

April 16, 1929.

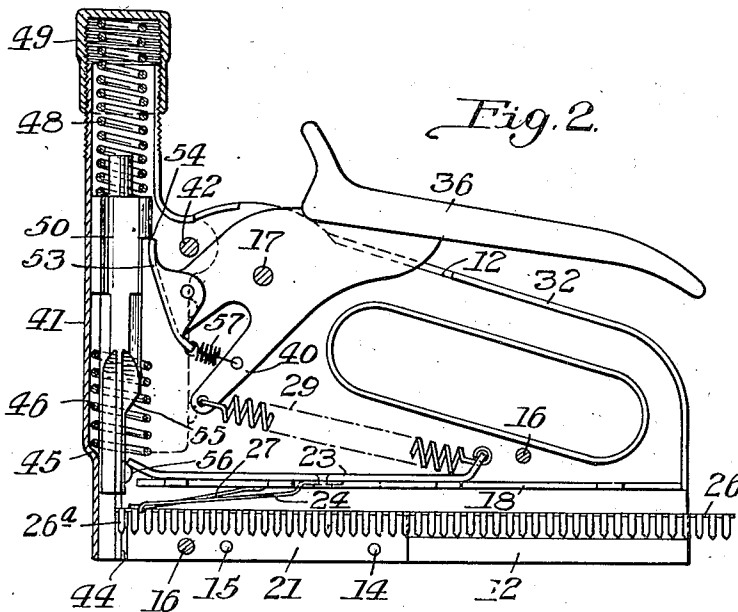
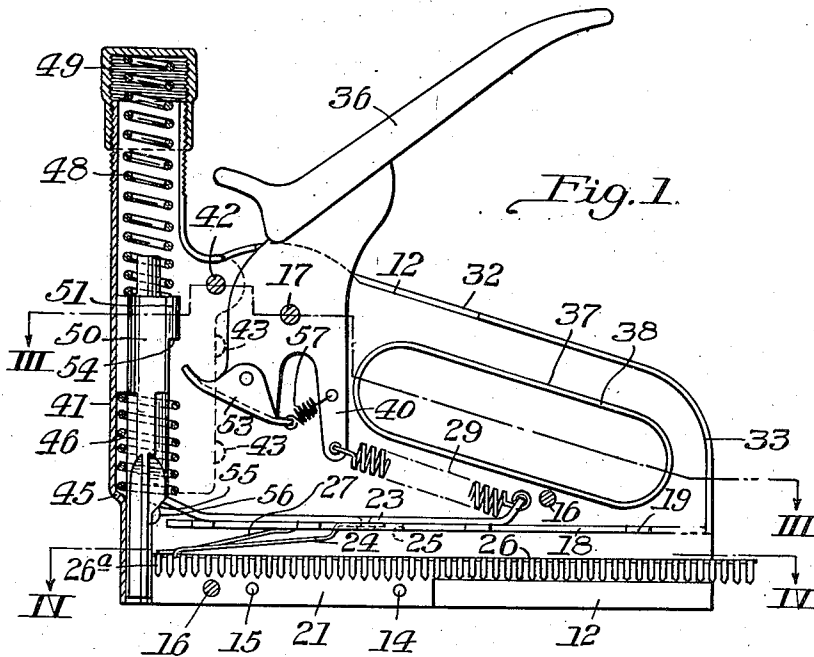
J. J. SZEPE

1,709,756

STAPLE DRIVING APPARATUS

Filed July 20, 1927

4 Sheets-Sheet 1



INVENTOR

Joseph J. Szepc
By Archworth Martin,
Attorney.

April 16, 1929.

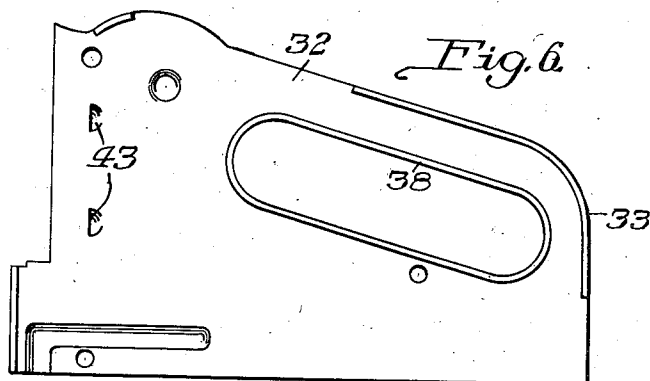
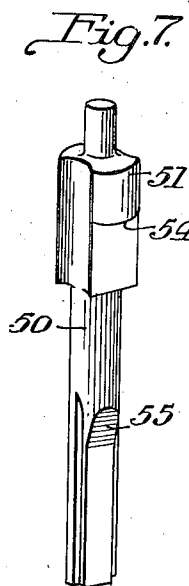
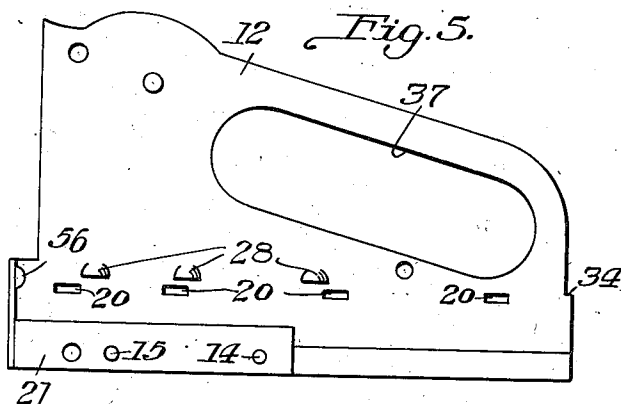
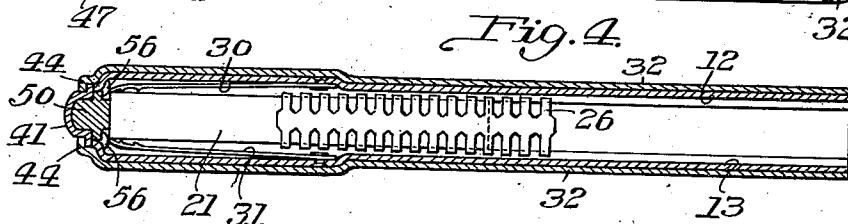
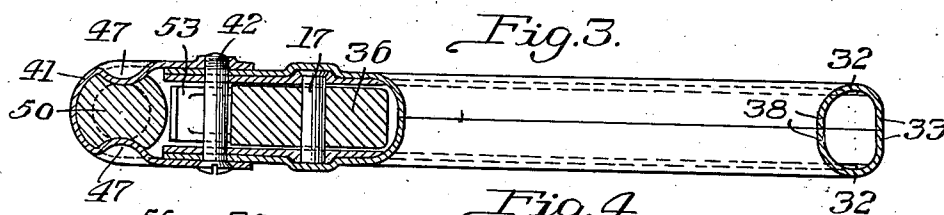
J. J. SZEPE

1,709,756

STAPLE DRIVING APPARATUS

Filed July 20, 1927

4 Sheets-Sheet 2



INVENTOR

Joseph J. Szepes
By Archibald Martin,
Attorney.

April 16, 1929.

J. J. SZEPE

1,709,756

STAPLE DRIVING APPARATUS

Filed July 20, 1927

4 Sheets-Sheet 3

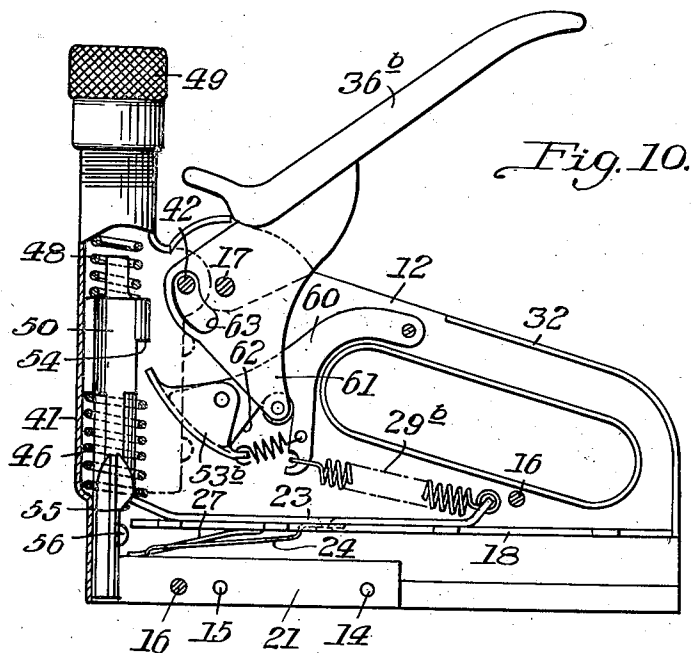


Fig. 10.

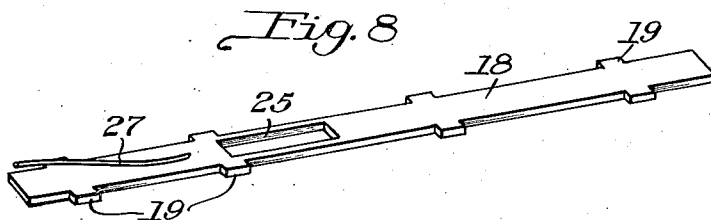


Fig. 8

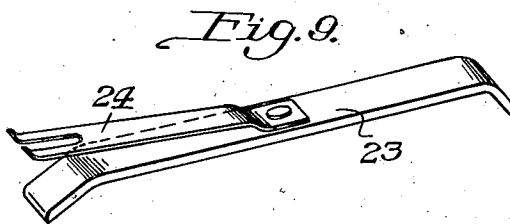


Fig. 9.

INVENTOR
Joseph J. Szepes
By Archworth Martin,
Attorney.

April 16, 1929.

J. J. SZEPE

1,709,756

STAPLE DRIVING APPARATUS

Filed July 20, 1927

4 Sheets-Sheet 4

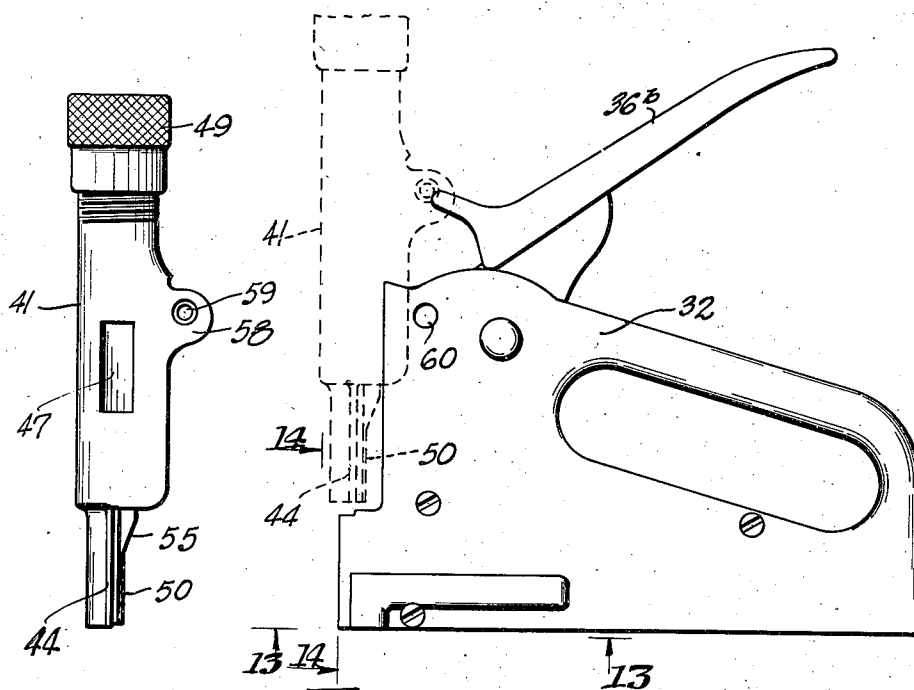


Fig. 11.

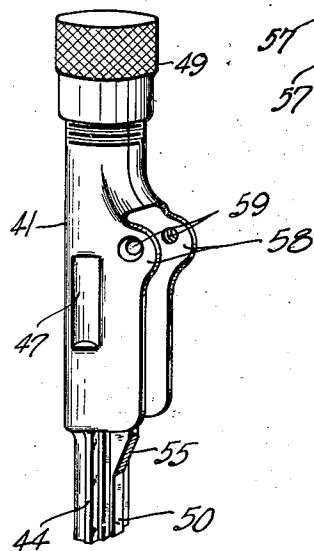


Fig. 12.

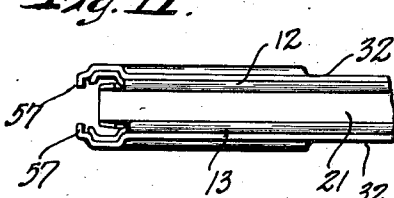


Fig. 13.

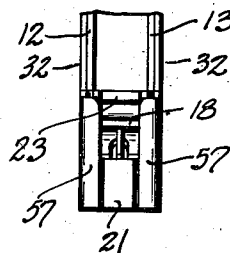


Fig. 14.

Inventor

Joseph J. Szep

By

Hooster & Davis

Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH J. SZEPE, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO THE E. H. HOTCHKISS COMPANY, OF NORWALK, CONNECTICUT, A CORPORATION OF CONNECTICUT.

STAPLE-DRIVING APPARATUS.

Application filed July 20, 1927. Serial No. 207,126.

My invention relates to staple driving apparatus, and more particularly to those of the type wherein tacks or staples are sheared from a strip and the points driven through cards, tags, sheets of papers, etc. for the purpose of fastening them together or for tacking them on a wood support such as a packing case. The invention is also capable of use in various other relations as for tacking blinds to their rollers, etc.

One object of my invention is to provide a stapling or tacking device of such form that access may be had to the same for the purpose of removing staples that have become jammed, without the necessity of disassembling the device to any considerable degree.

Another object of my invention is to provide means whereby the mechanism for advancing a staple strip will not become operative until after a staple has been actually sheared from the front end of such strip.

Another object of my invention is to provide an improved means for cushioning the blow of a spring-actuated shearing plunger.

Another object of my invention is to provide an apparatus wherein a single spring will serve both to hold the operating lever in extended position and to advance the staple strip.

A further object of my invention is to provide a stapling apparatus composed of a relatively few number of parts and which is, nevertheless, highly efficient in its operation.

Still another object of my invention is to simplify and improve generally the structure and operation of stapling apparatus.

Some of the forms which my invention may take are shown in the accompanying drawing, wherein Figure 1 is a sectional view, in side elevation, showing the position of certain of the parts immediately after a shearing operation; Fig. 2 is a similar view, but showing the position of the parts immediately preceding a shearing operation and with the shearing plunger placed under tension; Fig. 3 is a view taken on the line III—III of Fig. 1; Fig. 4 is a view taken on the line IV—IV of Fig. 1; Fig. 5 is an inside view of one of the side walls of the main casing for the apparatus; Fig. 6 is a view of a cover plate for the casing wall of Fig. 5; Fig. 7 is a perspective view of the plunger; Fig. 8 is a perspective view of the feed slide support of Figs. 1 and

2, in inverted position; Fig. 9 is a perspective view, of the feed slide, in inverted position; Fig. 10 is a view similar to Fig. 1, but showing a modified form of actuating mechanism for the plunger; Fig. 11 is a side elevation of the main casing and the plunger housing showing them in separated relation, and also indicates in dotted lines how the plunger housing is removed from and applied to the main casing; Fig. 12 is a perspective view of the plunger housing removed from the casing; Fig. 13 is a bottom plan view of the main housing with the plunger removed, the plane of the view being shown on line 13—13 of Fig. 11, and Fig. 14 is a front elevation of the lower part of the main casing with the plunger housing removed, the plane of this figure being substantially on line 14—14 of Fig. 11.

Referring to Figs. 1 to 6, the major portion of the operating mechanism is enclosed within a main casing composed of side walls 12 and 13 that are held in assembled relation by means of pins, rivets, screws or the like, represented by the numerals 14, 15, 16 and 17. A plate-like slide-way 18 is disposed between the side plates 12 and 13 and is provided with tongues 19, as shown more clearly in Fig. 8, that extend through perforations 20 in the side plates and afford vertical support for the plate 18 and hold the parts more firmly in position.

A combined shear block and strip support 21 is disposed between the plates 12 and 13 and is held in place by the pins 14 and 15. A feed slide 23 is slidably supported upon the slide-way 18 and carries a spring-like member 24 that projects through an opening 25 (Fig. 8) in the plate 18 and is bifurcated at its forward end. The projections at the forward end of the spring 24 engage behind the shoulders of staples which compose the staple strip 25, so that upon reciprocation of the feed slide 23 longitudinally of the plate 18, in a manner to be hereinafter described, the member 24 functions as a pawl to feed the strip 26 forwardly, step-by-step. A spring member 27 is secured to the underside of the slide plate 18 to hold the staples at the forward end of the spring down against the block 21, against upward drag by the plunger. Each of the wall plates 12 and 13 is provided with a series of inwardly projecting lugs 28 that are formed by punching the plates and

which overlie the edges of the feed slide 23, to serve as guides and prevent the feed slide from being moved upwardly, as through pressure of the spring 24, or a spring 29 that serves to urge the slide 23 forwardly as hereinafter explained.

The casing walls 12 and 13 have depressions formed at their lower front corners for the reception of pawls or dogs 30 and 31 respectively, that are in the form of spring-like elements whose rear ends are riveted to the casing walls and whose forward ends lie against the sides of the block 21, and have tooth-like projections that engage the prongs or teeth of the staples to prevent the staple strip from being retracted or moved backward upon retraction of the feed slide 23 and its pawl 24.

A cover plate 32 is secured in place against the outer sides of the casing walls 12 and 13 and is held in assembled relation therewith by means of the screws 16. The rear upper corner portions of the cover plates 32 are flanged inwardly as indicated at 33 in Figs. 3 and 6, to partially close the space between the plates 12 and 13. The lower ends of the flanges 33 rest upon ledges 34 (Fig. 5) formed on the rear edges of the cover plates 12 and 13 and terminate at that point, so as to permit the insertion of a staple strip 26, as shown in Fig. 1. A handle or operating lever 36 is pivotally supported by the pin 17 which is mounted in the casing walls 12 and 13 and the forward ends of the inturned flanges 33 terminate at about the mid portion of the upper edge of the casing so as to permit a sufficient range of movement of the handle 36 about its pivot.

The casing walls 12 and 13 are provided with openings 37 for the fingers of the operator when he grasps the handle 36, to permit of convenient and forceful operation of such handle. The cover plates 32 are provided with cut out portions that have inturned flanges 38 which overlie those edges of the plates 12 and 13 that bound the openings 37, to provide a smooth and extended gripping surface for the fingers of the operator.

The tension spring 29 has its rear end secured to the rear end of the feed slide 23 and its forward end connected to an extension 40 of the lever 36, thereby normally holding the slide 23 in its forward position and the handle 36 in its upper position. When the feed slide is retracted by the plunger as hereinafter described, the spring 29 will advance the slide 23 upon disengagement of the plunger therefrom and cause the pawl 24 to advance the staple strip 26.

It will be obvious from an inspection of Figs. 1 and 2 that when the handle 36 is depressed to raise the plunger 50 for the next staple driving operation the spring 29 will be further extended, greatly increasing its tension so that if for any reason the feed

slide 23 should tend to stick or the staples to bind on the slide the increased tension on the spring will be easily sufficient to force the feed slide and staple strip forward. In fact due to the considerable movement of the extension 40 the spring 29 is sufficiently extended so that there is practically positive operation of the feed slide from the lever 36. Obviously this reduces to a minimum the liability of failure of the feed mechanism to advance the staple strip at the proper time. Also when the machine is at rest as shown in Fig. 1 the spring 29 is under a relatively moderate tension sufficient to hold the handle in its elevated position, but this tension is automatically increased by the operation of the handle so that it is greatest at the time of advancing the staple strip which is the time when the greatest tension is desired. The spring is thus less liable to failure due to breakage or becoming set, as it is under the greatest tension for only a short time.

A plunger housing 41 is secured to the forward end of the casing by means of a screw 42 that extends through the cover plates 32 and the casing walls 12 and 13. The rear vertical edges of the housing 41 abut against ears or lugs 43 (Figs. 1 and 6) that are struck outwardly from the plates 33 and serve to permit convenient alinement of those holes in the ears 58 of the housing and the plates 33 through which the screw 42 extends. The lower portion of the plunger housing 41 has its vertical edges flanged as shown at 44 in Fig. 4, which flanges lie behind complementally-formed flanges 57 at the forward vertical edges of the cover plates 32 and abut against the forward vertical edges of the plates 12 and 13, so that the flanged housing is rigidly held against displacement by thrusts in a horizontal direction during operation of the machine. The plunger housing 41 is provided with an offset shoulder portion 45 (Figs. 1 and 2) that serves as a seat for the lower end of a cushion spring 46. At a point above the spring 46, the housing 42 is provided in each side with a depression 47 (Fig. 3). The shoulders formed by the lower ends of these depressions serve as seats for the upper end of the spring 46, to limit upwardly expansive movement thereof, while the shoulders formed at the upper ends of the depressions 47 serve as seats to limit downwardly expansive movement of a power spring 48. The housing 41 is provided with a screw cap 49 that serves not only as a closure for the upper end of the housing but also as a means for adjustably compressing the spring 48.

It will be noted that the plunger housing 41 carrying the plunger 50 and the springs 48 and 46 is readily removable from the main casing after the screw 42 has been removed. This is shown in Fig. 11. After this screw has been removed the plunger housing 41 may be

lifted upwardly, as shown in dotted lines, which movement withdraws the flanges 44 of the plunger housing from behind the flanges 57 on the casing members 32. The attachment of the plunger housing with the elements carried thereby to the main casing merely involves the reverse movement and sliding of the flanges 44 on the plunger housing behind the flanges 57 of the casing by sliding them downwardly from the top until the screw openings 59 in the ears 58 are in alignment with the screw openings 60 in the casing so that the screw 42 may be inserted in position. Thus in effect the single screw 42 is the only detaching means which need to be manipulated in securing the plunger housing to the casing or removing it therefrom, but this screw and the flanges 44 and 57 rigidly secure the plunger housing in position at the front of the casing. Thus the plunger and its springs may be assembled in the housing independently of the feed and plunger retracting mechanisms, and may be removed for renewal or repair without disassembling these mechanisms or disturbing them in any way.

A plunger 50 is slidably supported within the housing 41 and has an enlarged spring seating portion 51 disposed between the adjacent ends of the springs 46 and 48.

In the operation of the device, the handle 36 is grasped by the hand of the operator, with his fingers extending through the hand hole 37, and depressed, thus bringing a trigger 53 which is pivotally mounted upon the lower extension of the handle into engagement with a shoulder 54 of the plunger 50, to cause the plunger to be elevated against the compression of the spring 48 as the handle is turned in a clockwise direction. The cushioning spring 46 will not follow the plunger in its upward movement, by reason of the shoulders at the lower ends of the depressions 47. Immediately after the parts have passed the positions shown in Fig. 2, the trigger 53 will pass from beneath the shoulder 54 and permit the plunger to be snapped downward by the spring 48, to the position shown in Fig. 1. During its downward movement, the lower end of the plunger will shear the foremost staple 26^a from the strip 26, since such staple projects beyond the forward end of the block 21, such block serving as a shear block. The plunger continues its downward movement under the action of the spring 48 to drive the staple through a tag that is to be attached to a packing case (not shown) or to drive it into any other object, or to cause it to pass through a number of sheets of paper and be clinched upon an anvil (not shown) in a manner well-known in the art. During this continued movement after shearing of a staple, a cam surface 55 on the plunger engages against the forward upturned end of the feed slide 23, to force the

same backward against the tension of the spring 29, as shown in Fig. 1, so that upon upward movement of the plunger, the slide 23 will be returned by the spring 29, to the position shown in Fig. 2, thus advancing another staple 26^a into shearing position. As a means for guiding the plunger and spacing it from the forward end of the block 21, I provide tooth-like projections 56 struck in from the plates 12 and 13 along which the inner surface of the plunger will slide as it descends.

In order that the force of the power spring 48 will be more indirectly transmitted to the material being operated upon, its downward or expansive movement is limited by the upper ends of the shoulders formed by the depressions 47, so that when the spring has expanded downwardly into contact with such shoulders, the plunger will have sufficient velocity to continue its movement and complete the operation of shearing and driving a staple. The cushioning spring 46 is engaged by the lower end of the enlargement 51 of the plunger, in cases where the plunger is actuated in the absence of an anvil or surface to be operated upon. This cushioning action serves to damper the movement of the plunger and thus avoids excessive shocks to the operating mechanism. The limiting of the expansive movement of the spring 48 also serves to eliminate the shocks which would otherwise be imparted to the mechanism.

When the lever 36 is released and permitted to turn in a counter-clockwise direction, under the influence of the spring 29, the pawl 53 will be carried downward past the vertical surface of the shoulder 54, to the position shown in Fig. 1, and a spring 57 urges the pawl 53 in a counter-clockwise direction about its pivot so that its outer end will be in position to engage beneath the shoulder 54 when the handle 36 is again depressed and thereby cause the plunger 50 to be elevated as above explained.

Referring now to Fig. 10, I show a structure wherein the strip-feeding mechanism and the plunger are of substantially the form shown in Figs. 1 and 2, but wherein the spring 29^b which corresponds to the spring 29 of Fig. 1 and the pawl 53^b which corresponds to the pawl 53, instead of being connected directly to the lever 36^b are connected to a cam lever 60 which is pivotally connected at its rear end to the casing. The handle 36^b has an extension 61 that carries a roller which coacts with a cam surface 62 on the lever 60, to rock the cam lever 60 in a clockwise direction, when the operating lever 36^b is depressed. This movement causes the pawl 53^b to be engaged beneath the shoulder 54 of the plunger 50 to elevate the same against the pressure of the spring 48, as above explained, in connection with Figs. 1 and 2, to such point that the pawl 53^b will pass from beneath the shoulder 54 and allow the plunger

to descend under the pressure of the spring. The spring 29^b serves to advance the feed slide 23 and to return the cam lever 60 to the position shown in Fig. 10 and thereby raise the operating lever 36^b to the position shown, through pressure of the cam surface 62 against the cam roller. In this arrangement, the lever structure 36^b is provided with an arcuate slot 63 in that portion which projects forwardly beyond the screw 43 by which the plunger housing is secured to the casing, so that movement of such projecting portion of the operating lever will not be obstructed by the screw.

The arrangement just described permits of so proportioning the lengths of the lever 60 and the extension 61 of the lever 36^b as to secure a desired length of elevating movement of the plunger through a given range of movement of the operating lever 36^b.

In addition to the advantages above enumerated, my device possesses the further advantage of being of light weight and cheaply manufactured, because the casing plates 12 and 13, cover plates 32, and the housing 41, may be stamped from sheet metal. The various other parts of the machine, such as the handle 36, the plate 18 and the slide 23 may also be stamped from sheet metal, instead of by casting.

I claim as my invention:—

1. Staple driving apparatus, comprising a main casing open at its front end, a plunger housing open at its rear side, means for detachably securing the housing to the casing, operating mechanism within the casing adapted to advance staples into the said housing, a plunger in the housing for operating upon the staples, and a driving connection between said mechanism and the plunger for actuating said plunger.

2. Staple driving apparatus, comprising a main casing open at its front end, a plunger housing open at its rear side, means extending through the rear portion of the housing and the front portion of the casing for detachably connecting the housing and casing together, interlocking flange connections between another portion of the housing and the casing to supplement said securing means, operating mechanism within the casing adapted to advance staples into the said housing, a plunger in the housing for operating upon the staples, and a driving connection between said mechanism and the plunger for actuating said plunger.

3. Staple driving apparatus comprising a feeding device for advancing a strip of staples to operative position, a shearing element for severing the foremost staple from the strip, a spring for operating said element, means for retracting said element against the action of said spring, means controlled by movement of said shear element past the shear point for moving backward said feed-

ing device, and means operated by said retracting means for advancing said feeding device.

4. Staple driving apparatus, comprising a reciprocable feed device for advancing a strip of staples to operative position, a plunger for shearing the foremost staple from the strip, power means for operating said plunger, means for retracting the plunger against the action of the power means, a cam surface on said plunger for moving the said feeding device to retracted position at the completion of a shear operation, and means connected to the plunger retracting means for yieldably advancing said feeding device when the plunger has been moved to retracted position.

5. Staple driving apparatus comprising a reciprocable feed slide for advancing staples, a plunger for driving the foremost staple, a spring for imparting a driving force to said plunger, an operating lever having a trigger connection with said plunger to move the same to retracted position against the compressive force of said spring, a tension connection between said lever and said slide that normally tends to hold the lever in extended position and to hold the slide in advanced position, and means for effecting retractive movement of said slide when the plunger moves to advanced position.

6. Staple driving apparatus comprising a reciprocable feed slide for advancing staples, a plunger for driving the foremost staple, a spring for imparting a driving force to said plunger, an operating lever having a trigger connection with said plunger to move the same to retracted position against the compressive force of said spring, a tension connection between said lever and said slide that normally tends to hold the lever in extended position and to hold the slide in advanced position, and a cam surface on said plunger in position to engage the forward end of the slide to move it to retracted position during movement of the plunger to advanced position.

7. Staple driving apparatus comprising means for advancing staples to operative position, a plunger for driving the staples, a spring, means for moving the plunger to retracted position against the compressive force of said spring and for thereupon releasing said plunger, a cushioning device in position to be engaged by said plunger as it approaches its extreme position of advancing movement, and stop means for limiting the expansive movement of the spring to permit the plunger to have advancing movement independent thereof, previous to its engagement with the cushioning device.

8. Staple driving apparatus comprising means for advancing staples to operative position, a plunger for driving the staples, a spring, means for moving the plunger to re-

tracted position against the compressive force of said spring and for thereupon releasing said plunger, a cushioning device disposed in axially-spaced relation to said spring, in position to be engaged by the plunger as it approaches its extreme position of advancing movement, and stop means for limiting the expansive movement of said spring to permit the plunger to have advancing movement independently thereof, previous to its engagement with the cushioning device.

9. Staple driving apparatus comprising means for advancing staples to operative position, a plunger for driving the staples, a spring, means for moving the plunger to retracted position against the compressive force of said spring and for thereupon releasing said plunger, a second spring disposed in axially-spaced relation to the first-named spring, in position to be engaged by the plunger as it approaches its extreme position of advancing movement, stop means for limiting the expansive movement of the first-named spring, to permit the plunger to have advancing movement independently thereof, previous to its engagement with the second spring, and means for limiting the expansion of the second spring, whereby the plunger is permitted movement independently of either spring at a point intermediate the ends of its path of travel.

10. Staple driving apparatus comprising means for advancing staples to operative position, an element for operating upon said staples, a power device for actuating said element, a cushioning device for said element, and means for causing said element to pass out of control of said power device previous to engagement thereof with the said cushioning device.

11. Staple driving apparatus, comprising a plunger casing of sheet metal open at its rear side, a casing of sheet metal having plates with inturned flanges that abut against one another when said plates are held in assembled relation, means for detachably connecting the rear edges of the said housing and the front edges of said plates, a plunger having sliding movement within the said housing, and mechanism within said casing for actuating said plunger.

12. The combination with staple driving apparatus, of a casing therefor having side walls with hand-hole openings extending therethrough, a cover plate for each of the side walls, having an inturned flange which overlies that portion of the adjacent side wall which defines the said opening, and means for securing said cover plates in position.

13. In staple driving apparatus, a plunger housing composed of sheet metal open at its rear side, a movable plunger mounted in said housing, power means in the housing for

operating the plunger, a sheet metal casing open at its front end, means in the casing for operating the plunger against the action of said power means and means for detachably securing the rear edges of the housing to the front edges of the said casing.

14. Staple driving apparatus comprising a movable feed device for advancing staples to driving position, a spring normally under tension for advancing said device, a plunger for driving the foremost staple, a spring for operating the plunger, means for retracting the plunger against said spring, and a connection from said means to the feed spring to further tension said spring on operation of said means.

15. Staple driving apparatus comprising a reciprocable feed device for advancing the staples to driving position, a spring for advancing said device, a plunger for driving the foremost staple, a spring for operating the plunger, a lever for retracting the plunger against said spring, a connection from the lever to the feed spring arranged to tension said spring on operation of the lever, and means operated by the plunger for retracting said feed device.

16. Staple driving apparatus comprising a reciprocable feed device for advancing the staples to driving position, a spring for advancing said device, a plunger for driving the foremost staple, a spring for operating said plunger, means for retracting the plunger against said spring and connected to the feed spring to increase the tension on said spring as the lever is operated, and means operated by driving movement of the plunger to retract the feed device.

17. Staple driving apparatus comprising a movable feed device for advancing the staples, a plunger for driving the foremost staple, a spring for imparting a driving force to said plunger, an operating lever to retract the plunger against the action of said spring, and a spring connection between said lever and said feed device that normally tends to hold the lever in extended position and to hold the feed device in advanced position.

18. Staple driving apparatus comprising a plunger housing, a movable plunger mounted in said housing, a spring in the housing for operating the plunger, a casing, means for detachably securing the housing to the casing, and means in the casing for retracting the plunger against the action of said spring.

19. Staple driving apparatus comprising a plunger housing, a movable plunger in the housing, a spring for advancing the plunger, a casing, means for detachably securing the housing to the casing, means in the casing for feeding staples into the housing to be driven by said plunger, and means in the casing to retract the plunger against the action of said spring.

20. Staple driving apparatus comprising a plunger housing, a movable plunger in said housing, a casing having upright spaced flanges at the lower part of its forward end, 5 said housing being provided with flanges to slide behind those of the casing, means cooperating with the flanges to detachably secure the housing to the casing, and means in the casing to feed staples into position to be 10 driven by the plunger.

21. In staple driving apparatus a plunger housing open at its rear side, a movable plunger mounted in said housing, a casing provided with spaced flanges at its front end, 15 said housing having a portion slidable behind said flanges, means for operating the plun-

ger, and means for detachably securing the housing to the casing.

22. In staple driving apparatus, an upright plunger housing open at its rear side, 20 a staple driving plunger in said housing, a spring for driving the plunger, a casing open at its forward end and provided with upright flanges, said housing having a portion slidable behind said flanges, means for detach- 25 ably securing the housing to the casing, means in casing for retracting the plunger against said spring, and feeding means in the casing to feed the staples to driving position.

In testimony whereof I, the said JOSEPH J. 30 SZEPE, have hereunto set my hand.

JOSEPH J. SZEPE.