

Feb. 16, 1943.

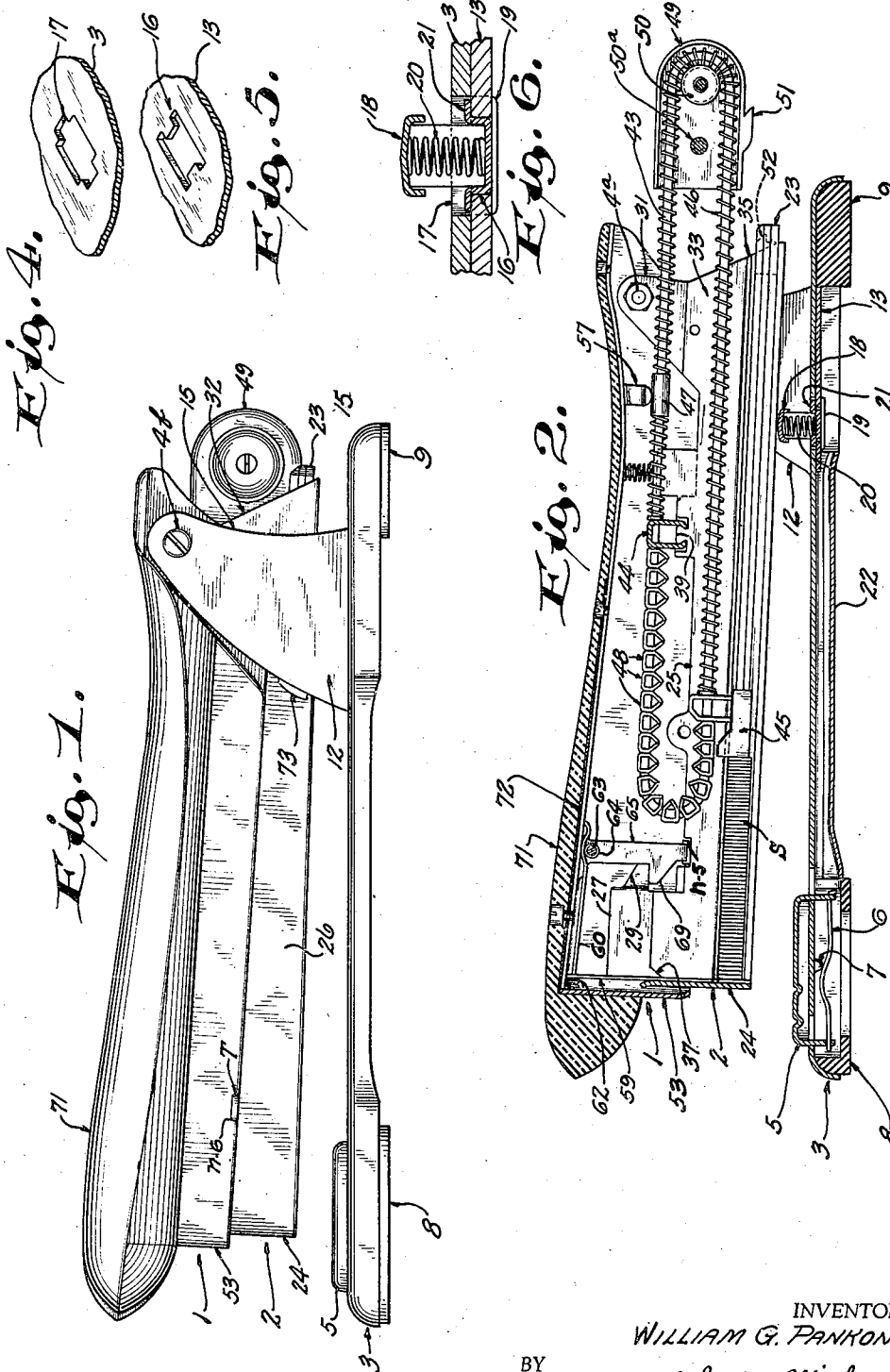
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2,311,412

FEED MECHANISM FOR STAPLING MACHINES

Filed July 1, 1940

4 Sheets-Sheet 1



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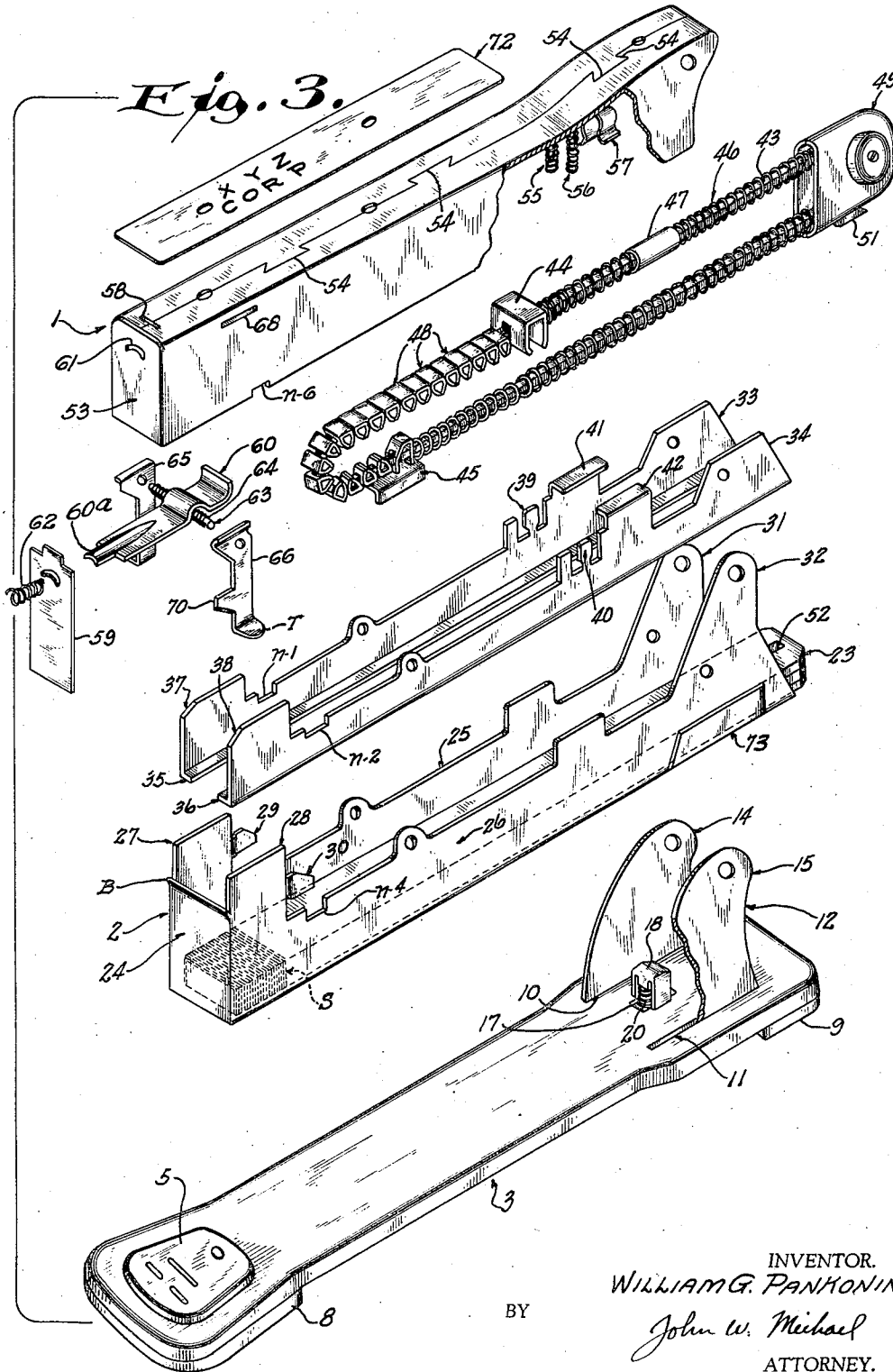
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FEED MECHANISM FOR STAPLING MACHINES

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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

Fig. 7.

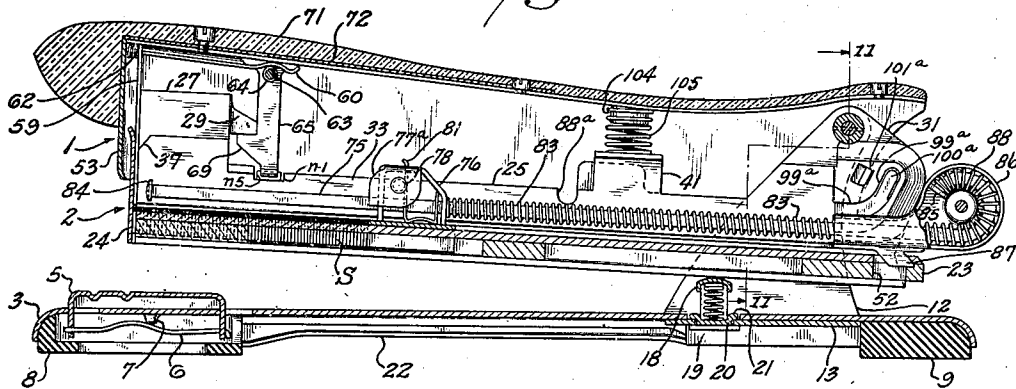


Fig. 8.

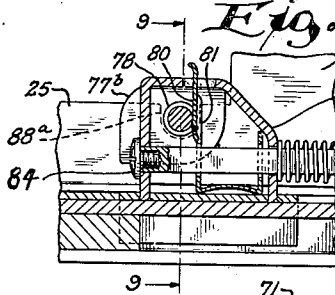


Fig. 9.

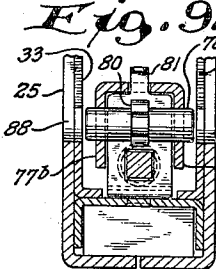


Fig. 10.

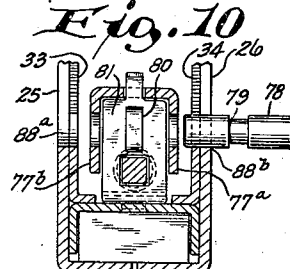


Fig. 14.

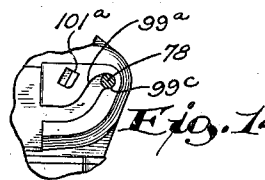


Fig. 12.

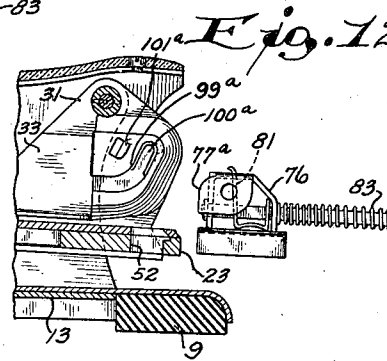


Fig. 11.

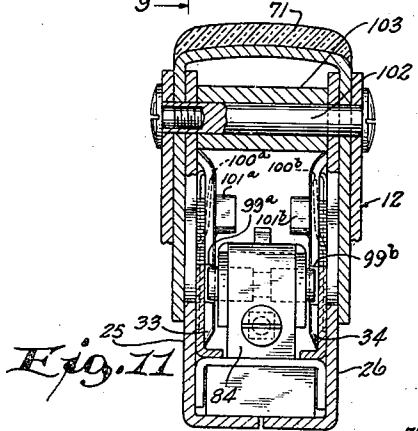
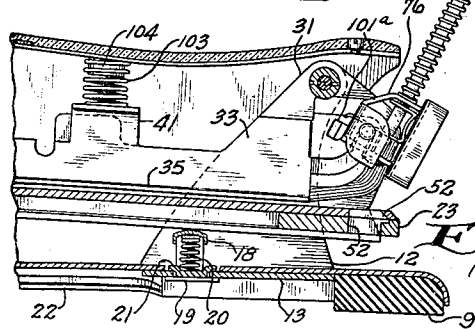


Fig. 13.



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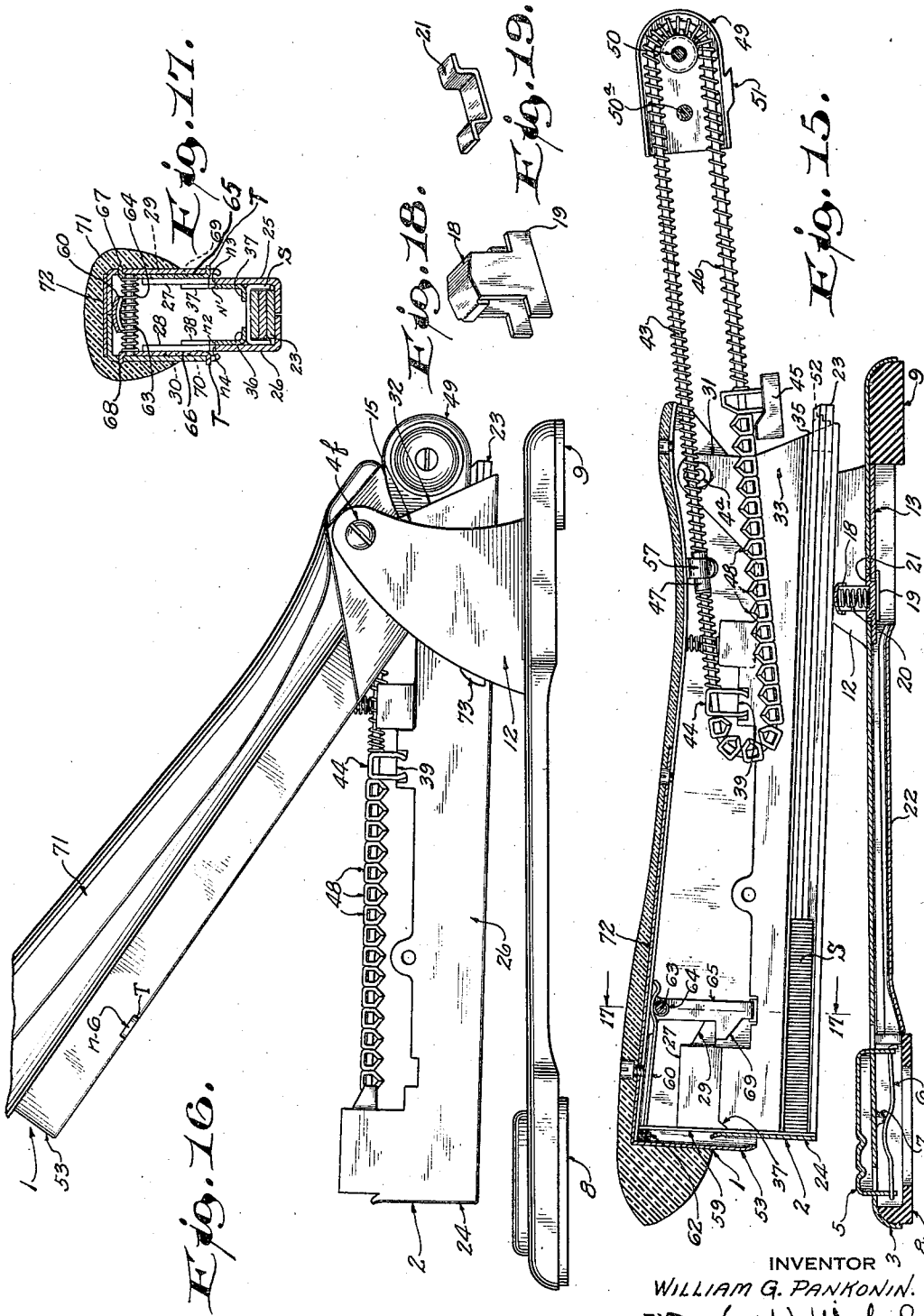
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FEED MECHANISM FOR STAPLING MACHINES

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,311,412

FEED MECHANISM FOR STAPLING
MACHINES

William G. Pankonin, Chicago, Ill.

Application July 1, 1940, Serial No. 343,380

20 Claims. (Cl. 1—3)

This invention relates generally to improvements in stapling machines.

One of the objects of the invention is to provide a stapling machine having a magazine and feeder mechanism for preformed staples wherein the feeder mechanism is retained in associated relationship with the magazine during the loading thereof, thereby preventing misplacement.

Another object of the invention is to provide a stapling machine of neat and simple appearance, adaptable for use as a desk type stapler, as a hand held plier type stapler, and as a tacker device.

The foregoing objects are accomplished by constructing the stapling machine of elongated arms pivoted at one end of each by a single pintle. One arm forms a base for the support of the other arms and also carries a staple clinching anvil. Two other arms, an operating arm and a magazine arm, are interrelated to form a staple storing and driving mechanism. This driving mechanism is operable by moving the operating arm relatively toward the magazine arm. This occurs whenever the motion of the magazine arm is arrested by the base arm or material being stapled. The base arm and operating arm are designed and dimensioned so that the operator can grasp them between the palm and fingers of one hand and operate them by squeezing the hand. The base arm is also adapted to be positioned on a supporting surface so that the operator may operate the operating arm by merely applying downward pressure. To use the machine as a tacker, the base arm is provided with brackets so that it can be swung away and out from under the magazine arm. The magazine arm may then be placed directly on the material and the staple driven therein without clinching by merely pressing downwardly on the operator arm.

In order to retain the feeder mechanism in associated relationship with the magazine during loading, the staple follower is made slidable on an endless follower rod. The follower rod has an upper leg slidably held in a retaining bracket positioned within the magazine. Slidably positioned on the follower rod between the retaining bracket and the forward end of the follower are a series of pointed blocks which act to urge the follower rearwardly along the lower leg of the follower rod as the rod is moved rearwardly. Thus the follower is removed from the magazine while the inner end of the rod still remains held by the retaining bracket.

Another way to retain the feed mechanism in associated relationship with the magazine during loading consists in providing the staple follower with a pivot pin which has sliding and pivotal engagement with curved frictional slots formed in the lower end of the magazine. This arrangement permits the feeding mechanism to be withdrawn from the magazine a sufficient amount so that the follower rod may be swung upwardly withdrawing the follower from the magazine. The frictional engagement of the slot combined with an abutment removably but positively retains the feeder mechanism in this latter position.

The novel features, which are considered characteristic of the invention, are set forth with particularity in the appended claims. Some of the features disclosed herein are also described and claimed in the application of William G. Pankonin, Serial No. 387,006, filed April 5, 1941. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings, in which:

Figure 1 is a view in side elevation showing a stapling machine embodying the present invention;

Figure 2 is a sectional view in side elevation showing a stapling machine embodying the present invention, the section line meandering from the center plane to a plane just inside the side wall of the magazine arm and back to the center plane again for sake of clarity;

Figure 3 is an exploded view in perspective showing the various parts comprising a stapling machine embodying the present invention;

Figures 4 and 5 are fragmentary views in perspective showing the notches in the base to accommodate the novel riser;

Figure 6 is a fragmentary sectional view of the novel riser;

Figure 7 is a sectional view in side elevation showing a stapling machine with a modified form of feeder mechanism embodying the present invention, certain parts being shown in full for the sake of clarity;

Figure 8 is a fragmentary, enlarged sectional view of the staple follower illustrated in Figure 7 shown in position for disassembly of its retaining pivot pin;

Figure 9 is a sectional view taken on the line 9—9 of Figure 8;

Figure 10 is a view identical with Figure 9 showing the retaining pivot pin removed from the stapler follower;

Figure 11 is an enlarged fragmentary sectional view of the loading end of the staple magazine, taken on line II—II of Figure 7;

Figure 12 is an enlarged, fragmentary, sectional view of the loading and staple magazine with the staple feeding mechanism removed;

Figure 13 is an enlarged fragmentary sectional view of the stapling machine of Figure 1 with the follower rod and staple follower positioned in staple loading position;

Figure 14 is an enlarged fragmentary view showing a modification of the loading end of the staple magazine;

Figure 15 is a sectional view in side elevation showing the stapling machine embodying the invention with the staple follower unit in retracted position;

Figure 16 is a fragmentary view in side elevation showing the stapling machine embodying the invention with the operating arm swung upwardly from the magazine arm;

Figure 17 is a sectional view taken on the line 17—17 of Figure 15;

Figure 18 is an enlarged perspective view of the riser; and

Figure 19 is an enlarged perspective view of the foot-plate associated with the riser.

Referring now to the drawings, the stapling machine generally comprises an operating or presser arm 1 overlying and interrelated with a magazine arm 2 and a base arm 3, which latter is adapted to support the stapling machine. These arms are all pivoted about the same axis

The base arm 3 comprises an elongated, inverted, channel-like member which carries at its forward end a staple-clinching anvil 5. The anvil 5 has two differently acting clinching cavities, and is shiftable forwardly and rearwardly of the arm 3 to aline a selected one of the clinching cavities with the ejection chute. A spring 6, extending between the downwardly extending ends of the anvil 5, has an upwardly bowed portion which bears against either side of a downwardly projecting ridge 7 to urge and maintain the anvil 5 to and in one of its selected positions. At its front and rear ends the base arm 3 is provided with rubber foot pads 8 and 9. Intermediate its ends the base arm 3 is narrowed, as is evident from Figure 3, to permit it to be readily grasped in the fingers of the operator's hand when the stapling device is used as a plier-type stapler. At the rearward end of the base member 3 there are provided two parallel spaced slots 10 and 11 piercing the upper surface thereof. A supporting bracket 12 has a web portion 13 positioned below the surface of the base arm 3 and two upwardly extending flanges 14 and 15 extending through the slots 10 and 11, respectively. The web portion is spot-welded or otherwise fastened to the base arm 3 to secure the bracket 12 in position. At the upper ends of the flanges 14 and 15 there are alined apertures which receive the nutted pintles 4a and 4b.

The web 13 of the supporting bracket 12 is provided with an aperture 16, the outline of which is substantially H shape, as is shown in Figure 5. The upper surface of the base arm 3 is provided with an aperture 17, which is cross shaped in outline, as shown in Figure 4, and is in substantial alinement with the aperture 16. A

riser housing (also described and claimed in the application of William G. Pankonin, Serial No. 387,005, filed April 5, 1941) having a crown top 18 and foot portions 19 (only one of which is shown) fits within the apertures 16 and 17 and extends above the surface of the base arm 3. The foot portions 19 engage the under side of the corners of the aperture 17 to prevent the riser from passing completely through both apertures. Inside the riser housing there is positioned a compression spring 20 which bears against a foot plate 21. The foot plate 21 fits within the sides of the riser housing and has offsets which engage the upper surface of the irregular edges of the aperture 16. The foot plate 21 is assembled by inserting one end upwardly through the apertures 16 and 17, compressing the spring 20 sufficiently to permit the other or following end of the foot plate 21 to enter through the apertures 16, whereupon the entering end may be partially withdrawn so that the foot plate assumes the position illustrated in Figure 6. This riser has a pivoted motion permitting fore and aft movement of the crown top 18 thereof as it is compressed by the operation of the stapling machine. This prevents a frictional wear arising between the crown top 18 and the bottom of the magazine arm 2. The riser can be disassembled by moving the foot plate 21 upwardly, compressing the spring 20, withdrawing one end of the foot plate out through the aperture 16, and permitting the other end to follow therethrough, whereupon both the riser and the spring 20 may be removed downwardly through both apertures.

The bottom of the base arm 3 has a cover plate 22, held by a tight frictional grip to the inner surfaces of the edges of the base arm 3. The cover plate 22 is co-extensive with the narrow portion of the base arm 3 and furnishes a smooth portion which is easily grasped in the hands of the operator when the device is used as a plier-type of stapler.

The magazine arm 2 has a laminated core 23 upon which the staples S ride in straddle fashion, as is indicated in Figures 2 and 3. Folded longitudinally about the forward end thereof is a housing member having a front wall 24 and side walls 25 and 26. Each of the side walls has a bottom portion bent underneath and secured to the bottom of the laminated core 23. The side walls are spaced from the sides of the core 23 to form a guide for staples on the core 23. The front wall is spaced from the front end of the core 23 to form an ejection chute through which staples are driven. The top edges of the side walls 25 and 26 are provided at their forward edges with upward projections 27 and 28 which are adapted to limit the relative movement between the operating or presser arm 1 and the magazine arm 2. At the rearward edge of these projections there are rearwardly projecting teeth 29 and 30 offset outwardly from the side of the respective walls and adapted to interlock with spring-biased clips to prevent the operating arm 1 from separating from the magazine arm except at the will of the operator. At the rearward end of the sides 25 there are pintle brackets 31 and 32 having apertures in their upper ends adapted to receive the nutted pintles 4a and 4b. Staple guides 33 and 34 are inserted within the confines of the walls 25 and 26, and are secured thereto by small flush rivets or other suitable means. The guides 33 and 34 have lower inwardly projecting flanges 35 and 36, which are

spaced from the top of the staples riding on the core 23. At their forward ends guides 33 and 34 are of greater height, and their corners are beveled at 37 and 38 to provide an easy entrance for the staple-driving tool carried by the operating arm 1.

On the upper edges of the guides 33 and 34, intermediate the ends thereof are locks 39 and 40 to detachably hold the retaining bracket for the follower rod. Adjacent the locks 39 and 40 are pedestals 41 and 42 providing a bearing for compression springs urging the operating arm 1 away from the magazine arm 2.

The follower mechanism (shown in Figures 2 and 3) comprises an endless follower rod 43 formed with upper and lower legs joined by curved ends. The follower mechanism is also described and claimed in the application of William G. Pankonin, Serial No. 387,004, filed April 5, 1941. The follower rod has slidably positioned on its upper leg a retaining bracket 44. The bracket 44 is of inverted U shape in cross section and has its opposite sides pierced to slidably receive the rod 43. The lower edges of the retaining bracket 44 are bent inwardly and are resiliently held in position. The retaining bracket is locked in place in the locks 39 and 40 by being forced downwardly over the locks until the lower edges snap in place around the necked-out part thereof, as is clearly shown in Figure 2. A staple follower or pusher 45 of conventional design, and having a lower portion adapted to ride on the core 23, is slidably positioned on the lower leg of the endless follower rod 43 by means of a small bracket having opposite sides pierced to slidably fit on the rod. Between the bracket 44 and the rear end (or the right side as viewed in the drawings) of the follower 45 is positioned a coiled compression spring 46 encircling the rod 43 and extending around its rearwardly curved end so as to extend along both upper and lower legs thereof. The spring 46 is split at its upper run a short distance from the retaining bracket 44, and is spaced at this split by a sleeve 47 which is slidably mounted on the rod 43, and is adapted to be engaged by a spring clip positioned on the under surface of the operating arm 1. A series of force-transmission blocks 48 are slidably positioned on the follower rod 43, and extend between the forward end of the retaining bracket 44 and the forward end of the follower 45. The force-transmission blocks 48 have opposite sides extending parallel for a portion of their length and then sloping toward each other to give the block a toothlike appearance in cross section. The opposite sides of the blocks are pierced so that they will be freely slidable on the rod 43. The sloping surfaces of the blocks 48 permit the blocks to readily pass around the curved end of the rod 43 while transmitting compressive force one to the other. The rear end of the follower rod 43 is provided with a handle 49 and latch 51. The handle 49 is made up of two symmetrically but oppositely designed parts, which when placed together loosely fit around the end of the rod 43 with the spring 46 assembled thereon. The end of the handle 49 has the same curvature as the end of the rod 43. Within the handle 49 is positioned a cylindrical spacer thimble 50 having a curvature approximately the same as the inside curvature of the spring as it passes around the curved end of the rod 43. The parts are held in position by an alining spacer 50a and by the thimble 50. At the lower edge of the handle

49 there is a tooth 51 adapted to detachably interengage with a notch 52 cut in the upper surface of the rear end of the core 23. The spring 46 freely slides around the rear end of the rod 43 within the confines of the handle 49.

It is preferable to form the rod 43 of square stock and to pierce slightly larger square or rectangular holes in the retaining bracket 44, the bracket on the follower 45, and the blocks 48. This prevents the blocks 48 from twisting out of alignment and assures that their sloping surfaces will make proper contact as they slide around the curved end. However, it is permissible to form the rod of round stock. In such event, bead-like members may be substituted for the blocks 48. Also, a tightly coiled, fully compressed spring may be substituted in lieu of the bead-like members or blocks to accomplish the same results, namely the transmission of force around a curvature of approximately 180 degrees.

The follower mechanism, shown in Figures 7 to 13, inclusive, comprises a follower rod 75 having a reversely curved outer end. Slidably positioned on the follower rod 75 is a staple follower 76. The staple follower 76 has the conventionally designed inverted U-shaped lower portion adapted to ride on the core 23 of the magazine. The upper portion of the staple follower has forward and rearward walls which are pierced to slidably receive the staple follower rod 75. Side ears 77a and 77b are provided on each side of the upper portion of the staple follower. These ears are pierced to receive a pivot pin 78, the purpose of which will be hereinafter described. The forward edges of the ears 77a and 77b are provided at their upper corners with a curved portion adapted to slidably engage with the driving tool 59 after the last staple has been ejected and thereby prevent damage to the follower. The pivot pin 78 is provided with a centrally located surrounding notch 79. This notch is engaged by a struck-up portion 80 formed on a retaining spring 81 positioned within the upper portion of the follower 76. The retaining spring 81 is generally formed in U shape, having a rearward leg engageable with the rearward wall of the upper portion of the staple follower and a forward leg projecting upwardly in substantial alignment with the apertures in the side ears 77a and 77b. The legs of the spring 81 are pierced to slidably receive the follower rod 75. The forward leg of the spring 81 has a projecting finger at its top edge which protrudes upwardly through an elongated slot in the top portion of the upper part of the follower 76. The spring 81 is tensioned so that the forward leg is urged forwardly against the pin 78 when the latter is inserted in the ears 77a and 77b. Positioned on the follower rod 75, between its curved outer end and the follower, is a coiled compression spring 83. The spring 83 is of sufficient length and compressive elasticity to urge the follower 76 forwardly along the rod 75 to the ejection chute end of the magazine. A headed screw 84 positioned on the inner end of the follower rod 75 prevents the follower 76 from becoming disengaged from the follower rod 75. Upon removal of the screw 84 the follower rod and spring may be disassembled from the rod. When the follower 76 is moved rearwardly of the follower rod 75 the spring 83 is compressed along the reversely curved outer end, thus permitting the follower to be moved rearwardly to substantially the loading end of the magazine. The end of the rod at its reversely curved end is pro-

vided with a washer 85 rigidly secured thereto by any suitable means, such as friction fit, welding, or riveting. The washer 85 prevents the spring 83 from passing beyond that end of the rod. A housing-like handle 86 is provided for the curved end of the follower 75. It is comprised of two symmetrically but oppositely designed dished out parts having an outline shape somewhat similar to a snail's shell. When the parts are positioned together the handle has a projecting portion which loosely surrounds the straight portion of the follower rod 75 and a main portion surrounding the curved end. Centrally of the main portion of the handle 86 each part is provided with an inwardly facing button-like projection. These button-like projections engage with each other to form a central axis within the handle about which the curved end of the follower rod and the coiled compression spring are guided. By reason of the shape and the loose engagement between the parts of the handle and the spring 83 on the curved outer end of the follower rod 75, the handle 86 is maintained in position without affecting the movement of the spring around the curved end. One of the parts comprising the handle has formed thereon a downwardly depending tooth 87, which engages with a notch 52. The parts of the handle 86 are held together by a nut and a screw 88. When the tooth 87 is positioned in the notch 52 the handle holds the rod 75 within the housing of the stapling machine a sufficient distance to permit staple follower 76 to exhaust the magazine of staples.

The top edges of the side walls 25 and 26, and the top edges of guides 33 and 34, are provided with notches 88a and 88b, which are in alignment with the horizontal line of the path of travel of the pin 78 within the magazine. When the handle 86 is unlatched the follower rod and follower may be removed rearwardly until the pin 78 is in alignment with the notches 88a and 88b. In such position the spring 81 can be depressed and the pin removed laterally from the follower 76, as is indicated in Figure 10. It is, of course, understood that during this operation the arm 1 has been released from its engagement with the arm 2 and swung upwardly, permitting access to the staple follower 76 and its associated parts.

As is shown in Figures 7, 11, and 12, the rearward end of the staple guides 33 and 34 have an enlarged portion which is inwardly offset and die-cut to provide upwardly curved slots 99a and 99b. The entering edge of the slots are in alignment with the path of travel of the extended ends of the pin 78 when the latter is positioned in the staple follower 76. Positioned between the side walls 25 and 26, and the inwardly offset end portions of the guides 33 and 34, are flat pieces of spring metal having tensioning tongues 100a and 100b cut therefrom and biased to project into the slots 99a and 99b. The inwardly offset portions of the guides 33 and 34 are provided with outer edges formed in bevel fashion outwardly into contact with the inner surface of the sides 25 and 26 to permit of easy access to the loading end of the magazine. Small abutments 101a and 101b are formed on the inwardly offset portions of the guides 33 and 34 within the arc of and adjacent the slots 99a and 99b. These abutments engage the top surface of the upper portion of the staple follower 76 when it is in staple loading position.

In lieu of the spring metal tongues 100a and 100b, the slots 99a and 99b may be provided with

notches 99c and 99d at their upper ends as illustrated in Figure 14. These notches engage the ends of the pin 78, and in connection with the abutments 101a and 101b hold the staple follower and rod in the staple-loading position shown in Figure 13.

In this modification, the presser arm 1, magazine arm 2, and base arm 3 may be pivotally held together by means of a pin 102 surrounded by a bushing spacer 103. The pedestals 41 and 42 need only be sufficiently high to permit clearance for the staple follower. Extending between the pedestal 41 and the top inner side of the presser arm 1 is a coiled compression spring 105 held in alignment by a centering stub 104 secured to the inside upper surface of the presser arm 1.

In the instrument shown in Figure 1, and in the instrument shown in Figure 7, the operating arm 1 (see Fig. 3) is formed of a single piece of sheet metal folded about the forward wall 53. The side walls extend rearwardly from the forward wall 53 and have their upper edges inturned and joined by tongue and groove means, indicated at 54. At the rear of the arm 1 the sides are pierced to receive the nutted pintles 4a and 4b. The arm 1 slidably fits over the magazine arm 2 and both are pivoted to the flanges 14 and 15 by the pintles 4a and 4b. The rear portions of the sides of arm 1 are offset inwardly at the rear and slide against the inner surfaces of the flanges 14 and 15. There is sufficient clearance between the walls 25 and 26 and the walls of arm 1 to accommodate the shanks of the clips 65 and 66 therebetween. The bottom edges of the front and side walls of the arm 1 are peened inwardly, as indicated in Figure 2. A pair of springs 55 and 56 are positioned within the confines of the arm 1 and are frictionally held on guides secured to the under surface of the arm. They rest against the upper surfaces of the pedestals 41 and 42, respectively, when the operating arm 1 is in operative position. These springs resiliently urge the operating arm 1 away from the magazine arm 2. A spring clip 57, adapted to detachably grasp and hold the sleeve 47, is soldered or otherwise secured to the top inner side of the operating arm 1 adjacent its rear end. At its top forward end the operating arm 1 is provided with a slot 58 adapted to receive a projection on the driving blade 59. A latch arm 60 is provided with a forward extension 60a adapted to pass through a crescent-shaped slot in the top of the blade 59 and enter into a similarly shaped slot 61 in the wall 53 to hold the driving blade 59 in the slot 58 and in abutment against the inner surface of the top of the operating arm 1. A small compression spring 62 is positioned between the inner surface of the forward wall 53 and the driving blade 59. The spring 62 urges the blade 59 against the shoulders formed at the base of the extension 60a and thereby flexibly maintains the blade in alignment with the ejection chute defined by the wall 24, the forward edges of the staple guides 33 and 34 and the beveled corners 37 and 38. The latch arm 60 is retained in position by a pin 63 (Figs. 2, 15 and 17) having thereon a compression spring 64 fitting within a semi-circular hump in the latch 60. The pin 63 is in turn retained in position by the action of two clips 65 and 66 of identical construction except that one is right hand and the other is left hand. The clips 65 and 66 are positioned within the arm 1 and have at their upper ends small flanges fit-
table within slots 67-68 cut in opposite sides of

the operating arm 1 near the front thereof (see Fig. 17). The spring 64 resiliently maintains the small flanges on the clips 65—66 in position within the slots 68, thereby locating the pin and clips with respect to the operating arm 1. The clips 65 and 66 are provided with teeth 69—70, which normally engage with the offset teeth 29 and 30 on the magazine arm 2 to limit the movement of the operating arm 1 away from the magazine arm 2. By pressing inwardly on outwardly extending tabs T at the bottom of clips 65 and 66, the teeth 69 and 70 will be moved out of alignment with the teeth 29 and 30, respectively, and the operating arm 1 may be moved about the pintles 4a and 4b away from the magazine arm 2. The sloping edges of the teeth 29, 30, 69, and 70 are beveled so that they will knife by each other when the arm 1 is swung into operating position. Notches 71 and 72 in guides 33 and 34, notches 73 and 74 in walls 25 and 26 provide clearance space permitting the tabs T to be moved inwardly. Notches 75 and 76 in the walls of arm 1 accommodate the tabs T of the clips 65 and 66.

A handle 71, shaped and recessed as shown in Figures 1 and 2, fits over the top of the operating arm 1 and is secured thereto by counter-sunk screws or other suitable fastening means. The handle 71 is preferably formed of transparent material. A card 72 bearing indicia is inserted between the top of the arm 1 and the handle 71. This card is of course interchangeable, and a card with appropriate insignia and indicia may be used as desired. The card is viewed through the handle which protects it from deterioration. The handle 71, however, may be made of other materials which produce a smooth surface and attractive appearance.

With the device positioned on a desk, and the base arm 3 resting flat thereon, to drive and clinch staples it is only necessary to apply force to the top of the operating or presser arm 1 or handle 71. The first action merely compresses both the operating arm 1 and the magazine arm 2 against the top of material inserted between the magazine arm and the anvil 5. Further compression causes the operating arm 1 to move downwardly relative to the magazine 2, thus forcing the staple driving blade 59 against the bridge of a staple, ejecting it downwardly between the wall 24 and the forward end of the core 23, whereby its legs are caused to pierce the material and be bent over in the clinching cavities formed in the top of the anvil 5. To assure this action the spring 20 has less effective compressive force than the two springs 55 and 56. When pressure is released the operating arm 1 is moved relatively away from the operating arm 2, and both of these arms are moved upwardly from the base arm 3 to assume the position shown in Figures 1 and 2. The relative movement between the arms 1 and 2 is limited by the engagement between the upper edges of the projections 27 and 28 and the top of the arm 1 in the down direction, and the engagement between the offset teeth 29 and 30 and the teeth 69 and 70 in the up direction. The total relative movement is sufficient to permit the edge of the driving blade to move a distance sufficiently in excess of the over-all length of the legs of the staples adapted for use in the machine to completely drive the same one by one from the magazine.

In the event that a staple is jammed, and it is necessary to obtain access to the interior of the magazine arm 2, it is only necessary to compress the tabs T, thereby disengaging the teeth 69 and

70 from the teeth 29 and 30, whereupon the operating arm may be moved about the pintles 4a and 4b upwardly and away from the magazine arm 2. Upon moving the operating arm 1 into operative relation with the magazine arm 2, the driver blade 59 is guided by the beveled portions 37 and 38 on the guides 33 and 34 and the beveled portion B on the edge of the forward wall 24. The beveled sloping portions on the teeth 29, 30, 69 and 70 guide those teeth laterally past each other until snapped into alignment by the action of the spring 64.

The staple follower mechanism, shown in Figures 2 and 3, is held in place by the retaining bracket 44. However, it may be moved forwardly and rearwardly of the magazine arm. When the follower rod is grasped by the handle 49 and pulled outwardly of the magazine arm 2, the force-transmission blocks 48, normally on the upper leg of the rod 43, are forcibly moved around the inner curved end to the lower leg thereof. This action of the force-transmission blocks positively moves the follower 45 rearwardly along the lower leg of the rod 43. As that rod itself is also being moved rearwardly, the distance moved by the follower 45 is substantially double that of the distance moved by the rod 43 as can be seen by comparing Fig. 2 with Fig. 15. Hence the follower 45 is moved clear of the rear ends of the guides 33 and 34 when the follower rod has been moved the full limit permitted by the engagement between its inner end and the retaining bracket 44. In this position the rear end of the follower rod 43 may be swung upwardly about the pivotal connection established between the rod and the retaining bracket 44, an amount sufficient to raise the follower 45 out of the loading path of staples being inserted on the core 23. When moved in this position the sleeve 47 is forced into and is clasped by the spring clamp 57. The sleeve 47 is slid to position in alignment with the clamp 57 when the rod 43 is completely retracted by the balancing action of both parts of spring 46. In this position there is no variable compressive force reacting on the larger portion of this spring and substantially exact positioning of the sleeve 47 is always obtained. The follower 45 and the follower rod 43 are held in this raised position so that the operator may readily insert the staples on the core 23. When staples have been inserted on the core the rear end of the follower 43 is moved downwardly, disengaging the connection between the sleeve 47 and the clamp 57, and the handle 49 is moved inwardly until the tooth 51 snaps into engagement with the notch 52. During this action the follower 45 is prevented from forward movement by engagement with the rearmost of the clip staples inserted on the core 23. This compresses the follower spring 43 in both its upper and lower legs and it continually urges staples forwardly along the core 23 into position underneath the driving blade 59. When the rod 43 is in the fully inserted position, there is sufficient space on the upper leg of the rod 43 and the curved forward portion to accommodate all of the force-transmission blocks 48, thereby permitting the spring 43 to urge the follower 45 forwardly to the forward end of the core 23, thereby assuring the positioning of the last staple beneath the driving blade 59.

In the case of the staple follower mechanism shown in Figures 7 to 13 inclusive, the follower rod 75 may be grasped by the handle 86 and disengaged from its connection with the core 23

and moved rearwardly of the magazine. When the staple follower 76 approaches the loading end of the magazine the outer ends of the pin 78 will be engaged by the curved slots 99a and 99b. Further rearward movement of the follower rod 75 and its associated staple follower is then confined to an upwardly pivotal sliding motion until it assumes the position shown in Figure 13. In this position the staple follower 76 will be clear of the core 23, permitting ready access to the magazine for the purpose of inserting staples therein. The ends of the pin 78 will be frictionally engaged by the inwardly tensioned tongues 101a and 101b and held in the uppermost end of the slots. In this position clockwise rotation of the rod 75 about the pivot pin 78 is prevented by the engagement between the abutments 101a and 101b with the top forward edges of the staple follower 76. When the magazine has been loaded it is only necessary for the operator to force the arm downwardly against the frictional engagement of the spring tongues 100a and 100b until the pin 78 has assumed a position sufficiently below the abutments 101a and 101b to permit the staple follower 76 and rod 75 to move in a clockwise position with the core-straddling portion of the follower resting on the core 23. When the rod 75 is in a substantially horizontal position, the feeder mechanism may be urged forwardly into the magazine. As the staple follower engages with the rearmost staple its forward action will be arrested. The rod 75, however, is urged in its full extent, thus compressing the spring 83 between the follower 76 and the curved end of the follower rod 75. When the rod 75 is inserted its proper length, the tooth 87 is latched in position on the notch 52.

In order to remove the follower mechanism entirely from the magazine it is only necessary to remove the pivot pin 78 in the manner heretofore described. With the pivot pin removed, the follower will readily slide between the inwardly offset portions at the rear of the staple guides 33 and 34, and the entire rod, spring, and follower assembly can be removed from the magazine as is illustrated in Figure 12.

The flanges 14 and 15 on the supporting bracket 12 are of sufficient height so that the ends of the operating arm 1 and magazine arm 2, and the handle 49 (when the follower rod is fully inserted), may readily clear the base arm 2 as the arms 1 and 2 are swung away from the base arm 3 about the pintles 4a and 4b. With the base arm 3 swung 180 degrees away from the arms 1 and 2, these arms may be used as a unit, and the device operated as a tacker device. That is, the staples are driven into material without clinching the legs, the action of the anvil 5 being eliminated. In other respects the device acts in identically the same manner as when the staples are being clinched as heretofore described.

If it is desired to operate the device as a plier type stapler, the device may be grasped in the hand of the operator, the fingers encircling the narrow portion of the base arm 3 and the handle 71 resting in the palm of the hand between the fingers and the thumb. Merely squeezing the hand causes the material to be clamped between the arm 2 and the anvil 5. Further squeezing causes the arm 1 to drive the staple through the material and clinch the legs thereof against the anvil.

Because of the height of the supporting bracket 12 it is preferable to provide the magazine 75

arm 2 with pressed-out portions 73 at the lower rear of the sides 25 and 26, respectively. These pressed-out portions have a sliding fit with the lower inner sides of the flanges 14 and 15 of the supporting bracket 12, thereby providing a guide to assure the proper alinement between the ejection chute and the cavities in the anvil 5.

Although there are shown and described certain specific embodiments of the invention, many modifications thereof are possible. The invention is not to be restricted except in so far as is necessitated by the prior art and by the spirit of the appended claims.

I claim:

1. In a magazine for staples, a staple follower, an endless follower rod upon which said follower is slidably mounted, a retaining bracket in said magazine through which said follower rod is slidable, a compression spring on said follower rod reacting between one side of said follower and said bracket, and a series of blocks slidably positioned on said rod between the other side of said follower and said bracket whereby relative movement of said bracket with respect to said rod in one direction will cause movement of said follower relative to said rod in an opposite direction.

2. In a magazine for staples, a staple follower, a two leg follower rod, the forward ends of said legs being connected by a curved connecting portion, said follower being slidably carried by one of said legs, a retaining bracket in said magazine, the other of said legs being slidably held by said bracket, resilient means for urging said follower forwardly along its support leg, and flexible positive compressive force transmission means positioned on said legs and connecting portion and transmitting force between said bracket and said follower whereby rearward movement of said follower rod causes said follower to move rearwardly along its leg against the force of said resilient means.

3. In a magazine for staples, a follower rod supported in said magazine and adapted to be partially withdrawn therefrom, a staple follower slidable on said rod, means for urging said follower forwardly on said rod, and positive motion transmission means acting between said magazine and said follower to urge said follower rearwardly along said rod as said rod is withdrawn from the magazine.

4. In a magazine for staples, a follower rod supported in said magazine and adapted to be partially withdrawn therefrom, a staple follower slidable on said rod, means for urging said follower forwardly on said rod, force transmission means acting between said magazine and said follower to urge said follower rearwardly along said rod until withdrawn from said magazine as said rod is partially withdrawn from said magazine, said rod being tiltable when partially withdrawn to raise said follower to provide access to said magazine, and a clip on said magazine adapted to hold said follower rod and said staple follower in said raised out of the way position.

5. In a stapling machine magazine, a follower rod, a retaining bracket for slidably holding said rod, said bracket being of inverted U shape in cross section and having inwardly turned portions on its lower edges, and tongue-like locks on said magazine over which said bracket may be forced so as to frictionally hold the same in place.

6. In a magazine for staples, a feeder mechanism comprising a follower rod, a staple follower

slidably carried by said rod, spring means to urge said follower along said rod, and a sliding pivotal connection between said rod and said magazine whereby said rod may be slid partially out of said magazine and pivoted upwardly to effect removal of said follower from said magazine.

7. In a magazine for staples, a feeder mechanism comprising a follower rod having a curved end, a staple follower slidably carried by said rod, and spring means to urge said follower along said rod, said means acting around said curved end, said rod being slidably and pivotally connected within said magazine.

8. In a magazine for staples, a feeder mechanism comprising a follower rod having a curved end, a staple follower slidably carried by said rod, means to urge said follower along said rod, said means acting around said curved end, and a housing-like handle for said curved end permitting movement of said means therein.

9. A magazine for staples having at its loading end an upwardly curved slot, a follower rod for said magazine, a staple follower slidable on said rod, and means for urging said follower along said rod, said follower having a pivot pin adapted to engage with said slot to retain said follower and rod in connected relationship with said magazine while permitting said follower to be swung upwardly and out of said magazine.

10. A magazine for staples having at its loading end an upwardly curved slot, frictional means associated with said slot, a follower rod for said magazine, a staple follower slidable on said rod, and means for urging said follower along said rod, said follower having a pivot pin adapted to engage with said slot and said frictional means.

11. A magazine for staples having at its loading end an upwardly curved slot, frictional means associated with said slot, a follower rod for said magazine, a staple follower slidable on said rod, means for urging said follower along said rod, said follower having a pivot pin adapted to engage with said slot and said frictional means, and an abutment on said magazine adapted to engage said follower to hold said follower and follower rod in connection with said frictional means in staple-receiving position out of said magazine.

12. A magazine for staples having curved slots at its loading end, feeder mechanism in said magazine comprising a follower rod, follower, and means for urging said follower along said rod, a pivot pin for said follower having extended ends adapted to engage with said slots, means for holding said pin in position relative to said follower, and cut-outs in the walls of said magazine adapted to be aligned with said pin whereby said pin may be removed from said follower and said magazine to permit removal of said feeder mechanism.

13. A magazine for staples, feeder mechanism comprising a follower rod having a curved end, a staple follower slidably carried by said rod, means to urge said follower along said rod, said means extending around said curved end, and a handle for said curved end comprising two oppositely related shell-like parts having inwardly projecting central portions adapted to fit loosely within said curved end.

14. A magazine for staples, feeder mechanism

comprising a follower rod having a curved end, a staple follower slidably carried by said rod, means to urge said follower along said rod, said means extending around said curved end, and a handle for said curved end comprising two oppositely related shell-like parts having inwardly projecting central portions adapted to fit loosely within said curved end, said handle having a tooth adapted to engage with said magazine whereby said rod is maintained in position therein.

15. A staple feeder mechanism comprising a bar, a follower slidably mounted on said bar, means for propelling said follower along said bar, a handle for said bar, said propelling means cooperating with said handle and said bar to position and hold said handle on said bar in a manner permitting said propelling means to be movable with respect to said handle.

16. In a mechanism for staples, a feeder mechanism comprising a follower rod having a curved end, a staple follower slidably carried by said rod, means for urging said follower along said rod, said means extending around said curved end, and a handle for said feeder mechanism having a cavity shaped to fit around said curved end and adapted to be supported thereby and by said means while permitting said means to be slidable therethrough.

17. A magazine for staples having at its loading end an upwardly curved slot, a notch formed at the upper outer end of said slot, a follower rod for said magazine, a staple follower slidable on said rod, means for urging said follower along said rod, said follower having a pivot pin adapted to engage with said slot and with said notch, and an abutment on said magazine adapted to cooperate with said notch to hold said follower and follower rod in a staple-receiving position out of said magazine.

18. A magazine for staples having at its loading end an upwardly curved slot, a follower rod for said magazine, a staple follower slidable on said rod, means for urging said follower along said rod, said follower having a pivot pin adapted to engage with said slot, locking means related with said slot, and abutment means associated with said locking means and adapted to engage and hold said follower and follower rod in staple-receiving position out of said magazine.

19. In a staple machine having a magazine for staples, a feeder mechanism adapted to be received therein including a follower and means for urging said follower forwardly in said magazine, said mechanism being slidably and pivotally associated with said magazine, and means for withdrawing said follower from said magazine while retaining a connection between said mechanism and said magazine.

20. In a magazine for staples, a staple feeding mechanism including a follower adapted to urge the staples forwardly in said magazine, said mechanism being slidably mounted with respect to said magazine, and means operative between said magazine and said mechanism whereby as said mechanism is moved rearwardly of said magazine said follower is caused to move rearwardly at a greater speed than said mechanism.

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