staple magazine and staple driving arm; the provision of a staple driver arm movable relatively to the staple magazine when a staple is being driven; the combination with the staple magazine of a staple driver arm movable relatively thereto; a unique arrangement for combining staple magazine, the driving means for the staple, and a second staple clinching device; a unique guiding member for a staple magazine; an improved member for a staple magazine; an improved means for joining a staple driving arm and a staple magazine; a cooperative arrangement of the moving parts of a staple clinching device whereby a single spring serves a plurality of functions; a unique combination of magazine, staple driver, actuating means, and a second clinching member and spring, whereby a single spring restores all of the parts to their normal positions; and an improved means for supporting the legs and the bridge of a staple from buckling while driving and clinching it into material, and also from accidental displacement from the driving slot.

These objects and such other objects as may hereinafter appear, are obtained by the novel arrangement, improved combination, and modified construction of the several parts and elements making up the several forms of the invention illustrated in the accompanying drawings.

In said drawings:

Figure 1 is a side elevation of one form of stapling device embodying the invention, the driver being elevated;

Figure 2 is a longitudinal section of the same device, the driver being upon the anvil;

Figure 3 is a transverse section taken on the line 3—3 of Figure 2;

Figure 4 is a similar view taken on the line 4—4 of Figure 2;

Figure 5 is a like view on the line 5—5 of the same figure;

Figure 6 is a similar view taken on the line 6—6 also of Figure 2;

Figure 7 is a fragmentary plan view taken on the line 7—7 of Figure 6;

Figure 8 is a plan view of a second form of the invention;

Figure 9 is a side elevation of the device shown in Figure 8;

Figure 10 is a longitudinal section of the device shown in Figures 8 and 9;

Figure 11 is a transverse section taken on the line 11—11 of Figure 10;

Figure 12 is a fragmentary detail taken on the line 12—12 of Figure 11;

Figures 13 and 14 are horizontal sections, the former being taken on the line 13—13 of Figure 10, and the latter being a similar section of a modified form of the device;

Figure 15 is a longitudinal vertical section taken on the line 15—15 of Figure 14;

Figure 16 is a horizontal section approximating the line 16—16 of Figure 10 but illustrating slightly modified structures;

Figure 17 is a similar section on the line 17—17 of Figure 2;

Figure 18 is a vertical section approximating the line 18—18 of Figure 16 but with a slight modification of structure;

Figure 19 is a detail of a driver blade in elevation;

Figure 20 is a vertical transverse section taken on the line 20—20 of Figure 18;

Figure 21 is a detail of the parts shown in Figure 16;

Figure 22, *a* and *b*, are elevations of staples deformed in the present apparatus;

Figure 23 is a detail of the pivoted driving blade; and

Figure 24 is a similar view of a hinged blade.

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

The illustrated form of the invention is disposed on a generally rectangular base 10 of an inverted dish type. In said base 10 are a plurality of feet, each of which is cushion covered, as for example at 12, with rubber to prevent the base 10 from marring a table or other object upon which the device is used.

The feet 11 may comprise rubber cushions 12 having a metallic core 13 inserted therein and

having a threaded aperture 14, there being a screw 15 extending through the base 10 into the said threaded aperture to maintain each foot 11 in selected position. The larger of the feet, as for example, the one at the front of the device, may have a plurality of apertures 14 in its core 13 and a corresponding number of screws 15 penetrating the base 10 to be inserted into the threaded aperture.

At the front end of the device and disposed upon the base 10 in a suitable manner, is an anvil. Several forms of anvils are shown. Two may be designated as single anvils and the other a multiple anvil.

The first of the single anvils to be described comprises a member having a vertical leg or back 16, a top section 17 in which a slot 18 is cut, and a forwardly projecting extension a part 19 of which is obliquely disposed to the base 10 and the remainder 20, the front of the anvil, normal thereto.

The two vertical portions 16 and 20 extend through the base 10 and are secured thereto by deforming of the projecting ends i. e., riveting or in any other selected manner. Through the back vertical section 16 of the anvil is a slot 21 the edges of which provide a guide.

A link 22 slidable along and upon the top of the base 10 has one end 23 projecting forwardly through said slot in the rear wall 16 of the anvil, said end 23 having at its front a thickened portion or lug 24. On the thickened portion 24 is a sloping or oblique face 25 which serves as a cam. When desired the end 24 and sloping face 25 may be formed by folding back a short section of the metal of the link 22 and shaping the end thereof to provide the cam 25 as is later described (see Figure 1).

Beneath the anvil is a yoke 26 having bifurcations 27 extending through the base 10 in slots 28 provided therefor. Said yoke 26 has upon one of its faces or as an integral portion thereof, a relatively thin staple clinching member 29. Said member operates in the lower section of the slot 18 in the anvil. The slot 18 may have inwardly sloping walls 30 whereby the legs of a staple are bent inwardly when the ends of the legs are pressed against the sloping walls 30 in the slot 18. When the yoke 26 is in its normal position, the staple deforming member 29 therein forms a bottom for the slot and directs the ends of the staple legs toward the center of the anvil, thus facilitating the bending under of the legs of the staple.

By the movement of the link 22 referred to, the cam face 25 engages the under side of the yoke 26 between the legs 27. Said yoke 26 is thus forced upwardly and at this time the staple deforming member 29 thereon is pressed against a staple in the slot 18 to flatten the staple legs, such pressing action being had upon the staple legs, when the upper staple driving member, later to be described, is resting upon the staple from above.

The yoke 26 has a sloping face 31 between the bifurcations 27 against which face the cam 25 on the link 22 is adapted to operate. Through the slots 28, the bifurcations 26 extend. At their ends they may have shouldered sections 34. A V-shaped spring 35 secured to the bottom of the base 10 by suitable fastening means projects forwardly, each leg 36 of said spring having a bifurcated end 37 engaging said shouldered sections 34 to force said yoke to normally occupy its lowermost position.

In the form of the device being described, the sloping face 19 of the anvil facilitates the positioning of paper upon the anvil and serves as a guide. The lower staple driver 29 deforms the ends of the staple causing them to be flattened out instead of remaining in an arcuate form as is usual in the old type of anvil (see Figure 22a).

The first action of the upper staple driver (later to be described) is to drive the staple legs through the material to be stapled and then to deform the legs of a staple by turning them under. The action of the under staple driver 29 is to press the partly deformed staple legs inwardly and upwardly against the material as far as the legs will go, the under driver then flattening the legs of the staple until they are parallel with the bridge of the staple. Other deformations of staple than that described and illustrated (see Figure 22) could be provided, when desired, in a stationary anvil like that just described.

A multiple form of anvil is also shown. It is circular in its configuration. It has a circular top 40 upon which a plurality of slots, 41 and 42, are disposed normal to one another. The anvil comprises, in addition to the central disk 40, a depending body or flange 43 which is cylindrical in form. At its bottom, it has an outturned flange portion 44 resting on base 10.

Over flange 44 there are diametrically disposed holding members 45 which comprise a base section 46, an offset section 47 which rests upon the flange 44 upon a cylindrical part 43, and an upturned nose 48 which rests above the flange 44. The front member 45 has a section 49 which is turned back to provide an oblique paper guide for directing paper to the top of the anvil. The rear member 45 has no such section 49.

Said members 45 are held in position by a plurality of rivets or screws 50 disposed in their base 46. The anvil, when disposed in said holding means 45, is rotatable on a central vertical axis to selected positions in the form of device shown, the anvil being guided by the members 45. The anvil is a close fit in the guide plates.

The under flange 44 of the cylindrical member has therein a plurality of ball seats 51. Said seats 51, as illustrated, are arranged ninety degrees apart and are positioned in the flange 44 so as to bring the anvil into proper registry with a lower and upper deforming tool when a seat 51 is engaged by a ball 52 seated in an aperture 53 in the base 10 and at the front end thereof. The aperture 53 is generally circular, and a ball is held in position therein by a Y-shaped spring 54. Said spring has its widest part 55 disposed on the front and sloping under face of the base 10.

The stem 56 of the Y-shaped spring extends rearwardly, and has therein a ball seat 57. When such seat is omitted, the spring has sufficient tension to keep the ball 52 within the aperture 53 in the base 10, without the employment of a ball seat in the spring. A rivet 58 fastened through the base 10 is adapted to hold the spring 54 in position. The ball 52 may be removed from its aperture 53 by distortion of the spring 54, when such removal is desired.

The under staple driving tools 59 and 60 are mounted upon a turntable disk 61. Said tools 59 and 60 are mounted to rotate with the top 40 upon the turntable 61 and the latter reciprocates within the cylinder 43 under the influence of an actuating member.

The disk 61 is secured to a shouldered shaft 62 extending through base 10 by way of an aperture therein by a machine screw 63 or the like. In-

intermediate the disk 61 and the top of the base 10 is a collar or shoulder 64 upon shaft 62. The downward movement of turntable 61 is thus limited and tools 59 and 62 are thus kept in slots 41 and 42. Therebeneath, the lower end of shaft 62 has a head 65, there being in a grooved section between the shaft and head means for lifting said turntable upwardly and for moving it downwardly in synchronism with the other movements of the staple driving apparatus. In such form of device, two types of deformation are possible, diametrically opposed positions of the disk producing the same deformations.

In another form of the invention, the anvil is movable and the tool stationary. In such form, the anvil member comprises an elongated member having at its front end an obliquely disposed section 70 to provide a guide to direct paper under the staple driving head. Beyond the oblique section 70, there is a substantially horizontal section 71, and at the rear of the horizontal section is a downwardly extending vertical section 72, which section terminates in an oblique camming face 73. Adjacent the front end of the anvil are ears 74. In ears 74 are apertures 75 through which a transverse shaft 76 may extend.

The transverse shaft 75 is journaled in the legs 77 of a U-shaped member 78 extending transversely of the base, the closed section of the U being on the under side of the base 10 and the legs 77 of the U extending through the base and through the closed section of the U-shaped member securing the bracket 78 in position.

On the under side of the horizontal section 71 is a hook portion 80 and upon the base 10 and secured thereto is a second hook member 81. Intermediate said hook members 80 and 81 is a coil spring 82 which has a tendency to urge the horizontal section 71 downwardly about the shaft 76 as a pivot. Adjacent the camming face 73 is a flat edge.

A transverse slot 83 is arranged near the rear of the horizontal section 71 of said anvil. Adapted to register therein is a staple deforming member 84 which is adapted to operate on the legs of a staple. Said member 84 is secured to or is integral with a U-shaped block 85. Said block, in turn, is secured to the base by suitable fastening members. Beneath the free and inner end of the anvil is a sliding member or link 86.

By the employment of the member 86 which is adapted to be reciprocated longitudinally of the base 10 and which is held thereon by means of a guide pin 87 extending through a slot 88 in said longitudinally extending member 86, a camming action may be had on the anvil, the end of the member 86 having an oblique cam face 89. The anvil has a flat edge 90 normally resting on the member 86.

In such form of the device, an initial clinching of a staple is had with the anvil in its uppermost position. At that time, the anvil rests upon the member 86. The second clinching action, that is the paralleling of the legs of the staple with the bridge, is had by removal from beneath the anvil of the sliding member 86. Thereupon the staple driving arm forces itself by the continuation of the short stroke of operation an additional distance downward to more nearly approach the lower staple deforming tool 84. On release of the staple driving arm, the member 86 forces itself under the anvil and raises it to its normal position.

The staple driving arm heretofore referred to

comprises a core 100 having milled out portions 101 at its sides. At the front end, said member 100 is milled away (102) up to the portions 101 which portions 101 provide a staple track. Milling off the lower portion 102 of core 100 provides a parallel space between the core 101 and side pieces 103 of the staple magazine. Such opening is designed to allow all small particles of wire and the like to fall from the magazine before such particles reach the staple driver. These particles might cause the machine to jam. The magazine is narrowed at its front from underneath so that if the machine is operated without material underneath the staple chute, a staple deformed by the down stroke has a tendency to remain in the chute. This will immediately stop additional staples from feeding forwardly and prevent the machine from being clogged up in the chute. By working the driver head down, the deformed staple will be ejected, such removal allowing the machine to perform properly.

The side members 103 keep staples upon the staple track. Each member 103 has a horizontal section 104 which provides an inwardly directed flange. Flanges 104 are secured to the side members 103 in any desired way.

At their front end, two lugs 105 project inwardly from the vertical members. Said members will be later described as anchors for a spring end. Intermediate their length two brackets 106 project outwardly therefrom, each bracket being so formed that its top face 107 is flush with the top edge of the side member 103. The horizontal portion 107 terminates in an upwardly turned ear 108 the body of which is parallel to the side member 103. Through each ear 108 is an aperture 109. In these apertures is mounted the member supporting the staple driver arm, there being supplied for this purpose suitable bolts and nuts 110. Intermediate the nuts and the ears 108, suitable washers may be disposed.

The side members 103 are joined to the member 100 by dowel pins 111 which transverse said several members in spaced apart relation. The front ends of the inwardly extending flanges 104 are deformed in part to provide upwardly pointing fingers 112, the purpose of which is to prevent any possibility of the upper staple driving tool from leaving its track which is at the front end of said side members 103.

For convenience, the side members 103 may be made in a single piece bent into an elongated U-shape, the front 113 and under face of which piece is formed or shaped to coincide with the under face and front of the core 100, and to leave a U-shaped opening intermediate the side members 103 and its front 113 and the front and sides of core 100 as just described.

There is at the front 113 a T-shaped extension 114 which section is offset from the closed end 113. The top of said T-shaped section 114 provides a stop for the downward movement of a staple driving plunger or arm later to be described. The under sections of said T provide a stop for the upward movement of said plunger driving mechanism.

The staple driving member or arm comprises a member U-shaped in plan view, said member having an offset front section 120. There is a slot at the under side thereof to provide a lip 121. Said lip 121 is transversely grooved at 121a to receive the top of a staple driving tool. The slot in section 120 extends downwardly to

cause the formation of two extensions 122 which provide the parts of the staple driving arm arrested by the underside of the extension 114. The area of the inturned lip 121 in front of the transverse groove 121a is that portion of the driver arm which engages the top of the T to arrest the downward movement of the staple driving mechanism. The slot in front 120 is of sufficient width that front 120 clears the magazine. The parallel edges of such slot register closely with the side members 103 of the magazine and thus prevent longitudinal disalignment of the staple driving lever and the magazine (see Figure 3).

The sides 123 of the arm flare outwardly from the offset section 120 and are bent backwardly to complete the U shape in plan view previously described, the rear ends of the side members 123 having lateral projections. One of these, 124, receives the bolts 110 extending through the ears 108 of the magazine side members 103. The other portion 125 extends downwardly through slots 126 in the base 10, being joined above said base by bolts and nuts or by shoulder rivets or the like to an actuating member for the under staple deforming tool or anvil. Said actuating member is link 22 or link 86 for the first and third forms of anvil described. In said forms of anvil, the links have a rearward extension somewhat Y-shaped and with upturned ears 127 through which bolts 128 pass into the driver arm side extension 125.

At the rear of the base 10 is a U-shaped bracket which has a horizontal base 130 and vertical U-shaped side members 131. The side members 103 of the magazine are adapted to be disposed between the U-shaped side members 131 and are guided thereby. One of the pins 111 passing through the side members 103 and the staple supporting member 100 may be disposed to fall within the open portion of the U-shaped side members 131.

To secure the bracket upon the base 10, the main body 130 thereof may have end extensions 132 projecting downwardly through slots 133 in said base 10 to be riveted thereto at the under side. The Y shape of the actuating links 22 and 86 for the under staple deforming tool is to avoid contact with the bracket just described.

In said bracket and about the front end thereof is a bolt or pin 134 which extends first through one of the legs of the U-shaped side members 131, and then through a side member 103, through the core 100, the other side member 103, and the other side member 131. The bracket thus forms the pivot of movement for the staple magazine.

Between the slots 126 on the under side of base 10 is a T-shaped member 140. The material of the transverse section 141 thereof projects into indentations 125a out in the lower ends of extensions 125. Said T-shaped member has undercut ends 142 fitting into the indentations 125a to prevent lateral movement in respect thereto. The stem section 143 of the T-shaped member 140 projects rearwardly through an aperture in a boss 144 on the lower side of base 10. Intermediate said boss 144 and the transverse section 141 of the T-shaped member 140 is a coil spring 145 whereby the T-shaped member 140 is urged forwardly of the device.

Such urging force urges the lower extensions 125 of the driving arm forwardly, and in turn urges the link actuating the lower staple deforming member out of operative position and additionally urges the driving tool end of the driv-

ing arm upwardly away from the anvil. By reason of the offset between pivot pins 134 and the axis of the pivotal connection defined by bolt 110 such urging force also urges the forward end of the magazine toward the anvil but with less force than it urges the driving arm away from the anvil. The abutment between extensions 122 and extension 114 causes the driving arm to move the magazine against such force away from the anvil to the work receiving position after the driving arm has moved away from the anvil a predetermined distance. Thus, a single spring is adapted to actuate all of the parts except the lower staple deforming tool in the first forms of anvils described against the effects of the manual operation thereon. In the second form described, the spring urges the resetting of the lower staple deforming member.

For the forming of the cam for operating the under staple deforming tool, attention is directed to Figure 1 showing a link 186 comprising an elongated portion 137 having an end 138 thereof turned over at 180 degrees angle, the turned over portion having an oblique face 139 adapted to cam against the transverse camming face between the legs of the member forming the under staple deforming tool support.

Movement of the parts of the device under the influence of downward pressure upon a handle 135 which may be secured in any suitable manner upon the top of the driving member 120 and sides 123 or be formed as an integral part thereof is as follows:

The initial movement, on downward pressure, is that of the staple magazine about its pivot, pin 134, which is disposed about equidistant from the ends of the magazine. This causes movement of the magazine and staple driving tool simultaneously. When the under side of the core 100 at its milled out portion 102 engages the top of an anvil, the staple driving tool arm continues its downward movement, carrying with it the staple driving tool. This movement is about pivot 110. The staple driving tool and its arm continue their downward movement until the lip 121 engages the top of the T-shaped member 114 or the lower projections 122 engage the top of the anvil.

During this second movement, that about pivot 110, the arm is pivoted in a plane above the level of the magazine and it moves about an axis defined by the bolt 110 which passes through the upper extensions 124 of the arm member and through the ears 108 upon the side members 103 of the magazine. Such movement currently forces the lower extensions 125 of the arm rearwardly.

Rearward movement of said extension 125 moves the link operating the lower staple deforming tool so that the camming surface thereon reaches the under side of the yoke member 26 upon which the under or lower deforming tool 29 is secured to force said tool 29 upwardly against the already partially deformed staple within the slot 18 in the anvil to complete its deformation and to force the staple legs into parallelism with the bridge portion thereof. Where the anvil floats, the action of the link 86 is to release the anvil to allow it to drop to admit of further movement of the staple magazine and upper staple driver arm.

A second form of the invention is also illustrated. In such form of the invention, the staple carrying arm is formed in substantially the same manner as in the first described form of the in-

vention. The under deforming too, however, is lever operated. Said form of deforming tool has been described in connection with the multiple anvil heretofore described.

5 About the grooved head 65 thereof is disposed a U-shaped lever 150 which is pivoted in the base, the pivots 151 being two in number and being disposed upon inturned or downturned ears 152 cut from the base. The smaller end  
10 153 of lever 150 is webbed and is adapted to fit about the grooved head 65 of the under staple deforming operating member. At the rear, said lever has upwardly extending sections 154.

In the upwardly extending sections 154 is an irregular slot 155 the faces of which provide a cam. Through said slot 155 there extends a bolt 156 suitably secured in position by a nut. The bolt 156 is secured in an aperture in the lower extension 125 of the staple driving arm. The  
15 arm member is secured to the upper section of the magazine, and the magazine pivoted to the base in this form of the device as in the previously described form. In the actuation of the present device, the initial movement is about the dowel  
20 pin 134 which transverses the magazine members.

When the magazine members conjointly with the driving tool arm have been moved downwardly the limit of their angular displacement, the driver arm is then forced downwardly in the same  
25 manner as in the previously described form of the invention. The initial downward movement of the magazine causes the bolt 156 which is secured in the lower extension 125 of the driver arm to move in the slot 155 in said lever member  
30 150 to a position ready to force the rear end of said lever member 150 downwardly.

Said lever member 150 being pivoted in the ears 152 of the base 10, is then moved about pivots 151 as an incident to further movement  
35 of the driver arm and thus forced by pressure on the handle 135 to lift the under staple deforming member, said member moving upwardly as the front arm of the lever moves in such direction because of the application of force to the  
40 rear end thereof. As in the previously described form of the invention, a single spring 157 which employs its urging force to move the lower extensions 125 of the housing member forwardly actuates all of the members of the second form  
45 of the device which are displaced by the actuation described. In this particular form of the invention, spring 157 also actuates the resetting of the lower staple deforming member by reversing the camming action of the bolt 156 in  
50 the slot 155.

The staple driving tool 160 comprises a relatively short blade 161 of material similar to a clock spring. At its top end, said tool may be provided with a hook-like support 162, somewhat  
55 in the nature of the conventional picture frame hook deprived of its lower upturned section. What is desired therefor is a hinge-like connection. A rivet or rivets 163 extends through the body of the blade 161 and through the depending  
60 portion of the support 162. The hook-over portion 162 of the support extends onto and rests upon the inturned lip 121 of the driver arm, the end of the supporting member 162 resting on the inner face of the lip of the arm and inwardly  
65 over that portion of the lip which is grooved. The upper end of the blade 161 is adapted to be inserted in the transverse groove 121a. The two forces, i. e., that of the hook member resting upon the lipped section of the arm and on one side  
70 thereof, and the top edge of the member 161 rest-

ing in the groove 121a on the under side of such lip, are ample to secure the staple deforming member in position and to prevent vertical or upward or downward displacement.

As previously stated, the desired connection is  
5 a hinge. When the arm is forced downwardly the blade will hinge to compensate for the angular movement of the arm about the magazine end. The staple driving tool 161 may be subject to flexing forwardly or rearwardly because of its  
10 combination of pivot means.

Lateral displacement of the blade 161 is prevented by the side members 123 at the lower portion of the blade and by the hook member 162  
15 engaging the walls of the U-shaped member 120 at its upper end. Excessive pivotal movement forwardly or backwardly is prevented by the upturned lips 112 on the ends of the flanges 104 in the side members 103. The play coincidental with such a mounting for the staple driving  
20 member as that described compensates for the angular displacement of said member coincidental to its use in driving a staple. There is relative movement of the driver arm and of the staple carrier arm at the front of the device during the staple driving operation which movement  
25 is slightly angular. The relatively loose mounting for the staple driving member compensates for such angular displacement without interfering with the efficiency of the stapling device.

In the present form of the invention, staples may be deformed as shown in Figure 22. To form a staple having both ends turned inwardly, the walls of the anvil each project inwardly at their ends to force the legs of the staple inwardly.  
30 This is the first step in the deformation of the staple. Thereafter, the under deforming member presses the legs flatly against the bridge portion of the staple resulting in a staple having legs compressed closely against the bridge.  
35

To obtain a form of staple deformation where one leg of the staple projects outwardly while the other end is bent inwardly, the end wall of the anvil projects outwardly and the other inwardly. The flattened arrangement of the staple legs is  
40 obtained by the compression of the staple by the under tool after the legs have been partly deformed by the upper tool.

At the front end of the magazine is a Y-shaped opening 170a intermediate the milled end 102  
45 of the core 100 and the side members 103. The opening 170a extends rearwardly a short distance. It permits of deformed or broken staples being forced from the apparatus without interfering with the remaining whole staples therein.  
50

Novel means for preventing the collapse of a staple during its insertion into a stack of paper or the like are illustrated. These means may assume different forms.

The front end of the core 100 may be provided  
55 with a member 170 having ribs 171 and 172 whereby friction is had upon staples as they are forced downwardly. The ribs 171 at the edge of the member 170, when desired, may be of less magnitude than the center rib 172. The side  
60 ribs are for the purpose of preventing the staple legs from bending inwardly from the bridge of the staple and collapsing. To prevent the staple legs from being bent backward, slight undercut grooves 173 are provided in the inner wall of  
65 the side members 103 at the front end of the device. As pressure is brought to bear against the ends of the staple legs while being forced through material, the legs spread or bend outward slightly and engage the grooves 173 which  
70 75



support them from buckling sideways. Such grooves provide a track for the staple legs and down which they follow under the pressure of the staple driver.

5 The front of the U-shaped housing may be slotted, as is shown at 190. Therein may be disposed a series of spring steel blades 191, there being as many of these blades as there are slots 190. The blades may be formed from a single sheet of material by slotting and articulation. 10 The center ridge may be slightly advanced or higher than the other ridges so that the pressure is greatest at the center of the staple bridge to prevent buckling. However, this is not absolutely necessary as the ridges are tapering closer to the front at their bottom than at their top, and if a staple bridge should bend downward it would immediately receive the full pressure of the supporting head and prevent it from so doing. 15 The ridges are also used to prevent accidental displacement of staples from the magazine.

The front of the driver may be longitudinally grooved as at 192 to prevent its direct contact with the rear oblique edges of the spring steel blades 190 so that there is no friction against the driver in its downward movement. Staples in their movement down the staple track come into contact with the spring steel blades 191 which blades are forced out of the slots 190 by the staples to open the track for the passage of the staple into an object on the anvil. The outer blades 191 are so positioned that they tend to support the legs of the staple from inward collapse. A guiding groove in the side members 30 103 may be employed with the blades 191 when desired.

In another form of the invention, a reciprocating block in the front end of member 100 of the magazine is employed. The front end of member 40 100 is cut away and apertured or otherwise suitably formed. In the formed section of member 100 there is provided a plunger 193 or the like. The under surface thereof is cut away at 194 to provide a section engaging a stop. The end of the plunger 193 includes a somewhat triangular block 195 when viewed in vertical section. Block 195 normally is urged forward by a spring 196 at the rear of plunger 193 and in aperture 197 of the core 100. Said spring 196 is adapted to force 50 the plunger toward the front of the device and into the staple path. Upon the front face of head 195 are ridges 198. The ridges may be the same height as has just been described. The movement of the block is about midway of the downward staple track. The grooves are cut in the rear of the driving tool so there is no friction or contact whatsoever against the driving tool.

This movable supporting arm which also may form a part of the magazine core has another very useful feature. Not only does it support the bridge and legs from buckling or bending but allows any bent, crooked or out of square staple to be ejected from the downward track without jamming or clogging the machine. The block 65 simply moves back against the tension of the spring and allows a defective staple to pass. This rearwardly movable block also is valuable in making it possible to use wire of variable thickness, the variation of diameter or width depending upon the distance allowed for the block to move back, the top edge of the block being beveled to allow the staples to be forced down the path. The face of the block 195 may be smooth or without notches and parallel with the housing 70 113—and may be used to allow crooked or wider

staples to be ejected. This arrangement would necessitate a spring for plunger 193 of greater tension than the tension of supporting members 191.

To guide the head 195 and to prevent axial 5 movement thereof, there may be a lug 199 projecting therefrom. Such lug is adapted to reciprocate in a track 200 formed in the upper face of the magazine member 100. The head and plunger may be riveted as shown—the plunger 10 has a slot at its front end and the head has two D-shaped holes when riveted in this fashion. Thus the center ridge of the head is not interfered with in any way. A pin 202 passing through the core 100 and into the cutaway section 194 in 15 the plunger 193 limits the forward movement of the member 195 which is adapted to engage the staples to prevent their collapse.

A member 180 is adapted to be hooked upon the lugs 105 at the front end of side members 103 20 to hold a spring end loop 181 in position. A spring 182 is secured to an angular extension 183 of member 180. Said spring 182 is looped through two slots 184 in said angular portion 183 of member 180 and extends rearwardly into a 25 housing which is mounted upon a U-shaped follower. Said parts will later be described.

As shown, each of the lugs 105 which project inwardly is provided with a shouldered slot 185. Between said lugs at the wide part provided by the deeper section of the slots 185 may be inserted member 180. Through the body of said member 180 is a circular aperture 186 for the purpose of facilitating handling. The bottom end of the angular extension 183 terminates in beveled 35 corners to facilitate insertion in the slots 185.

Depending from the main body of member 180 and extending to adjacent the bottom of the extension 183 is a flat spring 187 suitably riveted to the main body. In said spring is a curvature extending forwardly of the device. To place the spring anchoring member 180, the beveled ends thereof are forced into the wider portions of slot 185, intermediate the two lugs 105, it being necessary to compress the flat spring to accomplish 45 this entry.

When said member 180 has been forced inwardly, the spring 187 urges the member 180 rearwardly. Slots 188 in member 180 provide a section in said member which may fit upon 50 the shouldered section of the lugs 105 but not escape between said lugs 105. The main body is thus held upright in a position for ready manipulation. It is impossible to lift the member 180 out of its position without first advancing it forwardly against the resistance of the flat spring 187, but said member may be readily detached if and when desired.

On the under side of the staple magazine sides 103 is a projection 103a which is adapted to engage the base 10 to limit the angular movement of the magazine.

Instead of the staple driving arm being employed also to house a staple follower spring, as is conventional, the present form of the invention 65 is provided with lugs 105 adjacent the front end thereof by which a spring end may be hooked adjacent the staple housing, as described, such spring terminating in a drum within a housing 70 forming a part of a staple follower.

In one form of staple follower, there is a housing comprising a base 210 of a U-shape, the legs 211 of the U-shaped member being pointed downwardly to provide a follower having a cross 75

section of the shape of a staple to ride along magazine member 100.

Thereabove is a second U-shaped member 212 with its closed side 213 abutting the closed side of the lower member. Between the upstanding legs of the upper U member 212, there is a drum 214. Within the drum 214 is a coil spring 215. One end of the coil spring 215 is threaded through a transversely arranged tube 216 having apertures 217 therein at right angles to one another. The spring 215 is coiled about tube or tubular bearing 216 and projects through the drum by way of slot 218.

About the drum is a tape 219. This may be wound around the drum several times and the free end provided with a member 180 to make simple its attachment to the staple driving machine. A rivet 220 may extend through the tape 219 and spring 215 to provide anchorage for the spring upon the drum.

For holding drum 214 in position on the U-shaped member 212, there is a shaft 221 provided for insertion through the sides of the member 212 and tubular bearing 216. Said shaft 221 has a body the major portion of which is uniform in diameter. At one end, the shaft has a slotted head 222 and at the other end is formed to fit into a substantially rectangular aperture 223 in member 212. The shaft 221 is milled on opposite sides in continuation of the end to be fitted into a rectangular opening 223, one of the flat sides 224 being arranged to compensate for the projection of the end of spring 215 into the tubular bearing therefor. The lower U-shaped member 210 has an offset U-shaped longitudinal section 224 which provides space for the insertion of a rivet 225, the section 224 riding between flanges 103, and extending upwardly to the upper U-shaped member 212 to provide a guide which cooperates with flanges 104 to prevent displacement of the follower.

In the formation of the drum 214 there may be two side members 226, each having a plurality of slots 227 therein. Between the side members 226 is a strip member 228 having serrations 229, which extend through slots 227 to engage the interior of member 212 which is thus made to guide the drum. Other serrations 230 may extend through similar apertures and be clinched or riveted or otherwise secured to the side members 226.

At the front of the member 212 there is a slot 231 in each side wall in which a covering 232 is adapted to be seated at one end. Said covering 232 extends over the open top of the U-shaped side members and terminates above a flange 233 extending upwardly from member 212 at its rear and where the cover is secured in position by a machine screw or other means.

In the assembly of the drum 214, the tubular bearing with its coil spring is placed in position so that the shaft 221 may register therewith. The shaft 221 is partly inserted thereinto. By the use of a screw driver or other tool, the shaft 221 is turned, and with it turns the tube 216. With the turning of the tubular bearing 216, the tension on the spring 215 is increased. When the tension on the spring 215 is increased to the desired tension, the shaft 216 is forced inwardly its full extent. It is made to register with the rectangular aperture in member 212.

Over the threaded end of shaft 221 washer 234 is placed and thereafter a nut 235 is applied. The nut 235 is fastened in the usual way and tightened to preserve the adjustment obtained. As the hole

in the wall of the U-shaped member 212 through which threaded shank projects is rectangular, and the end of the shaft 221 is milled to a corresponding shape, there is no opportunity for release of the shaft 221 to reduce the tension on the spring 215 without removing the shaft from member 212 a part of the length of the shaft.

In one side of member 212, a lever 236 is fulcrumed at 237. On the side of the member 212 upon which the lever 236 is fulcrumed, there are additional apertures. At the front of the housing, there is a stop pin 238.

The lever 236 has a lug 239 which projects inwardly of the housing 212 by way of aperture 240 to engage the teeth formed by the serrations 229 comprising the underformed teeth of the circular portion of the drum 214.

At the front end, the lever 236 has a turned out finger piece 241 to aid in its manipulation. In such front section of the lever 236 which is enlarged, there is a slot 242 about the pin 238, the pin cooperating with the end walls of the slot 242 to limit the movement of the lever 236.

At the rear end of the lever 236, there is an inwardly projecting lug 243 which extends through another aperture 244 in the housing 212. At the end of the lug 243, there is suitable groove 245 for receiving one end of a coil spring 246. Within the housing is a second anchor hook 247 for the other end of the spring 246. The urge of the spring 246 is to force the lever 236 about its pivot in a direction so that lever 236 by reason of the lug 239 will fall in the path of the teeth 229 on the drum 214 to arrest rotation of the drum 214. Such mechanism is operative when the follower is removed from a stapling device to prevent winding of the coil spring 215, for teeth 229 will engage the lug 239 as the drum begins to rotate. When placed on a stapling machine, the top of the side member 103 engages the lever 236 to move the lug 239 out of the path of the teeth 229 so that the spring 215 may then be useful to propel the follower when the anchor for the tape is secured as heretofore described.

In a second form, the spring 182 for the staple follower may be slotted, the slots being indicated 250. The slots 250 are arranged in spaced relation and are preferably of uniform length and uniformly spaced apart.

Such spring 182 may be secured to the attaching member 180 in the usual way, for example, by looping the spring therethrough as heretofore described. At the other end, the spring 182 is wound about a key member or shaft 251 which is secured in the housing 252 which is quite like housing 212 except that it has slots 253 at its sides.

The slots 253 are substantially vertical. At the lower end of the slots 253 is a V-shaped enlargement 254. The spring 182 inserted through slot 255 in key 251 is wrapped therearound. By movement of the key 251 in a counter-clockwise direction, the tension on the spring 182 is increased. Such tensioning is had with the key 251 outside of housing 252. The key is then placed in the V-shaped enlargement 254 with the key ends 255 seated therein. When so positioned, the spring shaft 251 is difficultly removable from the slots 253. With the cover over the housing 212 the key or shaft 251 cannot be displaced.

Also in the housing 252 is a transverse shaft 260. At one end thereof a collar 261 may be attached thereto by a pin or other suitable fastening member. At the other end of the shaft and external to the housing 252 is a washer 262, and external to the washer 262 is a lever 263 which

may be attached to the shaft 261 in any desired manner, as for example, by a transverse pin.

The lever 263 at its free end is adapted to ride upon the top edge of one of the sides 103 and when the follower is in use in a stapling machine and normally rests thereon. Also, upon the shaft 260 and within the housing 252 is a pawl 264 which has a pointed end 265, such end being of a width and length adapted to readily penetrate through the slots 250 in the spring 182.

At the free end of the pawl 264 is a stud or lug 267 which is adapted to receive one end of a coil spring 268. The other end of the spring 268 is disposed about a second lug 269 which may be a part of the under side of the cover.

When the lever 263 rests upon the top edge of side member 103 the pawl is out of the path of the spring 182 as it moves into and out of the housing 252 when the follower travels forwardly and backwardly on a staple driving machine. The tautness of the spring prevents it from engaging the pawl. In the event of the follower being detached from a staple driving machine, the lever 263 is no longer held by the side 103, and the pawl 264, under the influence of spring 268, is forced into the path of spring 182. The end 265 of pawl 264 projects into one of the slots 250 in spring 182 and locks it against movement until the follower is replaced upon a stapling device. To limit the angular movement of lever 263, a stop pin 270 may be placed in the housing 252 adjacent thereto.

In any one of the several forms of the invention described, the same method of operation is employed. The staple follower is removed from the staple magazine by detaching the member 180 from the lugs 105. The staple follower may then be slidably removed from the rear end of the magazine. When it is removed, locking means as described prevent the winding of the follower spring.

Staples of the kind now generally employed, i. e., those which are individually formed and then glued together are placed in the magazine. The present arrangement of parts is the first in which staples of variations may be successfully employed. Oversize or undersize staples are equally effective as standard sizes. Likewise, the diameter of the wire is unimportant for all sizes work through the machine effectively. These are pressed towards the front of the machine by the finger or by the follower. When the follower is placed in position upon the magazine at the rear of the staples loaded thereto, the spring locking means is automatically released. The member 180 is drawn forwardly and attached within the slots upon the ears of lugs 105. The device is then ready for operation.

On a downward movement of the driver arm and the parts associated therewith, by the manual operation of the handle on the driver, the magazine moves downwardly about its pivot until the milled out front end thereof rests upon the anvil. The driver continues its downward movement driving from the staple track at the magazine end in the driver arm the foremost staple which is no longer supported by the magazine core 100.

When driving such staple from the machine, the bridge of the staple is supported and the legs thereof are held against doubling up or bending by any one of the several means described and illustrated. After the legs of the staple have penetrated the paper or other material upon the anvil, the anvil becomes effective to deform the

staple legs. The lower deforming member continues the deformation as a result of the more intimate contact of the driving and deforming members. The legs of the staple thus are straightened out until they are parallel with the bridge of the staple.

Under the urge of the main spring, the driving arm is returned to its upper position, the magazine and driving arm are parted to the full predetermined limit (that relative relationship where the driving blade is raised to staple receiving position within the discharge chute), the magazine is raised to work receiving position and the lower driving or clinching member is released to return to its depressed position. The device is then ready to repeat the operation.

For permitting of the upper blade compensating for the angular movement between the driving arm and magazine, the driving blade may assume the forms shown in Figures 23 and 24. In the former figure, the blade 301 is seated in a bar 302 which rotates in apertures in the driver arm, while in the form of the device shown in Figure 24, the blade 306 is supported on one wing 307 of a hinge, the other wing 308 of the hinge being anchored or secured to the staple driving arm in any suitable manner.

What I claim is new and desire to secure by Letters Patent of the United States is:

1. A stapling device comprising a housing forming a path for staples, and a movable member with one section upon which staples rest and another section normally projecting into said path for staples to engage a staple therein, said latter section having a plurality of ribs, one of said ribs being larger than the other ribs, and said ribs engaging the legs and bridge of a staple to prevent its collapse.

2. The combination in a stapling device, of a magazine comprising a bar having sides providing a track for staples, said bar being of reduced depth at its front, and an enclosing member extending about and having edges coinciding with the edges of said bar, said enclosing member having flanges extending partly over said bar as a guide for staples on said track.

3. A stapling device comprising a beam magazine, a follower removable from said beam magazine and having self-contained propelling means, and means for preventing the operation of said propelling means when said follower is removed from said magazine.

4. A stapling device comprising a beam magazine, a staple follower in said magazine, a coil spring in said follower and detachably secured to said magazine, said spring providing means for the self-propulsion of said follower along said magazine, and means for rendering said spring inoperative as a propelling means effective coincident with the detachment of said follower from said magazine.

5. A stapling device comprising a beam magazine, a staple follower disposed on said magazine and having a spring member therein, said spring when anchored on said magazine providing means for propelling said follower along said magazine, and means for detachably anchoring said spring member upon said magazine.

6. In a stapling device, a base, a staple magazine pivoted to said base and comprising a staple supporting section substantially parallel with said base, a staple driving tool holder comprising a U-shaped member having its legs in alignment with and at the sides of and pivoted to said magazine, a staple driving tool oscillatively

mounted in said staple driving tool holder, and a staple clinching seat on said base, the staple clinching movements of said magazine and of said staple driving tool holder being in the direction of said seat and in intersecting arcs.

7. In a stapling device, a base, a beam magazine substantially parallel thereto and pivoted thereon, a bracket upon each side of said magazine, a driving tool support pivoted to said brackets, and a staple driving tool oscillatively mounted in said support and movable normally of said magazine.

8. In a stapling device, a base, a beam magazine pivoted to said base and extending in a direction substantially parallel thereto, a bracket upon each side of said magazine and extending upwardly and outwardly therefrom, a staple driving tool support pivoted to said brackets, and a staple driving tool oscillatively mounted in said support for movement normal to said magazine.

9. In a stapling device, a base, a beam magazine for staples pivoted to said base and mounted in substantial parallelism therewith, a bracket on each side of said magazine, a U-shaped staple driving support with legs pivoted to said brackets and having a movement arcuate of said beam, and a staple driving tool oscillatively mounted in said bracket and having a movement normal to said magazine.

10. In a stapling device, a base, a magazine pivoted to said base and extending therealong in substantial parallelism therewith, a bracket at each side of said magazine, a support for a driving tool pivoted to said brackets, said support being U-shaped and one leg thereof being pivoted to each bracket, a staple driving tool oscillatively mounted in said U-shaped support, a staple deforming tool in said base and moving in a direction opposite to the movement of said driving tool, and means intermediate said deforming tool and the legs of said support for operating said tools in timed relation.

11. In a stapling device, a base, a magazine pivoted to said base and substantially parallel thereto, a bracket at each side of said magazine, a holder for a staple driving tool comprising a U-shaped member having T-shaped legs, one end of the cross bar of each T-shaped leg being pivoted to each of said brackets, a staple driving tool oscillatively mounted in said holder, a staple deforming tool in said base and opposed to said staple driving tool, and means intermediate the other end of the cross bars on the legs of said holder and said staple deforming tool for operating said deforming tool.

12. In a stapling device, a driving tool, an anvil having a plurality of different series of clenching seats registrable one series at a time with said driving tool, and a lower member comprising a plurality of setting sections movable as a unit and associated with said anvil, certain of said setting sections being complementary to certain of said clenching seats and being operable when said clenching seats are registered with said driving tool.

13. In a manually operated stapling device, an anvil, a magazine for staples, a staple driving tool holder pivoted upon said magazine, a staple driving tool in said holder and adapted to remove staples from said magazine and cooperate with said anvil to partially deform the legs of a removed staple, a unitary deforming tool further deforming the legs of such staple into parallelism with the bridge of the staple, and a lever actu-

ated by said driving tool holder to render said unitary deforming tool operable.

14. In a stapling device, a housing forming a path for staples, and a magazine having one section upon which staples rest and a second section having a staple supporting part projecting therefrom in alignment with the top surface of the first section and movable longitudinally thereof into the staple path to engage a staple discharged from said magazine, said second section being movable toward and in alignment with said first named section to open the staple path for the ejection of a staple from the device.

15. A beam magazine for staples, said magazine having a top surface upon which staples are supported, a staple driver movable across said magazine, and a plunger having a top surface in alignment with the top surface of said magazine and movable longitudinally into and out of the front end of the magazine into and out of the path of each staple as it is discharged by said staple driver.

16. In a stapling machine, a beam magazine for staples comprising a core forming one section of a staple track, and staple supporting means engaging staples one by one as discharged from such track and comprising a second section of the track upon which such staples ride, said second section reciprocating longitudinally of said first section.

17. In a stapling machine, a beam magazine for staples comprising a core forming a staple track, and a member movable relative thereto and forming a continuation of said core and an extension of such staple track, said member reciprocating longitudinally of said core.

18. In a stapling machine, a beam magazine having a core forming a staple track, and a member spaced from the end of said core forming one wall of a staple ejection chute, said core having an extension movable relatively thereto and upon which staples ride, said extension forming another wall of such ejection chute.

19. In a stapling machine, a longitudinally extensible stable carrying beam magazine, a member spaced from the end thereof to provide therewith a staple discharge chute, and resilient means for urging said magazine into extended position and toward said member.

20. In a stapling machine, a beam magazine for staples comprising a core and a member reciprocable longitudinally thereof, said core and movable member conjointly forming a continuous track surface upon which staples ride, said core and said movable member having interfitting parts for preventing staples from lodging between said core and member as the staples ride along such track surface.

21. In a stapling device, a staple driving means, a beam magazine comprising a core forming a staple track, and a strip of metal folded to provide a U-shaped member having legs extending longitudinally of said core, said legs intermediate their length being provided with brackets and providing a support for said staple driving means and having inwardly directed flanges extending over said core to guide staples therealong.

22. In a stapling device, a beam magazine for staples, a staple driving means comprising a U-shaped staple driving lever having its legs pivoted upon said magazine, the closed section of said U-shaped lever being movable across the forward end of said magazine and the legs of said lever preventing transverse movement thereof.

23. A stapling machine comprising a beam

- magazine for staples, an anvil for partially deforming the legs of a staple, a hand actuated U-shaped staple driving lever having legs pivoted to said magazine, and a means beneath said anvil for flattening the legs of a staple driven thereagainst by said lever, said lever having an extension for actuating said means for flattening the legs of a staple.
24. In a stapling machine, a beam magazine for staples, a U-shaped lever having a driving tool thereon and having legs in spaced relation to said magazine and pivoted thereon, the front of said U-shaped member being open to provide spaced apart sections engaging said beam magazine to limit the upward and downward movement of said lever.
25. In a stapling device, a base, an anvil on said base, a staple deforming element also on said base and associated with said anvil, a staple carrying arm mounted on said base, a staple driving lever pivoted to said staple carrying arm and having extensions, a yoke for actuating said staple leg deforming element, and a link connecting said yoke and said staple driving lever.
26. In a stapling device, a beam magazine, a U-shaped driving lever pivoted to said magazine, said U-shaped member having a part of its closed end bent at a right angle, and a staple driving tool pivotally secured to said bent part.
27. In a stapling machine, a pivotally mounted staple carrying arm, a staple driving lever pivotally connected to said arm, and a driving tool oscillatively mounted in said lever for driving staples from said arm, the movement of said driving lever relative to said arm causing said driving tool to flex longitudinally of said staple carrying arm.
28. In a stapling device, a flat hollowed base having an anvil, a staple carrying arm movably mounted on said base, an actuating lever movably mounted on said arm, a staple driving tool in said actuating lever, there being fixed members on said lever extending to the under side of said base, and a single spring means mounted beneath said base and acting in a plane substantially parallel therewith and against said members to urge said lever to raised position.
29. In a stapling device, a beam magazine comprising a core forming a track for staples, sheet metal sideplates mounted on said core and having flanges in spaced relation thereto to guide staples thereon, said sideplates having ears extending upwardly to act as bearings, a staple driving lever comprising a transverse section and paired parallel extensions, the extensions being mounted on said ears, and a driving tool mounted in the transverse section of said operating lever.
30. In a stapling machine, a base, an anvil thereon, a staple carrying arm mounted on said base, a staple driving member mounted on said arm and having a hook receiving section, and a staple driving tool in said member and having a hook member for pivotal connection to said hook receiving section.
31. In a stapling device, a hollowed base having slots therethrough, an anvil thereon, a beam magazine movably mounted on said base, a staple driving member movably mounted to said magazine, a driving tool in said member, a staple leg flattening instrumentality beneath said anvil, said staple driving member having downward extensions beneath said base and operable in said slots to operate said leg flattening instrumentality.
32. In a stapling device, a beam magazine comprising a core forming a staple track, and sideplates with inwardly directed flanges mounted on said core in spaced relation thereto to guide staples along said track, said core having shoulders spacing said core and sideplates, and said core and sideplates being of reduced depth at their front end, said shoulders on said core terminating at said reduced portion.
33. In a stapling device, a base, a staple driving means on said base, and a hollow cylindrical anvil having a plurality of sets of deforming cavities, said anvil being rotatable on said base on an axis normal to the top surface thereof and means within the hollow portion of said anvil operable with said sets to flatten the legs of staples after deforming by said cavities.
34. In a stapling device, a base, staple driving means on said base, a rotatable anvil having deforming cavities for the legs of staples mounted on said base on an axis normal thereto, and means beneath said anvil cooperating with said anvil and said driving means to flatten the legs of staples previously partially deformed on said anvil.
35. In a stapling device, a base, a rotatable anvil provided with a plurality of sets of staple deforming cavities and mounted on said base, a staple driving means carried by said base, and means within and rotating with said anvil and cooperating with said driving means to flatten the legs of a staple against material on said anvil.
36. In a stapling device, a base, a rotatable anvil mounted on said base and having slots therein, staple driving means mounted on said base for driving and clenching staples against said anvil, and movable members in said slots cooperating with said anvil to further deform the legs of staples clenched thereon.
37. In a stapling device, a base, an anvil on said base to partly deform a staple, staple driving means on said base, said anvil comprising a strip of material elevated from the top surface of said base and having an angular section at its front to facilitate positioning of material thereon, and means operable beneath said strip and above said base cooperating with said driving means to further deform the legs of a staple on said anvil.
38. In a stapling machine, a base, an anvil on said base and comprising a folded strip of material, said anvil being elevated from the top surface of said base and having front and rear parallel sections normal to said base for mounting said anvil upon said base, the front wall of said device having a sloping face to facilitate the positioning of material upon said anvil.
39. In a stapling device, a base, an anvil comprising a stationary member, and a member movably mounted thereover, and having a slot there-through registering with said stationary member, said movable member having at its front an angular sloping portion to facilitate the positioning of material upon said anvil and means locking said member from movement.
40. In a stapling machine, a base, a beam magazine movably mounted on said base, a staple driving lever having a driving tool therein and movably mounted on said magazine, said lever having paired extensions, and a T-shaped spring actuated member in said base and cooperating with said paired extensions to elevate said lever.
41. In a stapling device, a staple carrying arm, a staple driving means pivoted to said arm, there being a staple discharge chute between said driving means and said arm, and said arm having

at its front a resiliently supported face member extending into said discharge chute to support the bridge and legs of a staple against collapse during its movement across such face.

42. In a stapling device, a beam magazine, a follower thereon, and a flat coil spring mounted upon said follower for actuating said follower along said magazine and having one of its ends connected to said magazine and cooperating therewith to propel said follower.

43. In a stapling device, a beam magazine, a spring actuated follower removably disposed upon said magazine, said spring being mounted on said follower and having a connection to said magazine for propelling said follower along said magazine, means carried by said follower to prevent actuation of said spring when said follower is detached from said magazine, and hand operated means for releasing said propelling means when said follower is removed from said magazine.

44. In a stapling device, a beam magazine, a follower on said beam and detachable therefrom, a spring on said follower for actuating said follower and having a connection to said magazine to assist in propelling said follower along said magazine, and means carried by said follower for preventing said spring from functioning when said follower is removed from said magazine.

45. In a stapling machine, a beam magazine, a follower on said magazine, a spring on said follower for actuating said follower, said follower being removable from said magazine and said spring having cut out portions, and means cooperating with the cut out portions of said spring to prevent the operation of said follower when said follower is removed from said magazine.

46. In a stapling machine, a beam magazine, a follower for said magazine and having a drum, spring means propelling said drum, and a flexible connection from said spring to said magazine to assist in propelling said follower along said beam magazine.

47. In a stapling device, a beam magazine, a staple follower removable from said magazine, a spring rotated drum on said follower, a flexible connection cooperating with said magazine to propel said follower along said magazine, and means to prevent movement of said drum when said follower is detached from said magazine.

48. In a stapling device, staple driving means, a beam magazine, a staple follower removable from said magazine, a spring upon said follower and having a connection to said magazine to propel said follower along said magazine, and means independent of said staple driving means to prevent movement of said spring when said follower is removed from said magazine.

49. In a stapling device, a beam magazine, a spring actuated staple follower detachable from said magazine, a spring on said follower for propelling said follower along said magazine, means cooperating with said magazine to allow an advancing movement of said follower along said beam magazine under the urge of said spring when said follower is mounted on said magazine, and means preventing the movement of said spring when said follower is removed from said magazine.

50. In a staple device, a staple carrying arm, a follower on said arm, a spring mounted on said follower to actuate said staple follower, a housing for said spring having sideplates, said sideplates having slots with shoulders, and a flat

rectangular shaped core for said spring mounted within said slots, said spring cooperating with said shoulders to lock said core from displacement in said housing.

51. In a stapling device, a staple magazine, a discharge chute, means for feeding staples from the magazine into the chute, a staple driver to eject the staples one by one through said chute, a member resiliently operable and having a plurality of elongated ribs, said ribs extending into said chute and positioned substantially at the point where the staples from the magazine enter the chute so as to engage the legs of a staple as it enters said chute and during its travel through said chute.

52. In a stapling device, a staple magazine, a discharge chute for staples associated with said magazine, a staple driver reciprocally guided by said chute and a resiliently movable member having a plurality of elongated ribs, said ribs extending into said chute, one of said ribs positioned to engage the bridge and others positioned to engage the legs of a staple during its travel through said chute.

53. In a stapling device, a staple magazine, a discharge chute for staples associated with said magazine, a staple driver reciprocally guided by said chute, and a resiliently movable member having a plurality of elongated ribs, said ribs extending into said chute, one of said ribs positioned to engage the bridge and others positioned to engage the legs of a staple during its travel through said chute, said ribs being tapered so as to extend further into said chute at their bottoms than at their tops.

54. In a stapling device, a staple magazine, a discharge chute for staples associated with said magazine, a staple driver reciprocally guided by said chute, and a resiliently movable member having a plurality of elongated ribs, said ribs extending into said chute, one of said ribs positioned to engage the bridge and others positioned to engage the legs of a staple during its travel through said chute, said staple driver having complementary grooves to clear said ribs.

55. In a stapling device, a staple magazine, a discharge chute for staples associated with said magazines, a staple driver reciprocally guided by said chute, and a resiliently movable member having a plurality of elongated ribs, said ribs extending into said chute, one of said ribs positioned to engage the bridge and others positioned to engage the legs of a staple during its travel through said chute, said ribs being tapered so as to extend further into said chute at their bottoms than at their tops, said staple driver having complementary grooves to clear said ribs.

56. In a stapling device, a staple magazine, a discharge chute, a staple driver to eject staples one by one from said chute, a member resiliently operable and having a plurality of elongated ribs, said ribs extending into said chute and positioned to engage the legs of a staple during its travel through said chute, said member having a portion upon which staples rest while in said magazine and a portion forming one wall of said discharge chute.

57. In a stapling device, a staple magazine, a discharge chute for staples associated with said magazine, a staple driver reciprocally guided by said chute, and a resiliently movable member having a plurality of elongated ribs, said ribs extending into said chute, one of said ribs positioned to engage the bridge and others positioned to engage the legs of a staple during its travel through



said chute, said member having a portion upon which staples rest while in said magazine and a portion forming one wall of said discharge chute.

58. In a stapling device, a staple magazine, a discharge chute for staples associated with said magazine, a staple driver reciprocally guided by said chute, and a resiliently movable member having a plurality of elongated ribs, said ribs extending into said chute, one of said ribs positioned to engage the bridge and others positioned to engage the legs of a staple during its travel through said chute, said ribs being tapered so as to extend further into said chute at their bottoms than at their tops, said member having a portion upon which staples rest while in said magazine and a portion forming one wall of said discharge chute.

59. In a stapling device, a staple magazine, a discharge chute for staples associated with said magazine, a staple driver reciprocally guided by said chute, and a resiliently movable member having a plurality of elongated ribs, said ribs extending into said chute, one of said ribs positioned to engage the bridge and others positioned to engage the legs of a staple during its travel through said chute, said staple driver having complementary grooves to clear said ribs, said member having a portion upon which staples rest while in said magazine and a portion forming one wall of said discharge chute.

60. In a stapling device, a staple magazine, a discharge chute for staples associated with said magazine, a staple driver reciprocally guided by said chute, and a resiliently movable member having a plurality of elongated ribs, said ribs extending into said chute, one of said ribs positioned to engage the bridge and others positioned to engage the legs of a staple during its travel through said chute, said ribs being tapered so as to extend further into said chute at their bottoms than at their tops, said staple driver having complementary grooves to clear said ribs, said member having a portion upon which staples rest while in said magazine and a portion forming one wall of said discharge chute.

61. In a stapling machine, a staple magazine, a discharge chute for staples associated with said magazine, a staple driver reciprocally guided by said chute, and a resiliently movable member having a plurality of elongated ribs, said ribs extending into said chute, one of said ribs positioned to engage the bridge and others positioned to engage the legs of a staple during its travel through said chute, said member being supported outside of said discharge chute, one wall of said chute being provided with apertures for accommodating said ribs.

62. In a stapling device, a staple magazine, a discharge chute for staples associated with said magazine, a staple driver reciprocally guided by said chute, and a resiliently movable member having a plurality of elongated ribs, said ribs extending into said chute, one of said ribs positioned to engage the bridge and others positioned to engage the legs of a staple during its travel through said chute, said ribs being tapered so as to extend further into said chute at their bottoms than at their tops, said member being supported outside of said discharge chute, one wall of said chute being provided with apertures for accommodating said ribs.

63. In a stapling device, a staple magazine, a discharge chute for staples associated with said magazine, a staple driver reciprocally guided by said chute, and a resiliently movable member hav-

ing a plurality of elongated ribs, said ribs extending into said chute, one of said ribs positioned to engage the bridge and others positioned to engage the legs of a staple during its travel through said chute, said staple driver having complementary grooves to clear said ribs, said member being supported outside of said discharge chute, one wall of said chute being provided with apertures for accommodating said ribs.

64. In a stapling device, a staple magazine, a discharge chute for staples associated with said magazine, a staple driver reciprocally guided by said chute, and a resiliently movable member having a plurality of elongated ribs, said ribs extending into said chute, one of said ribs positioned to engage the bridge and others positioned to engage the legs of a staple during its travel through said chute, said ribs being tapered so as to extend further into said chute at their bottoms than at their tops, said staple driver having complementary grooves to clear said ribs, said member being outside of said discharge chute, one wall of said chute being provided with apertures for accommodating said ribs.

65. In a stapling device, an ejection chute through which staples are discharged, said chute having front and rear guiding means for the bridge portion of a staple, and front, side and rear guiding means for the legs of a staple, said rear guiding means for the legs being operable only when said legs spread during the driving action of the staple.

66. In a stapling device, a staple magazine including a core upon which staples ride in straddle fashion and staple retaining walls, a discharge chute for staples associated with said magazine, said chute having side walls in substantial alignment with said retaining walls, and a staple driver reciprocally guided by said chute, said side walls being provided with grooves positioned in substantially horizontal alignment with said core and adapted to receive the legs of staples as they spread during the driving action and provide a rearward guide therefor.

67. In a stapling device of the type specified, a staple magazine in which staples ride in line formation, a discharge chute positioned at one end of said magazine and adapted to receive staples from said magazine and guide the same during the driving action, said chute adjacent the legs of staples therein being provided with shoulders, said shoulders being in substantial alignment with the end of said magazine and slightly spaced from the legs of a staple as it enters said chute, said shoulders engaging the legs of a staple as they spread during the driving action and providing a rearward guide therefor.

68. In a stapling device, a staple driving tool, an ejection chute through which staples are discharged by said tool, means for supporting staples for movement into said chute, said chute having spaced guiding means for the bridge portion of a staple, one of said means being supported by said staple supporting means and movable relative to said other guiding means to allow a staple of larger width material than the normal width of said chute to be ejected while preventing said staple from clogging said chute as it is being acted upon by said tool.

69. In a stapling device, a staple driving tool, a core upon which staples ride in straddle fashion and a forward member spaced from one end of said core and defining therewith an ejection chute for staples having a normal staple receiving opening at the entrance end thereof, said core being of

flexible construction to allow staples of larger width than said opening to enter therein and be ejected through said chute by said tool.

70. In a stapling device, supporting means for staples to be driven a staple driving tool, and ejection chute for staples having spaced front and rear guiding means providing a staple receiving opening therebetween, said opening being tapered to allow staples of wider cross section than said opening to be started therethrough by the driving action of said tool, said rear guiding means being carried by said staple supporting means, and means associated therewith for resiliently biasing said rear guiding means toward said front guiding means whereby said rear guiding means may yield rearwardly to permit said opening to enlarge.

71. In a stapling device of the type specified, a staple magazine in which staples ride in line formation, a discharge chute positioned at one end of said magazine and comprising spaced forward and rearward walls forming an opening for and guiding the staples received from said magazine during the driving action, said rearward wall being resiliently movable away from the other wall to increase said opening in the event a staple of larger stock is received from said magazine.

72. In a stapling device, a staple magazine, a discharge chute for staples comprising pairs of oppositely spaced members forming an opening through which staples received from said magazine are driven, a plurality of resiliently movable ribs extending into said opening and positioned to engage the legs of a staple during its travel through said opening, there being means on one pair of said opposite members positioned to engage the rear surface of the legs of a staple as they spread during said driving action, and another pair of said opposite members being resiliently and relatively movable to increase said opening.

73. In a stapling device, a magazine, a discharge chute therefor, and a staple driving tool reciprocally operable in said discharge chute, said magazine and chute consisting of a core upon which staples ride in straddle fashion, an integral member having an end wall portion extending across and opposite one end of said core and spaced therefrom and side portions extending longitudinally along the sides of said core and spaced therefrom and projecting above the top level thereof, and inwardly directed spaced flanges secured to the inner faces of said side portions and lying over and spaced from the top of said core, the ends of said flanges adjacent said one end of said core being provided with projecting fingers forming a guide for said driving tool, the said end of said core, the said end wall portion and the said side portions defining the walls of said discharge chute, and the said side portions, the said flanges and the said core coacting to guide staples in said magazine.

74. In a stapling machine including staple feeding and driving mechanism, a magazine for staples consisting of a core having a portion upon which staples ride in straddle fashion, vertically extending side plates secured to said core and extending longitudinally thereof, said plates being spaced from said portion to provide guides for staples thereon, the upper edges of said plates for the length thereof projecting above the top

level of said portion, and spaced flanges resting against the inner faces of and secured to said plates intermediate said upper edges and the top level of said portion, said flanges overlying and spaced from said portion for the length thereof to form guides for staples thereon, said flanges and said plates above said flanges providing operating space for said mechanism.

75. In a stapling machine including staple feeding and driving mechanism, a magazine for staples consisting of a core having a portion upon which staples ride in straddle fashion, vertically extending side plates secured to said core and extending longitudinally thereof, said plates being spaced from said portion to provide guides for staples thereon, the upper edges of said plates for the length thereof projecting above the top level of said portion, and spaced flanges resting against the inner faces of and secured to said plates intermediate said upper edges and the top level of said portion, said flanges overlying and spaced from said portion for the length thereof to form guides for staples thereon.

76. In a stapling machine, a base, an arm pivotally connected to said base and having at one end a discharge chute for staples, a lever pivotally connected to said arm and having a driving tool reciprocable in said chute, and spring means directly acting between said lever and said base to urge the driving tool end of said lever away from said base, said pivotal connections being offset to cause said spring means to urge the discharge chute end of said arm towards said base.

77. In a stapling machine, a base, a staple carrying arm providing a discharge chute pivoted to said base, a staple driving lever having a tool reciprocable in said chute pivoted to said arm, and single spring means for urging said lever away from said base, said spring means indirectly and with decreased force urging said arm toward said base, there being abutments between said lever and said arm whereby said lever causes said arm to move away from said base.

78. In a stapling device, a base, a staple carrying arm pivoted to said base, and staple driving mechanism associated with said arm and reciprocable to drive staples from said arm and clinch the same against said base, and single spring means having a reaction between said mechanism and said arm to cause said mechanism to assume a predetermined position relative to said arm, said means being effective to cause said arm and mechanism to be raised to work receiving position relative to said base.

79. In a stapling device, a base, a beam magazine having an ejection chute for staples and pivoted to said base, a driving lever having a front wall and side walls, said side walls being in overlapping relation to said beam magazine and pivoted thereto, and a driving tool reciprocal in said ejection chute, the inner side of said front wall being provided with a rectangularly shaped projection, said driving tool having hook means for hingedly engaging the same with said projection for pivotal movement about an axis substantially parallel to the plane of said tool whereby a driving connection is established between said driving lever and said driving tool.

WILLIAM G. PANKONIN.



## CERTIFICATE OF CORRECTION.

Patent No. 2,059,020.

October 27, 1936.

WILLIAM G. PANKONIN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 13, first column, lines 4 and 5, claim 70, for "supporting means for staples to be driven a staple driving tool, and" read a staple driving tool, supporting means for staples to be driven, an; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2nd day of February, A. D. 1937.

(Seal)

Leslie Frazer  
Acting Commissioner of Patents.