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Fig. 4

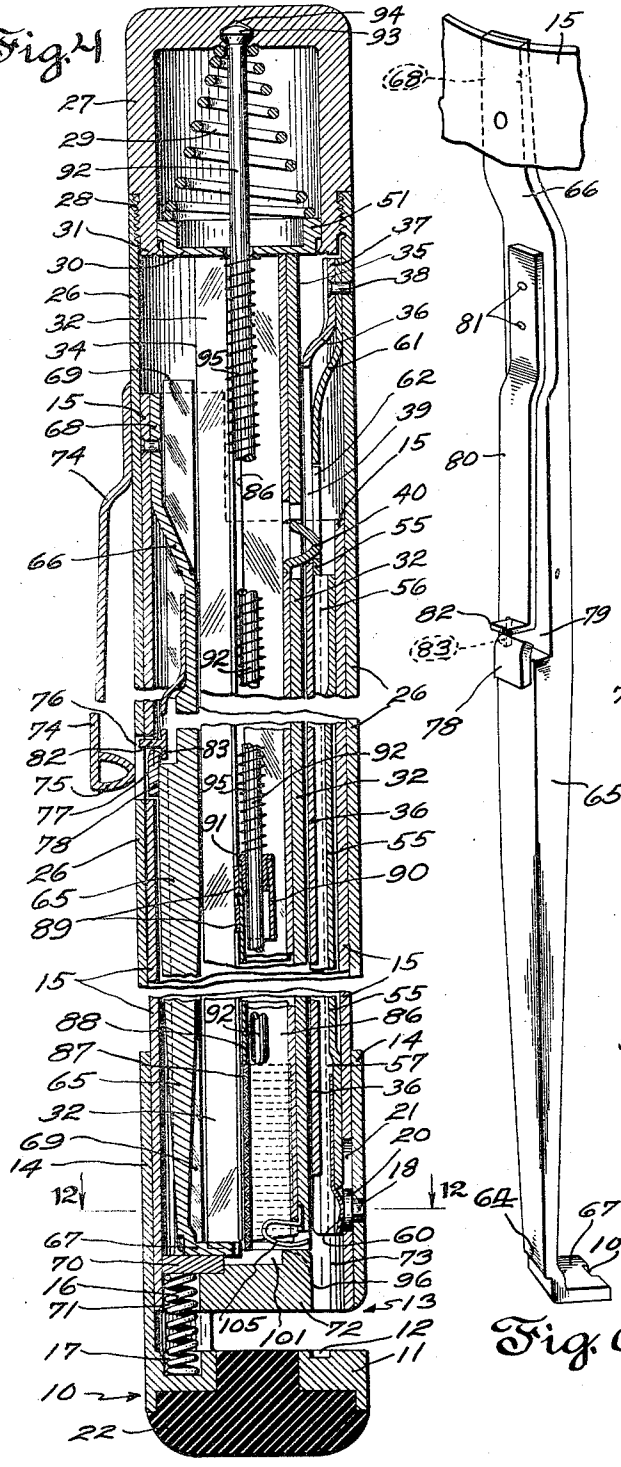


Fig. 6

Fig. 2

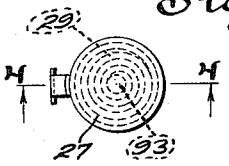


Fig. 5

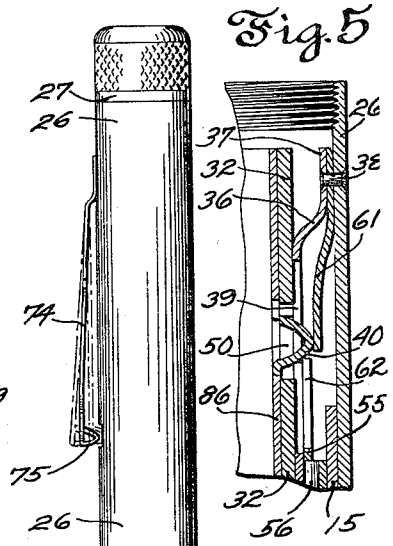
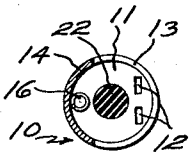


Fig. 1

Fig. 3



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Fig. 7

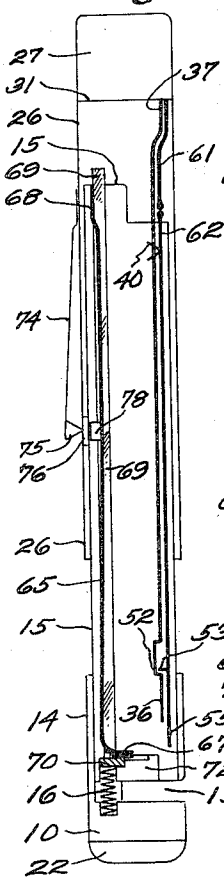


Fig. 8

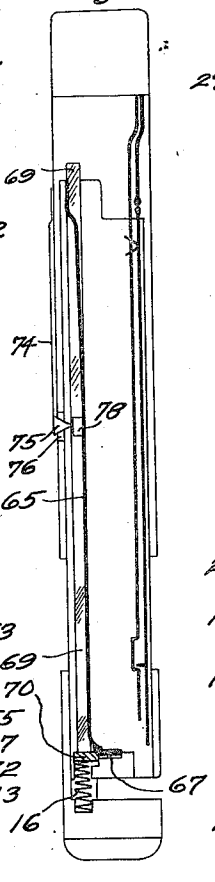


Fig. 9

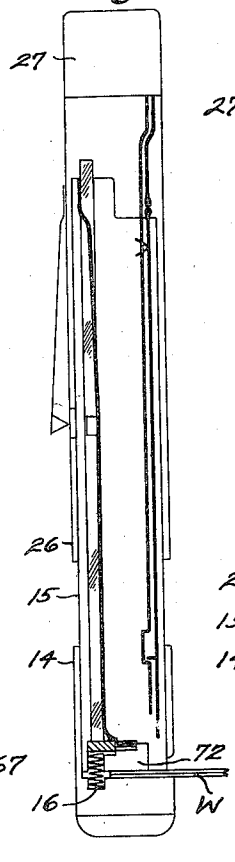


Fig. 10

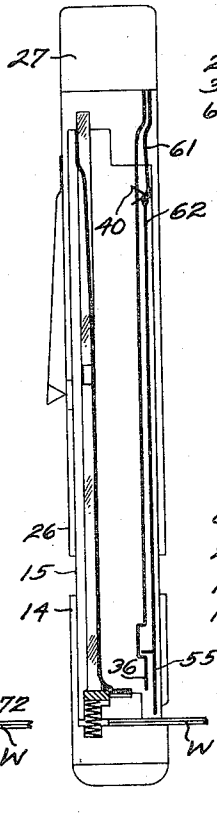


Fig. 11

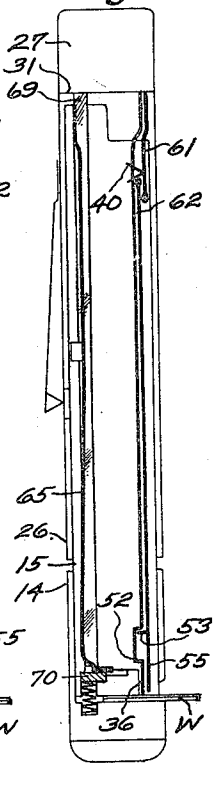
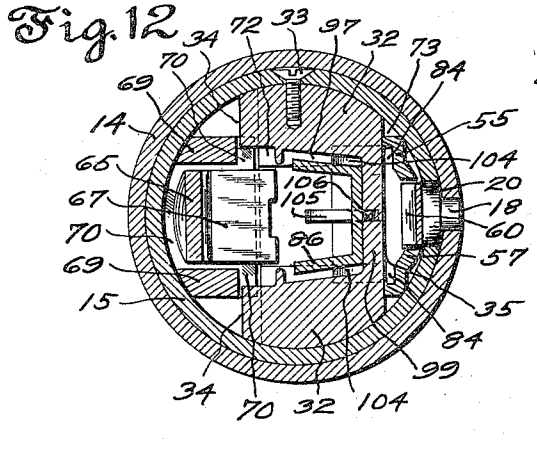


Fig. 12



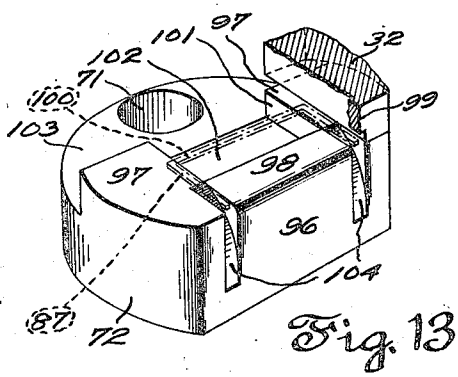


Fig. 13

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Fig. 15

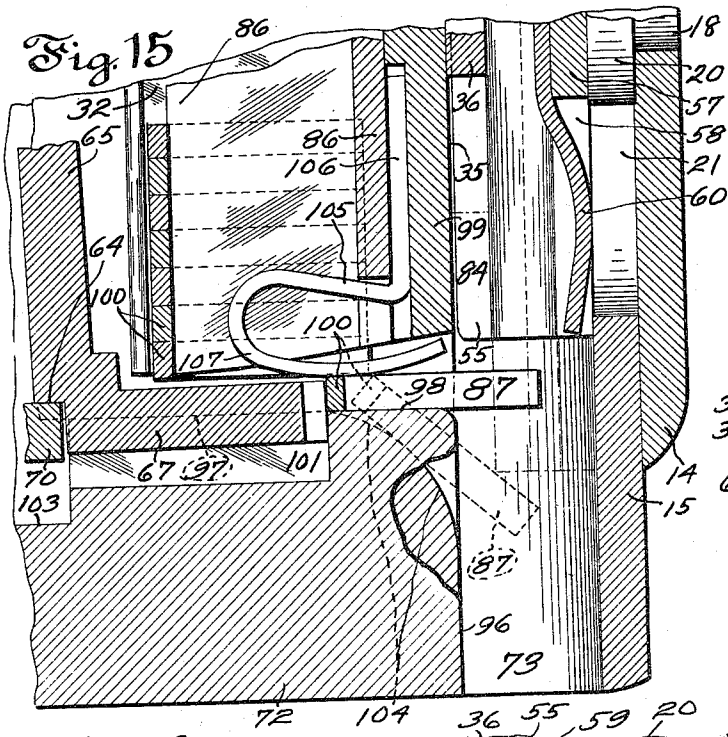


Fig. 14

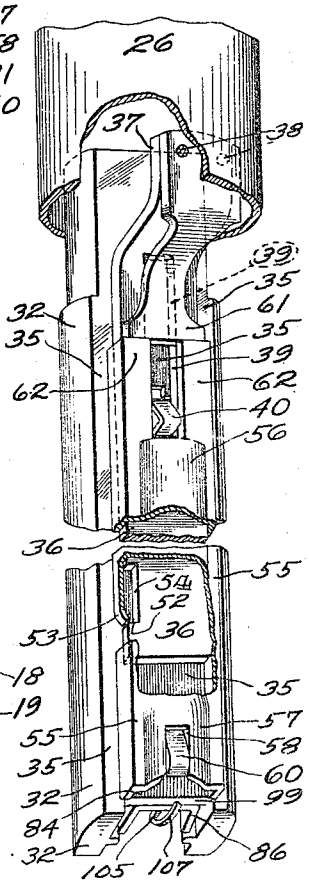


Fig. 16

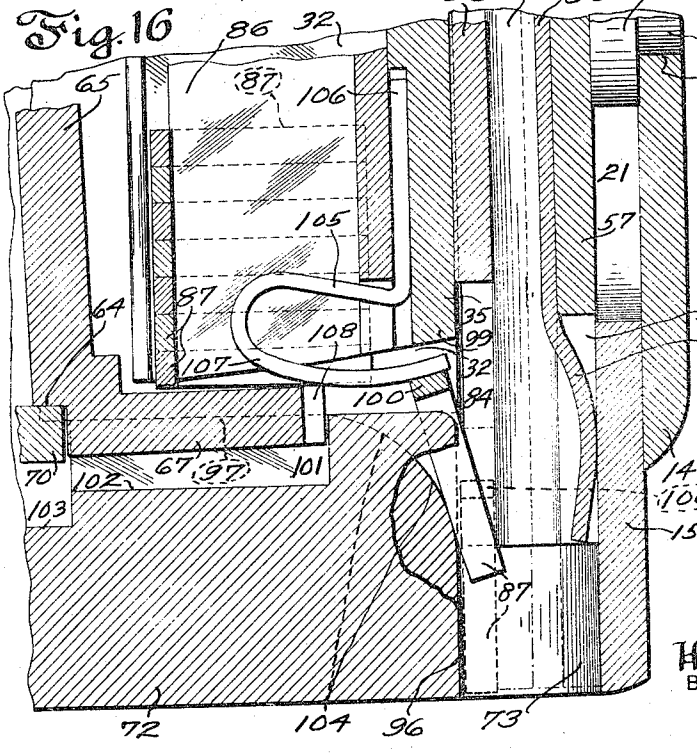
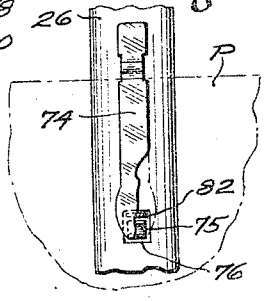


Fig. 17



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Fig. 18

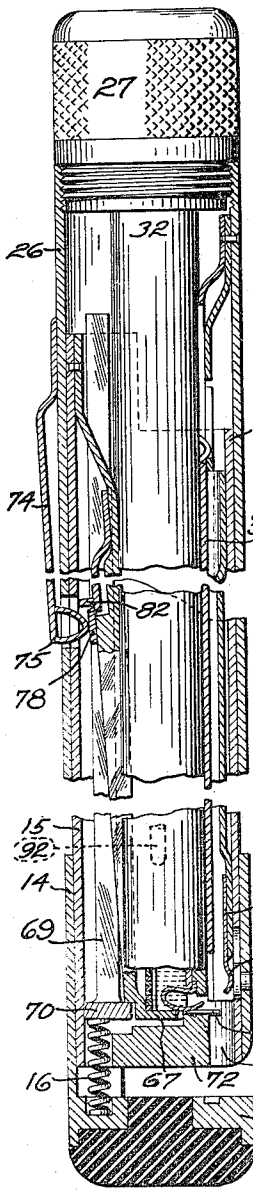


Fig. 19

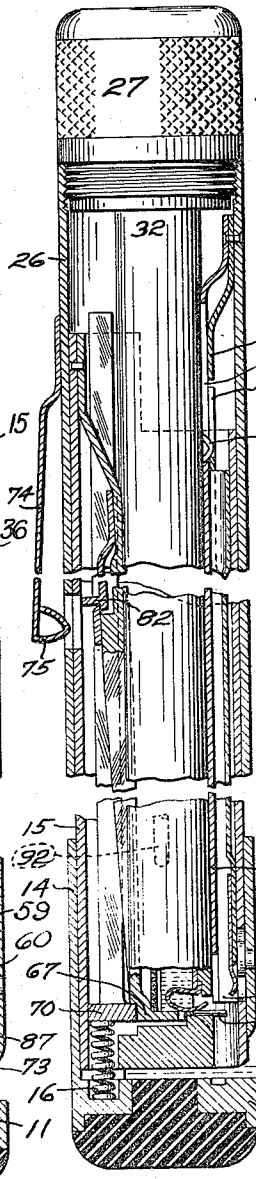


Fig. 20

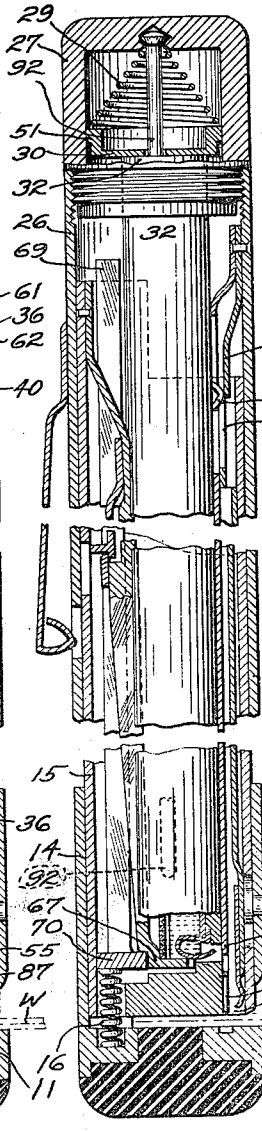
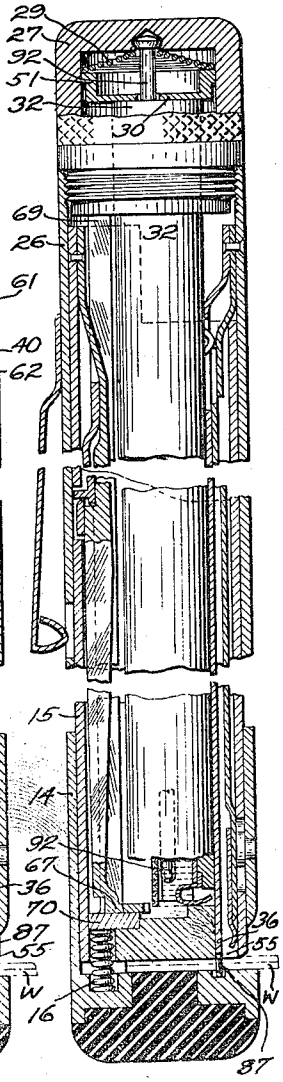


Fig. 21



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UNITED STATES PATENT OFFICE

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STAPLER

Howard M. Larsen, Westport, Conn., assignor to The E. H. Hotchkiss Company, Norwalk, Conn., a corporation of Connecticut

Application April 2, 1938, Serial No. 199,546

25 Claims. (Cl. 1—49)

This invention relates to portable staplers and to novel features of construction thereof which enable a stapling implement to assume the external characteristics and appearance of a pocket carried fountain pen. The improvements further relate to novel characteristics in stapling mechanism irrespective of the outward form of the stapler as a whole and to novel methods by which a staple may be transferred or kicked off from a stored row of staples, or from a strip of material from which a staple may be cut, into a staple raceway which parallels the row of staples. The improvements are of similar advantage in implements known as "tackers" by means of which the legs of a staple are driven into work without clinching or bending over the legs of the staple.

In stapler or tacker implements as heretofore constructed, the stored row of staples which is usually automatically fed toward the raceway through which the staple is to be driven out of the implement, has commonly been disposed in perpendicular relation to the direction in which the raceway extends, or the handle which is manually actuated to cause the staple to be driven along the raceway has been arranged in laterally offset position in relation to the path in which the staple driver slides. Both of these characteristics in an organization of stapling mechanism militate against the possibility of condensing the mechanism into a form, size and relationship that can be housed in a manner to simulate in external appearance a pocket carried fountain pen.

An object of these improvements is to provide a stapler or tacker having working parts so constituted and arranged that they may be housed within a long, slender, cylindrical casing or elongated barrel structure thereby to simulate in external appearance a pocket fountain pen.

A further object is to equip such casing with an external spring clip of familiar form and appearance as carried by pens, pencils, and similar articles for gripping the edge of a coat pocket to prevent loss of the article, and to make this clip an operative element of the stapling mechanism.

A further object is to divide the casing into telescopically related tubular sections one of which may serve as a handle for maneuvering and operating the stapler.

A further object is to dispose a staple driving raceway and a long row of stored staples side by side within and lengthwise of a casing having the characteristics described.

A further object is to employ spring means which in common shall act to feed the staples toward their point of delivery from the implement and also to restore the handle to normal position after it has been manually actuated to drive a staple.

A further object is by novel means and method to transfer an end staple from the stored row of staples legs foremost into the staple driving raceway.

A further object is to provide clog preventing means in the form of an automatically acting latch which operates to prevent the kick off and displacement of a subsequent staple from the stored row of staples until the staple which has last been kicked off and displaced therefrom shall have been ejected from the machine.

A further object is to utilize a common spring means to bias the above mentioned latch and to lift the working parts of the stapler from contact with the anvil base so that room is normally provided for receiving work therebetween.

A still further object is to provide a resistive catch normally tending to prevent staple driving operation of the implement by unintentional pressure thereon in its handling as a pocket carried article.

The foregoing and still other important objects of the invention are referred to in greater detail in the following description of constructions illustrative of forms in which the invention may be embodied and wherein reference is had to the accompanying drawings. In the drawings:

Fig. 1 is a view in side elevation showing the complete stapler and indicating by broken lines different positions to which its pocket clip may be flexed for divers purposes.

Fig. 2 is a plan view looking downwardly on Fig. 1.

Fig. 3 is a plan view of the anvil base and is taken in section on the plane 3—3 in Fig. 1 looking in the direction of the arrows.

Fig. 4 is a longitudinally contracted view of the complete stapler drawn on an enlarged scale and taken in central vertical section on the plane 4—4 in Fig. 2 looking in the direction of the arrows.

Fig. 5 is a fragmentary view of certain parts in Fig. 4 differently positioned as when the pusher for the staple turning bar has been thrust out of position to impel the latter.

Fig. 6 is a perspective view of the staple kick off leg detached and shows a fragment of the magazine tube by which it is carried.

Fig. 7 is a diagrammatic view indicating normal relative positions of main sections and parts of the stapler when not in use.

Fig. 8 is a similar view showing the parts as positioned when a staple has been kicked off preparatory to turning and driving the same.

Fig. 9 is a similar view showing parts as positioned when the magazine tube is depressed into contact with the work to be stapled.

Fig. 10 is a similar view showing the parts as positioned when the staple has been rocked or turned and is ready to be driven into the work.

Fig. 11 is a similar view showing the parts as positioned at the end of the staple driving movement.

Fig. 12 is a view drawn on a larger scale than Fig. 4 showing parts as positioned in the latter figure and is taken in cross section on the plane 12—12 in Fig. 4 looking downwardly.

Fig. 13 is a perspective view of the rocker block detached and shows a fragment of the bottom end of one side of the magazine body in its relation to the rocker block.

Fig. 14 is a longitudinally contracted perspective view of the staple driver and staple turning bar in their relation to the magazine body and handle sleeve, the latter being mostly broken away.

Fig. 15 is a greatly enlarged view of certain parts associated with the rocker block of Fig. 4 differently positioned as in Fig. 9, the block being partially broken away.

Fig. 16 is a view similar to Fig. 15 showing the parts in positions corresponding to Fig. 10.

Fig. 17 is a fragmentary view of the stapler wall in the vicinity of the spring clip looking at the latter from the left in Fig. 4.

Fig. 18 is a view similar to Fig. 4, fewer of the parts being shown in section and the parts being positioned as diagrammatically represented in Fig. 8.

Fig. 19 is a similar view showing the parts positioned as diagrammatically represented in Fig. 9.

Fig. 20 is a similar view showing the parts positioned as diagrammatically represented in Fig. 10.

Fig. 21 is a similar view showing the parts positioned as diagrammatically represented in Fig. 11.

Referring more particularly to Figs. 1 to 4 and 7 to 11 of the drawings, relatively movable housing parts forming three main sections of the barrel of the stapler may be enumerated as the anvil cup designated as a whole by 10, the magazine tube 15, and the handle sleeve 26 with its cap 27. Anvil cup 10 includes the anvil base 11 carrying the usual staple clinching depressions 12 and is cut away transversely to provide the gap 13 into which sheets of paper, or other work to be stapled, may be inserted. For placing against a desk top or other surface to be protected from scars, the anvil cup 10 is further provided with an end bumper 22 of rubber or other suitably soft material.

Magazine tube 15 carries within its thin cylindrical walls most of the operating parts of the stapler and its lower end telescopically fits and is slidable up and down within the upper cylindrical walls 14 of anvil cup 10. A compression spring 16 having its lower end seated within a small well 17 in anvil base 11 presses upwardly against certain parts carried within the magazine tube 15, which are later to be described, and with sufficient force to maintain this tube and all of its carried parts elevated above the anvil base 11 to the positions shown in Figs. 1, 4, 7 and 8. Stop means limiting the lift of tube 15 to this position consist in displaceable stop plug 18 whose shank slidably fits within and occupies a hole 19 in the wall 14 of the anvil cup and whose enlarged head 20 slidably occupies a vertically elongated slot 21 in the cylindrical wall of magazine tube 15. For disassembling cup 10 and tube 15, the stop plug 18 may be displaced inwardly, or toward the left in Figs. 4 and 15, in a manner that will later be made clear.

The handle sleeve 26 which telescopically and slidably fits over the upper portion of magazine tube 15 carries at its top end a hollow cap 27 to which are attached various devices cooperative in the action of the stapler and which in part reach into the interior of tube 15 to assist in feeding the staples. By means of its threaded engagement at 28 with the open top end of handle sleeve 26, cap 27 may be unscrewed and removed from the latter for replenishing the contained charge of staples.

Cap 27, and hence handle sleeve 26, are constantly thrust upwardly in relation to magazine tube 15 by the vertically expansive thrust of a helical spiral compression spring 29 which bears between the roof of cap 27 and a floating plunger disc 30. Disc 30 is freely slidable vertically within the hollow of the cap and is retained therein by peaning inwardly the bottom open edge 31 of the cap. Plunger disc 30 is thus caused to bear downwardly against the top end of a magazine body 32 which comprises a long trough-like part of rather solid character whose cross sectional shape is best shown in Figs. 12 and 14 and includes the cross wall 99. The length of body 32 is such that its upper end portion projects considerably above the top end of magazine tube 15. Magazine body 32 may be fixedly and removably secured to and within tube 15 by one or more flush headed pins or other suitable fastening means herein illustrated by screw 33 (Fig. 12). The rounded longitudinal edges of body 32 snugly abut the interior of tube 15 nearly throughout its length. Body 32 also has oppositely disposed flatted faces 34 and 35 throughout its length, between which and the cylindrical walls of magazine tube 15, two long vertical chambers are respectively formed. These chambers contain working parts of the staple operating mechanism.

One such working part consists of the long blade-like staple driver 36 whose top end is offset outwardly at 37 and thereat is solidly riveted or otherwise fixedly secured to the inside surface of handle sleeve 26 as by rivets 38, spot welding or other suitable means. The staple driver 36, as best shown in Figs. 4 and 14, contains in its upper portion a vertically elongated slot 39 through which projects a stationary cam-shaped piece 40 fixedly stationed on magazine body 32 in a manner to protrude outwardly from the flat face 35 thereof. While in some constructions the cam projection 40 may be integral with the metal of magazine body 32, for good wearing quality it is here shown as comprising an angularly bent narrow strip of preferably hardened steel, which may be wedged, sweated, or otherwise firmly lodged in an opening 50 in cross wall 99 of the magazine body. In the relative placement of parts just described, it is seen that the engagement of cam projection 40 with the bottom end of slot 39 in the staple driving blade

36 provides a positive stop limiting the extent to which spring 29 can elevate the cap 27 in relation to the magazine tube 15 and body 32. This stop preferably acts to so limit upward movement of cap 27 before the peaned over edge 31 of the cap shall have engaged with the annular shoulder on the plunger disc 30 formed by its peripheral flange 51. The staple driver 36 is held in freely sliding contact against and relative to the flat face 35 of magazine body 32 nearly throughout its length by the interposition between this driver 36 and the cylindrical wall of sleeve 26 of a longitudinally floating and freely slidable staple turning bar 55. A vertically elongated notch 54 forming a bottom shoulder 52 is cut in the edge of driver 36 into which projects the end of a prong 53 struck inwardly from the edge wall of turning bar 55 as best shown in Fig. 14 and for purposes which will later appear.

Staple turning bar 55, as shown in Figs. 12 and 14, is shaped in cross section to provide a shallow channel which constrains the staple driver 36 to longitudinal movement and which is occupied thereby. At two points near either end of the staple turning bar, this channel is deepened by rounded out portions in the wall of the bar, 56 at the top and 57 at the bottom thereof. These depressed portions are suitably curved slidingly to fit the interior surface of magazine tube 15. The lower rounded out portion 57 contains a notch 58 opening through the bottom edge of the bar and which is slightly wider than the diameter of head 20 of the stop plug 18. This notch 58 is occupied by a thin leaf spring 59 whose top end is firmly bonded to the staple turning bar 55 within the rounded out portion 57 in a manner to leave clear the lengthwise channel in the bar occupied by driver 36. The bottom or free end 60 of leaf spring 59 yieldingly holds the stop plug 18 outwardly or toward the right in its position shown in Figs. 4 and 15, so that by pressing radially inward on the outermost end of stop plug 18, the plug head 20 may be thrust toward the left and into notch 58, its shank thereby becoming disengaged from hole 19 in the wall 14. This permits the handle sleeve 26 and all of its carried parts to be completely separated longitudinally from the anvil cup 10 in disassembling the stapler. Fig. 16 illustrates how the head 20 of the stop plug is positively imprisoned within the slot 21 by the solid wall of the slidable bar 55 in other longitudinal positions of the magazine sleeve 26 relative to the anvil cup 10.

As best shown in Figs. 4, 5, and 14, a stub-like leaf spring member, or pusher, 61 is secured at its top end firmly between the fixed end 37 of staple driver 36 and the wall of handle sleeve 26. Member 61 is bent to produce an offset by means of which its lower end is yieldingly disposed toward the left and flanks the staple driving blade 36 in face to face contact therewith. Thus normally, and at the beginning of a downward staple operating movement of the handle sleeve 26 relative to magazine tube 15, the lower end of leaf spring member or pusher 61 is aligned with pushes downwardly against the bifurcated top end of the staple turning bar 55, whose notch-separated parts 62 straddle and in no way interfere with the stationary cam projection 40 but may be laterally steadied by the presence of projection 40 therebetween. During its downward movement for turning, preparatory to driving, a staple, the bottom end of the resilient pusher 61 becomes thrust aside toward the right upon encountering the uppermost inclined cam surface of stationary projection 40 as shown in Fig. 5. By this means the drive connection between spring 61 and the staple turning bar 55 becomes broken for purposes that will later appear.

The space between the left face 34 of the magazine body 32 and the cylindrical wall of magazine tube 15 is for the most part occupied by a downwardly depending and laterally swingable staple kick-off leg 65, and by the long upstanding posts 69 of a vertically reciprocative latch 70, which posts flank the edges of leg 65. Kick-off leg 65 is shown detached in Fig. 6, and its top end portion 66 possesses enough resilient flexibility to permit substantial inward swinging movement of its staple actuating foot 67. The extreme top end 68 of the leg 65 is firmly riveted or otherwise rigidly secured to the magazine tube 15 near the top end of the latter. Other than in portion 66, leg 65 may comprise virtually a rigid body.

The long upstanding posts 69 (Figs. 4 and 12) form integral parts of a vertical slidable U-shaped latch whose base plate 70 takes the upward thrust of the compression spring 16 which as before mentioned extends upwardly through the hole 71 in the staple rocker block 72. This thrust is imparted upwardly by latch plate 70 to the foot 67 of leg 65 and thus through the length of the latter to the magazine tube 15 hence tending constantly to lift tube 15 and all of its carried parts relative to anvil cup 10.

Rocker block 72 is fixed within the bottom end of magazine tube 15 and plugs and fills most of said end of the tube leaving open the space 73 through which driven staples may be ejected. Space 73 is adapted to be entered upon occasion by the bottom ends of the vertical reciprocative staple driver 36 and staple turning bar 55. Rocker block 72 contains a flat sided well or recess 101 whose sides flank and guide the edges of staple actuating foot 67 of the kick-off leg 65 in its reciprocative movements. Posts 69 are vertically guided by the edges of the kick-off leg 65 which they flank and also by sliding contact with the inner surface of magazine tube 15 and the flat face 34 of the magazine body 32. Base plate 70 of the latch is also vertically guided by its sliding fit between the wall of magazine tube 15 and the shoulder on block 72 adjacent the right edge of latch plate 70 (Fig. 4).

For at suitable times cutting or breaking off and kicking aside the bottom staple from a stored strip of staples, means are provided for manually thrusting the staple kick-off leg toward the right from its position in Fig. 4. These means include a manually operable spring leaf clip 74 firmly attached at its upper end in any suitable manner to the exterior surface of the handle sleeve 26. The lower turned over working end 75 of clip 74 is normally positioned outside of but opposite an opening 76 in the wall of handle sleeve 26 large enough to admit clip end 75 therethrough. Clip 74, in the manner of clips with which pocket carried fountain pens are commonly equipped, is also adapted to engage and cling to the top edge of a vest or coat pocket in which my improved stapler may be carried as is a fountain pen, thereby to prevent the stapler from falling out of such pocket.

In the position of parts shown in Fig. 4, the wall of magazine tube 15 is seen to contain an opening 77 registering with the opening 76 in handle sleeve 26 which is occupied by a pressor

pad 78 carried by the staple kick-off leg 65. Opening 77, like opening 76, is adapted to admit the working end 75 of clip 74 thereinto when these two openings are aligned longitudinally of the stapler.

In Figs. 4 and 6, the left or outward face of the kick-off leg 65 is seen to be cut back in a portion 79 just below the top edge of pressor pad 78 to provide clearance for a resilient safety catch which may comprise a leaf spring element 80 firmly mounted at its top end to the cut-off leg 65, as by rivets 81, and having a portion of its bottom end turned outwardly to form the lip 82 which is urged by the resilience of element 80 to extend through opening 77 and into opening 76. The outermost position of lip 82 may be determined by the engagement of a downwardly projecting unbent portion 83 of the bottom end of catch 80 with the top edge of pressor pad 78 which overhangs the clearance cut-back 79 in the body of leg 65.

In the position of parts shown in Fig. 4 the lip 82 extends into opening 76 and thus underlies the wall edge of handle sleeve 26 bordering the top of opening 76. It therefore normally, and until retracted inwardly by the manually effected staple kick off action of leg 65, serves as a safety stop positively to prevent or yieldingly to resist unintentional operation of the stapler, depending on whether the resilient strength of leaf spring 80 is made heavy or light, respectively. In the latter case it may be observed that the leverage is such that suitable weakness of spring 80 would permit strong downward pressure on its lip 82 to force this lip inwardly. Thus lip 82 might act as a protective detent rather than a positive lock in resisting staple operating downward movement of handle sleeve 26 relative to magazine tube 15.

The parts having now been described from which action is derived for working upon the staples, those parts of the implement which act more directly upon the staples themselves will be explained. For storing and feeding a long strip of pre-cut adhering staples 87, or a long blank strip of staple material from which such staples could be cut by a suitably formed edge on cut-off foot 67, the hollow trough of the magazine body 32 is equipped with a track bar 86 of U-shaped cross section as shown in Fig. 12 nearly coextensive in length with the magazine body 32 and having its sides spaced sufficiently from body 32 to slidingly admit therebetween the legs of the staples. In the usual manner the staples 87 are intermittently fed downwardly along the track bar 86 by the constant push of follower 88 which straddles and rides along the track bar as do the staples.

Between the side walls of the track bar, follower 88 has secured thereto by fastening tabs 89 a holding yoke 90 for the bushing 91 which slidingly engages the long, vertical and centrally disposed rod 92. Rod 92 extends upwardly and passes freely through a central opening in the plunger disc 30 which itself is slidable in cap 27. An enlarged terminal head 93 on rod 92 is centered with and connected to the roof wall of cap 27 by a ball and socket type of engagement with the central recess 94 therein. A long staple feed spring 95 surrounds the rod 92 and is under compression between the bearing bushing 91 and the plunger disc 30 for exerting therebetween the pressure which constantly urges the staples downwardly along track bar 86. Thus the staple feeding spring 95 and the cap lifting spring 29 are under compression in what may be termed series relationship to each other through the intervening medium of floating plunger disc 30. All of the staple feeding parts, including follower 88, rod 92, and spring 95, are withdrawable from the interior of the stapler by and with the cap 27 when the latter is unscrewed and removed from the operating sleeve 26. The magazine body 32 and any unexhausted supply of staples 87 on the track bar 86 are thus left undisturbed within the operating sleeve 26.

Beneath and slightly spaced from the bottom end of the track bar 86 and abutting against the bottom end of side portions of magazine body 32, is the staple rocker block 72 hereinbefore referred to.

In Fig. 13 the block 72 is clearly shown to have flat top faces 97, 97 which abut against the bottom ends of both side portions, respectively, of magazine body 32. In the same plane with top faces 97 is a flat table face 98 from which the bottom edge of the superimposed cross wall 99 of the magazine body 32 is upwardly spaced by being cut away at its bottom end. This affords a lateral opening through which the bottom staple can be kicked toward the right in Figs. 13, 15 and 16 from its position shown in Figs. 4 and 13 to its position shown in Fig. 15. In this latter position the crown 100 of the staple will rest upon the table surface 98 instead of bridging the gap between the exposed shelf-like portions of top faces 97, 97, on which top faces 97, 97 the legs of the staple were originally supported. The gap between block faces 97 and 97 is formed by a straight sided well 101 whose sunken floor surface 102 is somewhat higher than the rest of the upper surface 103 of the rear portion of block 72 (Fig. 13). The staple turning block 72 is further provided with convexly curved rocker tracks 104 at the bottom of cutouts of such width, and so spaced, as freely to accommodate therein the legs of the staple while being rocked or turned from its positions in Fig. 15 to its positions in Fig. 16. The uppermost right edge of block 72 along table face 98 is preferably slightly rounded or chamfered to reduce the sharpness of this edge over which the crown of the staple passes just before entering the raceway.

Centrally of the staple track bar 86 is a staple constraining spring member 105 having a straight upwardly extending end 106 fixedly mounted in a vertical groove between the cross wall of track bar 86 and the cross wall 99 of magazine body 32 and having a bowed free portion 107 extending generally along the path of travel of the staple crown 100 from left to right in Figs. 15 and 16. This free portion of spring member 105 may, at its lowest points, be spaced above the table face 98 of turning block 72 a less distance than the width of the staple crown 100, so that the staple crown will be lightly squeezed between spring member 105 and table face 98. This action of spring member 105 constantly urges the crown of the staple downwardly and may further urge the staple crown somewhat toward the right in Figs. 15 and 16 as the legs of the staple rock upon the convexly curved bottoms of the cutouts 104 in the rocker block. The manner in which the staple legs are actuated to effect this turning movement of the staple and in which the staple is then driven into the work will become clear from the following description of operation.

The operation of the stapler as a whole for feeding, turning and driving a staple into work, such as through sheets of paper represented at W in Figs. 9, 10 and 11, will now be described

with reference to diagrams of the successive movements of the main sections and parts of the stapler as represented in Figs. 7 to 11 inclusive, in conjunction particularly with Figs. 18 to 21, inclusive.

In Figs. 7 and 18 the operating sleeve 26 with its cap 27 is in the most elevated or upwardly extended position relative to the magazine tube 15, and tube 15 is in its most elevated or upwardly extended position with respect to the anvil cup 10, so that the transverse cutout or gap 13 in the latter is fully open for receiving the work to be stapled. First, and optionally before or after applying the stapler to the work, the pocket clip 74 is pressed inwardly by the thumb or finger of the operator's hand so that its pressor end 75 forces pad 78 inwardly, or toward the right, and with it the entire lower portions 64 and 67 of kick-off leg 65 until these parts are positioned as shown in Figs. 8, 15, 16 and 18.

In this position, kicker foot 67 of the kick-off leg brings up against the upright edge of the sunken well 101 in block 72. As soon as the kick-off leg reaches this position it is instantly locked therein by the upsnapping movement of latch plate 70 under the urge of spring 16 which therefore has been pressing plate 70 upwardly against the lower surface of foot 67. The right edge of latch plate 70 is now lodged in a heel notch 64 at the bottom corner of leg 65 and this latch plate is thus prevented from rising farther than its position in Figs. 8, 9, 10, 15, 16, 18, 19 and 20. When the pocket clip 74 is released by the operator's hand, it springs back to normal position as shown in all figures of the drawings except Figs. 8 and 18, leaving the kick-off leg 65 and foot 67 locked as explained. During this staple kicking movement of leg 65 from its position in Figs. 4, 7 and 12, to its position in Figs. 8, 15, 16, 18, 19 and 20, the right edge of foot 67 pushes the bottom staple 87 toward the right in Fig. 4 or in the direction its legs are pointing. The staple now becomes positioned as shown in full lines in Figs. 15, 18 and 19.

A central notch 108 in the toe edge of foot 67 affords clearance to prevent this edge from contacting or disturbing the constraining spring member 105, between whose bowed free portion 107 and the table face 98 of turning block 72 the crown 100 of the staple is thus lightly squeezed and lodged. In this displaced position of the staple, its legs are horizontally suspended without underlying support just over the two rocker cutouts at 104 respectively, in the rocker block 72. When the bottom staple has been so severed from the staple strip and sufficiently displaced, the tendency of spring 95 acting through the follower 88 to feed the row of staples downwardly along the track bar 86, advances the next following staple downwardly toward the new underlying foot 67 of kick-off leg 65.

The operator grasps only the handle sleeve 26 and its cap 27, and now places the bottom bumper end 22 of anvil cup 10 against any sufficiently rigid object, such as the top of a desk or table, and presses continuously downward to effect a telescopic collapsing movement of the main stapler sections in a manner to contract the overall length of the whole stapler structure from its maximum length indicated in Figs. 7, 8 and 18 to its minimum length indicated in Figs. 11 and 21. During this telescopic movement of the sections, three series of operations of the interior parts are successively effected without interruption for the respective purposes of (1) bringing the bottom surface of rocker block 72 to bear downward against the work W to be stapled; (2) rocking the staple into its raceway in position to be driven into the work; (3) driving the staple into or through the work and clinching it against the anvil base. In this last action latch 70 is tripped or depressed in a manner hereinafter described to free the kick-off leg 65 and permit it automatically to return to its original position ready to effect a subsequent breaking off of another staple when the implement is next to be used.

Figs. 9 and 19 show no change in the position of the parts from that in Fig. 8, other than that the magazine tube 15 and all of its supported parts have been forced downwardly in unison by overcoming the magazine lifting tendency of spring 16 so that the bottom surface of rocker block 72 now clamps the work papers W downward against the anvil base 11. It will be understood that because spring 29 possesses an excess of strength over spring 16, no relative movement between operating sleeve 26 and magazine tube 15 has up to this time taken place.

In Figs. 10 and 20, continued downward movement of the handle sleeve 26 has been unaccompanied by any corresponding movement of the magazine tube 15, because the lower end of the latter is against the work, but the staple driver 36 and the staple turning bar 55 have continued to move downward in unison with handle sleeve 26 by which driver 36 and pusher 61 are carried. The trippable pusher 61 has forced staple turning bar 55 downwardly in unison with driver 36. Thus the bottom end of the staple turning bar 55 has moved from its full line position in Figs. 15, 18 and 19 through its broken line position in Fig. 15 and full line position in Fig. 16 to its lowest position shown by broken lines in Fig. 16 and by full lines in Figs. 20 and 21, thereby engaging and forcing downwardly the horizontally suspended legs of the staple 87 and causing these legs to rock over the convex cutout tracks 104 in rocker block 72. During this rocking movement of the staple, excessive lifting of its crown 100 is prevented by the bowed free portion 107 of the constraining spring member 105 which lightly bears downwardly against only this crown portion of the staple as the latter moves successively from its full line position in Figs. 15, 18 and 19 through its broken line position in Fig. 15 and full line position in Fig. 16 to its position ready to enter the work shown by broken lines in Fig. 16 and by full lines in Fig. 20.

In this last position the staple is slidingly closeted within the raceway 84 which is formed by abutment against the flatted right edge 96 of block 72 of the shallow channeled staple turning bar 55. The upper part of this channel-formed raceway is occupied by the staple driver 36 whose bottom end is superimposed above the crown of the staple whose legs now extend downwardly readily to be driven into the work.

At the point in the downward travel of handle sleeve 26 which has been reached in Figs. 10 and 20, the bottom end of the leaf spring pusher 61 (which up to this point has been impelling the staple turning bar downwardly) encounters the stationary cam projection 40 by which it is now thrust aside as shown in Figs. 5, 10 and 20, with the result that continued downward movement of the handle sleeve 26 ceases further to impel the staple turning bar. Thus in continued downward movement of handle sleeve 26 the staple

driver 36 continues to travel alone and without the bar 55 and forces the staple downwardly in raceway 84 and out into the work W, whereupon it is clinched against anvil depressions 12 in the usual way. Figs. 11 and 21 further show that at the extreme bottom end of the downward stroke of handle sleeve 26, the edge 31 of cap 27 engages the top ends of the long upstanding posts 69 of the latch plate 70 and depresses these posts against the resistance of spring 16. Thus plate 70 is forced downwardly into contact with surface 103 of the rocker block 72 and releases the notched heel 64 of the staple cut-off leg. The latter then automatically springs toward the left and resumes its original position shown in Figs. 4, 7 and 12. The thus retracted foot 67 holds latch 70 depressed until locking action is next needed. Since no staple can be displaced from the row of staples until latch 70 has released foot 67, the implement is clog-proof against more than one staple occupying the raceway at a given time.

Also at this point, the staple feeding spring 95 forces the vertical row of staples downward so that a new bottom end staple now contacts the shelf-like top faces 97 on the rocker block 72 ready to be kicked off from the row of staples and then turned and driven in repeated use of the implement.

When the hand of the operator ceases to press down upon the handle sleeve 26 and its cap 27, springs 16 and 29 immediately lift the magazine tube 15 and handle sleeve 26, respectively, whereby the telescopic sections of the stapler are restored to their original elevated positions. Plug 18 limits the upward movement of the magazine tube 15 relative to the anvil cup 10, and the bottom end of slot 39 in driver 36 meets the projection 40 on body 32 to limit the upward movement of the handle sleeve 26 relative to magazine tube 15. Also in this self-restoring movement of the parts, the bottom shoulder 52 of a notch 54 in the edge of driver 36 as shown in Fig. 14 engages the prong 53 struck in from the edge wall of turning bar 55 and thereby raises bar 55 to its starting position as in Figs. 4, 7, 8, 9, 18 and 19.

The stapler which has been described becomes usable as a tacker for driving staples into work without clinching the legs thereof, by entirely omitting the anvil cup 10 and base 11 and sealing the bottom end of hole 71 in block 72 with a cover plate coextensive in area with the bottom face of block 72 so that the bottom end of spring 16 may be supported by this plate. In this modification the length of spring 16 may be correspondingly reduced or the rocker block may be made vertically thicker to provide for substantially the same length of spring as that shown in Fig. 4. Or optionally, the hole 71 in block 72 may be bored from the top of the block without opening through the bottom of the block thus providing a closed bottom well in the material of the block 72 for seating and retaining the bottom end of spring 16.

Many departures from and substitutes for the exact constructions herein chosen to illustrate the present improvements are possible within the scope and underlying principles of this invention and the intent of the following claims is to cover and embrace all substitutes and equivalents which would be suggested by the disclosure hereof and which fairly fall within their terms.

I claim:

1. A staple storing and driving implement embodying, in combination, staple actuating mechanism including parts constructed and arranged to feed and eject a stored staple, and an assemblage composed of slender elongated barrel structures housing said parts proportioned and delineated outwardly to resemble a pocket carried fountain pen, one of said structures having near one end of said assemblage a work receiving cutout forming a transversely disposed notch opening laterally and of minimum width to receive the work thereby to occasion only an inconspicuous break in the otherwise pen resembling outer contours of said composite barrel structures throughout a maximum portion of the length of said assemblage for enhancing the resemblance of said implement to a pocket carried fountain pen.

2. A staple storing and driving implement embodying, in combination, stapling mechanism including parts constructed and arranged to deliver a stored staple, a slender elongated barrel structure housing said parts outwardly proportioned and delineated to resemble a pocket fountain pen, a pocket clip resiliently carried on the outside of said barrel structure in a manner to slip over and grip the edge of a garment pocket, and means enabling said pocket clip to cause operation of said delivering part of said mechanism upon designed manipulation of said clip after the implement is removed from the pocket.

3. A stapler containing an elongated staple storing chamber having a staple receiving end and a staple delivering end embodying in combination, inner and outer elongated hollow structures telescopically engaged for relative sliding movement in a manner jointly to house said chamber and by said relative sliding movement to contract and expand the length thereof and means within said chamber to advance the staples stored therein along a fixed and straight path of travel extending from said receiving end of the chamber to said delivering end of the chamber, said means being constructed and arranged to accommodate contraction and expansion of the length of said chamber.

4. A stapler as defined in claim 3 in which the said elongated hollow structures form parts of a composite tubular body proportioned and delineated on its exterior to resemble a pocket fountain pen, one of said structures having near one end of the body a work receiving cutout forming a transversely disposed notch opening laterally and of minimum width to receive said work thereby to occasion only an inconspicuous break in the otherwise pen resembling exterior of said composite body throughout a maximum portion of its length.

5. A stapler embodying in combination, telescopically slidable barrel sections jointly housing an elongated magazine chamber for storing staples, one of said sections having a lateral opening through the wall, mechanism confined in said chamber constructed and arranged to deliver staples to be driven from said chamber, a clip resiliently carried on the exterior surface of one of said barrel sections in a manner to flex for sliding over and clinging to the edge of a garment pocket, and a projection carried by said clip in position to enter said lateral opening and act on said mechanism when said clip is manually forced toward the barrel section.

6. A stapler containing an elongated staple storing chamber having a staple receiving end

and a staple delivering end embodying in combination, inner and outer elongated hollow structures telescopically engaged for relative sliding movement and jointly housing said chamber, a cap device carried by one of said structures extending crosswise the staple receiving end of said chamber and operative through its reciprocative movements to contract and expand the length of the latter and means operative between said cap device and the stored supply of staples constructed and arranged to push said staples progressively toward said staple delivering end of said chamber in different stages of the lengthwise contraction and expansion of the latter.

7. A staple storing and driving implement as defined in claim 2 in which the said elongated barrel structure is comprised of an interior body portion and a hollow exterior handle portion sleeved over and telescopically slidable in relation to said body portion and carrying the said clip, together with connections enabling the sliding of said handle portion relative to said body portion to cause operation of parts of the said stapling mechanism.

8. A staple storing and driving implement embodying in combination, stapling mechanism including parts constructed and arranged to impel a stored staple in respectively different directions, a compound barrel structure housing said parts including a hollow interior body section and a hollow exterior handle section sleeved over and telescopically slidable in relation to said body section, a clip resiliently carried on the outside of said handle section in a manner to slip over and grip the edge of a garment pocket, means enabling said clip when manipulated to operate a part of said mechanism in a manner to impel a staple crosswise of said barrel structure and means enabling sliding of said handle section relative to said body section to operate a part of said mechanism in a manner to impel a staple lengthwise of said barrel structure.

9. In a stapler containing an elongated magazine chamber for storing staples, in combination, means to feed staples lengthwise of said chamber, devices operative within said chamber to drive staples therefrom, a handle operatively connected to actuate said staple driving devices comprising a portion of said stapler arranged to reciprocate in a straight path of travel longitudinally of said chamber, a plurality of helically coiled compression springs arranged in end-to-end relation in lengthwise alignment with said chamber, a floating plunger located between and separating said springs in a manner to receive the thrust of both of said springs simultaneously in respectively opposite directions for enabling one of said springs to exert pressure for feeding said staples in one direction, and an abutment in said chamber constructed and arranged to limit movement of said plunger in said one direction for enabling the other of said springs to exert pressure for biasing said handle in the opposite direction.

10. In a stapler containing a stored strip of staples and having an outlet for the ejection of said staples, in combination, a follower arranged to transmit thrust to said strip of staples for feeding the latter in a direction approaching said outlet, a manually actuatable staple driving device arranged to be reciprocable away from and back to a starting position for driving staples one at a time through said outlet, and connections between said follower and said device including spring means constructed and arranged to bias said follower to exert its said thrust and simultaneously to bias said device toward its said starting position.

11. In a stapler as defined in claim 10, the combination therein defined in which the said follower and the said staple driving device are constructed and arranged to move in straight parallel paths and in which the said spring means of the said connections bias said follower and said device in directions tending to move them in respectively opposite directions.

12. In a stapler in which a row of staples is automatically fed in a path longitudinally flanking a raceway with the legs of said staples pointing transversely toward said raceway, mechanism for transferring said staples legs-foremost one at a time from said row of staples to said raceway, including an abutment positioned to intercept an end staple of said row of staples in a manner to arrest the automatic feeding advance of the latter, means to engage and displace said intercepted staple legs-foremost from said row of staples and transversely toward said raceway, and means to swing the legs of said displaced staple into a position in which they occupy and are aligned with said raceway.

13. A staple driving and clinching implement embodying an anvil base for clinching staples, an elongated staple storing magazine structure, and a staple driving handle device all provided with concentric cylindrical walls cooperatively overlapped in substantially coaxial relationship in a manner to form a composite elongated straight implement in which said structure and said handle are constructed and cooperatively related in a manner to restrict them to translative movement relative to one another and to said base longitudinally of their said common axis.

14. In stapler construction, a series of at least three members having tubular portions and including respectively a cup-like base, a staple magazine housing, and a cap-like operating handle, one end of said magazine housing fitting telescopically and slidably within the tubular portion of said base, and the other end of said magazine housing fitting telescopically and slidably within the tubular portion of said handle, all of said members being cooperatively related in a manner to restrict them to translative movement relative to one another.

15. In combination with stapler construction as defined in claim 14, separate springs respectively constructed and arranged to urge the said magazine housing in a direction away from the said base and to urge the said handle in a direction away from said magazine housing, together with separate stop means constructed and arranged positively and respectively to limit movement of said magazine in a direction away from said base and positively to limit movement of said cap in a direction away from said magazine housing.

16. In a stapling mechanism including a reciprocative staple kick-off element biased toward a normal position, a reciprocative staple driver, a handle member connected to actuate said driver, a manually operable device connected to displace said kick-off element from its said normal position and latch means automatically operative to catch and hold said element against return to said position, said handle member further being operatively related to said latch means in a manner to actuate the same after driving a staple thereby to release

said element and permit its return to normal position.

17. In stapling mechanism, in combination, a staple turning bar having an opening therethrough elongated in the direction of travel of said bar, a staple driver, an actuator connected to said driver in a manner to impel the latter in unison therewith, a device operative to transmit movement from said actuator to said actuator while said bar is impelling said driver, and trip means stationed to project through said elongated opening in a position to be engaged by a portion of said device in a manner operatively to disassociate said device from said bar after the latter has moved far enough to turn said staple, whereby the actuator may continue to move the driver without further accompanying movement of said turning bar.

18. The method of transferring a U-shaped staple from a row of staples legs-foremost into a raceway extending parallel to said row of staples, which includes the steps of supporting the legs of said staple in a position pointing transversely toward said raceway, then shifting said staple to and holding said staple in a position in which its legs are deprived of support while the free ends of said legs project transversely across the raceway, and then swinging the free ends of said unsupported legs in the direction said raceway extends while simultaneously advancing said crown of the staple transversely toward and into said raceway.

19. A stapler containing an elongated staple storing chamber having a staple receiving end and a staple delivering end embodying in combination, inner and outer elongated hollow structures telescopically engaged for relative sliding movement in a manner jointly to house said chamber, means constructed and arranged within said chamber to advance the staples stored therein along a fixed and straight path of travel extending from said receiving end of the chamber to said delivering end of the chamber, and a detent device carried by the inner of the hollow structures and arranged to engage with the outer of said structures constructed and arranged normally to resist the said telscopic collapsing of said structures to prevent accidental actuation of the staples.

20. In stapler construction, an elongated tubular housing structure, an elongated magazine body adapted to carry a supply of staples and shaped and arranged within said structure to divide the interior thereof into two narrow chambers located on respectively opposite sides of said body and extending lengthwise of said structure, and staple actuating mechanism housed by said structure and including parts respectively located in said body-separated chambers and extending lengthwise thereof, said parts being further constructed and arranged in a manner to engage and act upon a common staple at one extreme end of said magazine body.

21. The method of transferring a U-shaped staple from a row of staples legs-foremost into a raceway extending parallel to said row of staples, which includes the steps of supporting the crown of said staple at a point adjacent said raceway so that the legs of the staple extend into and crosswise said raceway, and then rocking said staple while simultaneously advancing its legs lengthwise of the raceway and maintaining portions of said legs therein so that said crown of the staple finally swings toward and into said raceway.

22. The method of transferring a U-shaped staple from a row of staples legs-foremost into a raceway extending parallel to said row of staples, which includes the steps of disposing said staple so that its legs extend at an angle to the raceway while the free ends of said legs occupy said raceway and then advancing the crown of the staple into said raceway while the staple legs assume varying oblique dispositions relative to the raceway until said staple crown has reached said raceway.

23. A stapler embodying in combination, a compound barrel structure including inner and outer elongated hollow sections telescopically engaged for relative sliding movement, longitudinally spaced spring abutments carried respectively by each of said sections, spring means located between said abutments biasing said sections to separate in a manner to expand the length of said barrel structure, and a straight track for guiding staples extending within and lengthwise of said barrel structure and fixedly carried on said inner hollow section.

24. A stapler embodying in combination, a compound barrel structure including inner and outer elongated hollow sections telescopically engaged for relative sliding movement, longitudinally spaced spring abutments carried respectively by each of said sections, spring means located between said abutments biasing said sections to separate in a manner to expand the length of said barrel structure, and a straight track for guiding staples extending within and lengthwise of said barrel structure and fixedly carried on said inner hollow section, together with means operatively associated with said track in a manner to push constantly on all staples guided thereby.

25. In a stapler in which a row of staples is automatically fed in a path longitudinally flanking a raceway with the legs of said staples pointing transversely toward said raceway, mechanism for transferring said staples legs-foremost one at a time from said row of staples to said raceway, including an abutment constructed and arranged to intercept an end staple of said automatically fed row of staples in a manner to support said end staple so positioned that its legs point toward said raceway, means to engage and displace said intercepted staple legs-foremost from said row of staples and into a position in which only the free ends of the legs of said staple occupy said raceway, and means to swing said displaced staple into a position in which its legs are completely contained within and aligned with said raceway.

HOWARD M. LARSEN.

CERTIFICATE OF CORRECTION.

Patent No. 2,231,539. February 11, 1941.

HOWARD M. LARSEN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, lines 24 and 39, for the word "vertical" read --vertically--; page 8, first column, lines 9 and 10, for "actuator while said bar" read --bar while said actuator--; 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 18th day of March, A. D. 1941.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)