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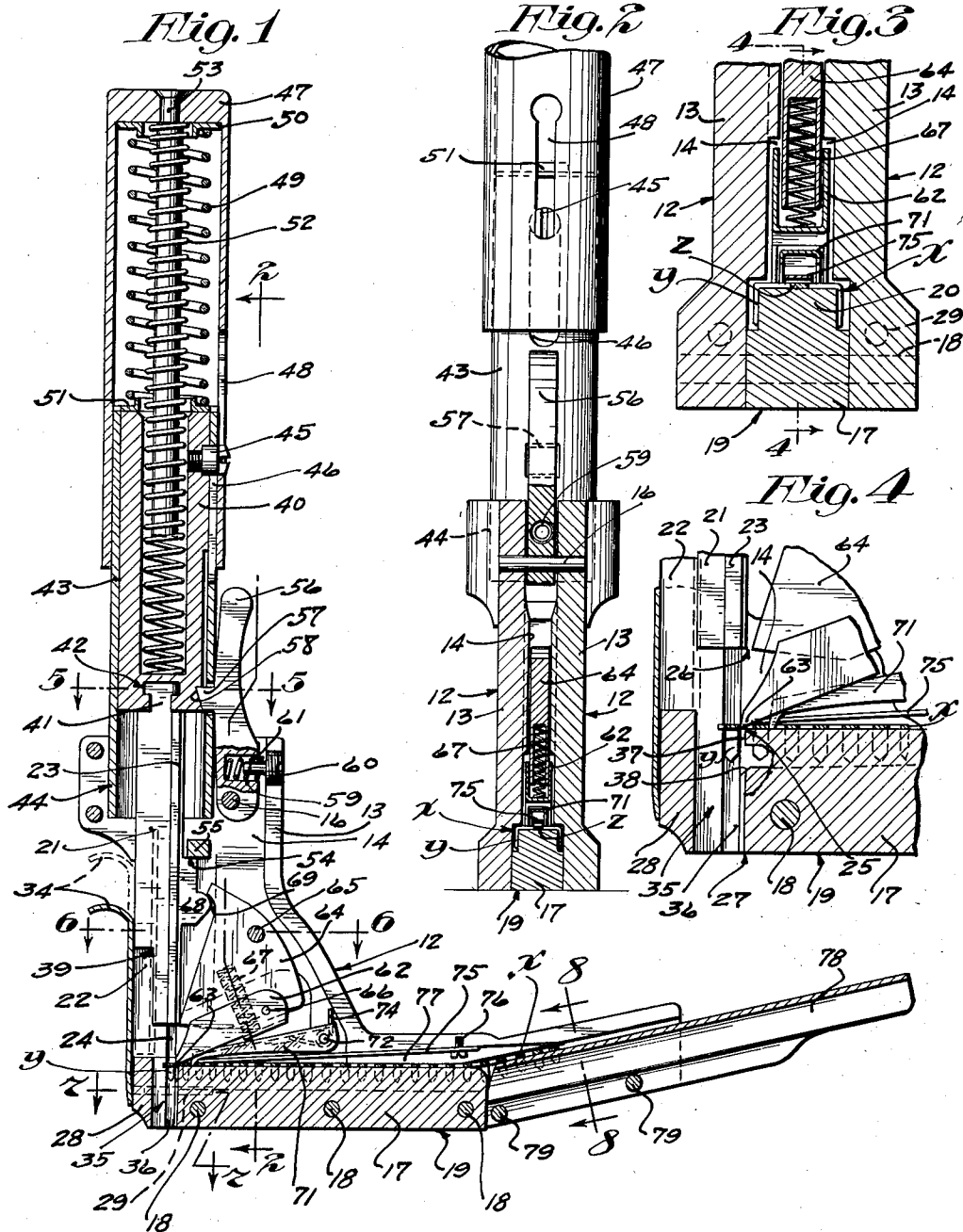
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STAPLING MACHINE

Filed Aug. 27, 1931

2 Sheets-Sheet 1



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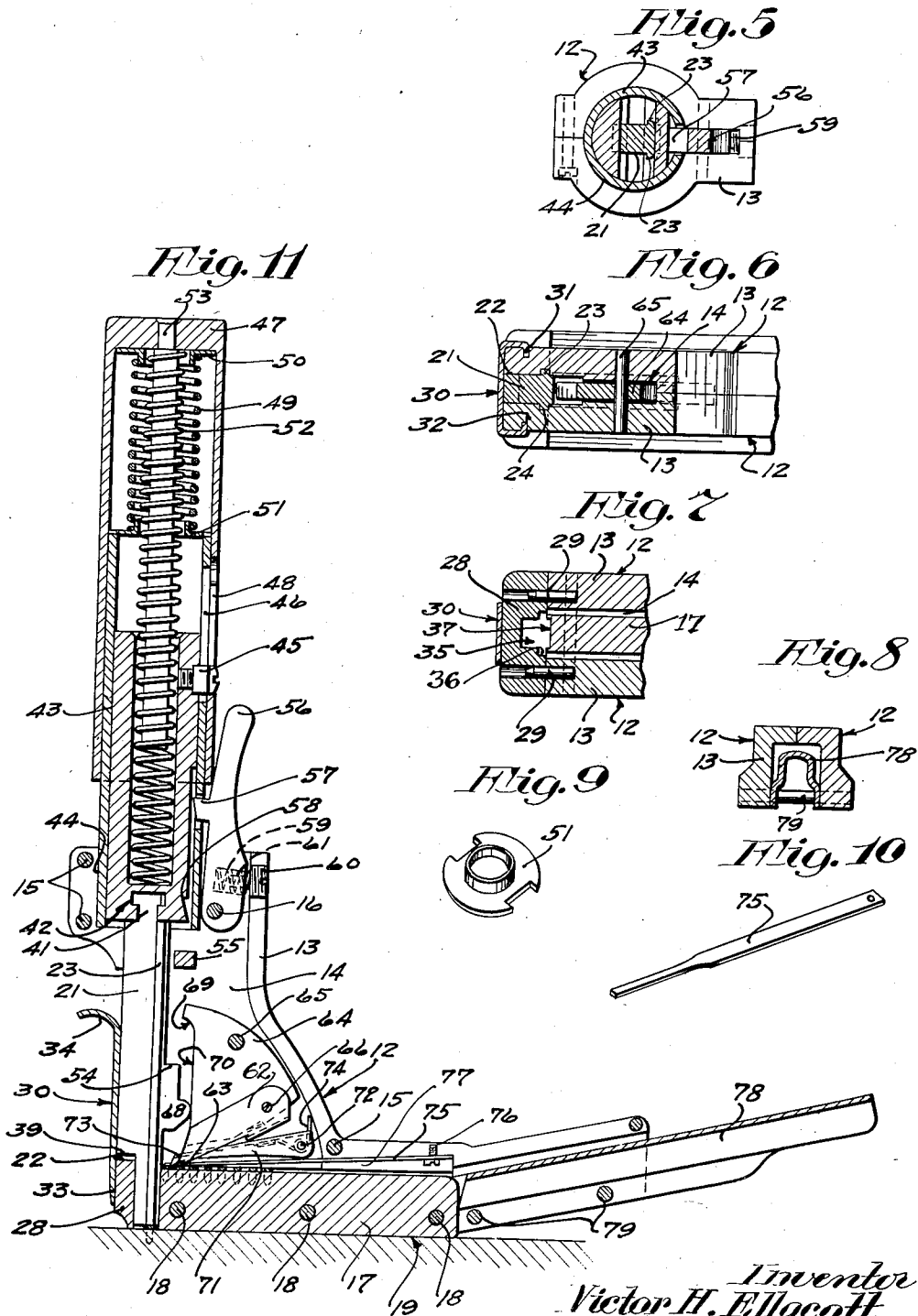
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UNITED STATES PATENT OFFICE

1,943,661

STAPLING MACHINE

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Application August 27, 1931. Serial No. 559,641

9 Claims. (Cl. 1—48)

This invention relates to stapling machines and more particularly to such machines using staples formed into strips but especially well adapted for securing tags on boxes and the like.

One of the objects of this invention is to provide a stapling machine adapted to be manually operated to first cause a staple to be cut from a staple strip, and then cause the prongs of the severed staple to be forced through the tag and into the material of the container for the purpose of securely holding the tag in place.

It is a further object of this invention to provide a machine of simplified and rugged construction that will stand up against the abuse that it is often subjected to.

A still further object of this invention is to provide instant means for exposing the front portion of the staple chamber in case a staple therein should prove to be defective and jammed in the machine.

Another important object of this invention is to provide a stapling machine that may be readily held in one hand, while the other hand is used for holding tags or cards in position to be fastened to wooden crates, containers, and the like, or for holding paper lining in position to be secured to freight cars, and manually-operated to sever the staples from the staple strip and drive the prongs thereof through the tags, cards, paper lining or other material, and into the object on which they are held for securing the same thereto.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

To the above end, generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a view of the improved stapler partly in elevation and partly in longitudinal section;

Fig. 2 is a fragmentary view partly in rear elevation and partly in section taken substantially on the irregular line 2—2 of Fig. 1;

Fig. 3 is a view corresponding to Fig. 2 but showing only the lower end portion thereof, on an enlarged scale;

Fig. 4 is a fragmentary detail view with some parts sectioned on the line 4—4 of Fig. 3;

Figs. 5, 6, 7 and 8 are detail views with some

parts sectioned on the lines 5—5, 6—6, 7—7 and 8—8, of Fig. 1, respectively, on an enlarged scale;

Fig. 9 is a perspective view of the spring base removed from the machine;

Fig. 10 is a perspective view of the staple strip presser device removed from the machine; and

Fig. 11 is a view corresponding to Fig. 1 but showing the stapler operated to produce its cutting and driving action.

The numeral 12 indicates the body of the improved stapler which, as shown, comprises a pair of side plates 13, the opposing faces of which are recessed to form a housing 14 for certain of the parts of the stapler, as will hereinafter appear. These side plates 13 are detachably but rigidly connected by a plurality of screws 15 and a single pin 16. Fitted between the side plates 13 at the bottom of the body 12 is a longitudinally extended staple supporting bar 17 rigidly secured by pins 18 to said side plates.

The bottom edges of the side plates 13 and the bottom of the bar 17 are flush and afford a shoe or presser foot 19 that directly engages a card, a piece of paper or the like and presses the same onto the objects to which they are to be secured by staples, said presser foot being free to slide thereon from one stapling position to another. The side plates 13 rearward of the bar 17 and the presser foot 19 are outwardly and rearwardly inclined so as to permit said presser foot to rest flat within a relatively small depression or recess in which it may be placed.

The upper portion of the bar 17 is shaped to form a guide-way 20 for supporting a staple strip X with freedom for longitudinal sliding movement thereon. The individual staples Y which form the strip X are connected together at the centers of their transverse portions by short necks Z which, together with said transverse portions, form the body of the staple strip X. By reference to Fig. 3 it will be noted that the body of the staple strip X rests on the top of the guide-way 20 while the prongs of the staples Y extend into channels formed by the guide-way 20, engage the sides of said guide-way and hold said strip against lateral shifting movement thereon. It will also be noted that the prongs of the staples Y are out of contact with the sides of the plates 13 and their points are out of contact with the bottoms of the channels into which said prongs extend.

A plunger 21 is mounted in a guide-way 22 formed by the opposing faces of the side plates 13 and at the front of the body 12. On the sides of the plunger 21, at the inner face thereof, is a

pair of longitudinally extended ribs 23 that slidably work in guide channels 24 in the opposing faces of the side plates 13 and hold said plunger for straight line sliding movement perpendicular to the guide-way 20 with its outer face flush with the outer edges of said side plates. The front end of the bar 17 is substantially in the plane of the inner face of the plunger 21 and its upper edge affords a cutting edge 25 and the inner face of the plunger, at its lower end, affords a cutting edge 26 which cooperates with the cutting edge 25, see Fig. 4, when the plunger 21 is depressed to sever the strip X midway between the first two staples Y.

A displaceable chamber block 28 is detachably applied to the side plates 30 by a pair of parallel pins 29 and forms a forward extension of said plates. These pins 29 are anchored in the side plates 13, extend into bores in the block 28, and normally support said block with freedom for removal from the device by sliding movement longitudinally of the guide-way 20. When the block 28 is removed from the device it permits inspection of the front or cutting end of the bar 17 as well as the adjacent end of the guide-way 20 and permits the removal of a defective staple or the entire staple strip X by a forward movement longitudinally of the device. The joint between the side plates 13 and the block 28 is indicated by the numeral 27, see Fig. 4.

A gate lock 30 is provided for holding the chamber block 28 against outward movement on the pins 29 and yieldingly presses the same against the side plates 13. This gate lock 30 is in the form of a U-shaped plate the wide transverse portion of which slidably engages the front edges of the side plates 13 and the side members of which overlap the body 12 and are slidably interlocked therewith by tongue and groove connections.

The tongues 31 of said connections are formed on the inner longitudinal edges of the side members of the lock 30 and the grooves 32 of said connections are formed in the side plates 13. Formed with the lower end of the lock 30 is a wide depending spring finger 33 which normally extends in front of the block 28, yieldingly bears thereagainst, and holds said block pressed inward against the side plates 13. On the upper end of the lock 30 is a finger piece 34 by which the lock 30 may be slid to and from an operative position. The gate lock 30 performs another important function in that it forms a guard for the reciprocatory plunger 21.

The staples Y forming the strip X are successively positioned in a staple chamber 35 in the block 28 under the plunger 21, as will presently appear. Formed in the opposing walls of the staple chamber 35 are channels 36 for the prongs of the staple Y to be severed from the strip X and which channels form continuations of the guide channels 24. The guide-way 20 leads directly into the staple chamber 35 in which the outermost staple Y, to be severed from the strip X by the plunger 21, is positioned by the feeding mechanism for the strip X, as will presently appear, with its prongs in the channels 36 and its body, midway between the two outermost staples Y at the cutting edge 25.

By reference to Fig. 7 it will be noted that the outer end of the bar 17, at the cutting edge 25, is recessed at 37 so as to cut the body of the staple strip X midway between the two outermost staples Y and with the prongs of the outermost staple Y in the channels 36. The bottoms of the channels formed by the guide-way 20 are down-

wardly beveled into the channels 36, as indicated at 38, see Fig. 4, so that in case the outermost staple Y is positioned with its prongs not fully in the channels 36 the pointed ends thereof will engage the beveled surfaces 38 as said staple is cut from the strip X and direct said prongs into the channels 36. It is important to note that the channels 36 are formed entirely in the inner face of the block 28 and that the inner sides thereof are formed by the outer end of the bar 17.

It will thus be seen that when the block 28 is removed from the body 12 the outermost staple Y will be exposed and can be removed from the stapler as well as the entire strip X by a forward sliding movement thereof.

The outer and lower end portion of the plunger 21 is notched at 39 so as to enter the staple chamber 35 during its projecting movement and which chamber is shaped to guide the same.

A cylindrical ram 40 is detachably secured to the upper end of the plunger 21 by a separable connection comprising a T-head 41 on the outer end of said plunger and a T-slot 42 in the inner end of the ram 40. This ram 40 is mounted in a tubular extension 43 the inner end of which is fitted in a cylindrical seat 44 therefore in the two side plates 13 which are frictionally clamped thereon by certain of the screws 15 and the screw 16. The members 41 and 42 of the separable connection are held interlocked by the mounting of the plunger 21 and the ram 40 in the machine and are separable only by relative lateral movements of the plunger 21 and the ram 40 when removed from the machine. This separable connection 41-42 permits independent self-alignment of the plunger 21 and ram 40 in the machine in a lateral direction longitudinally of the tool.

The ram 40 is held from turning about its axis in the extension 43 but with freedom for reciprocatory movement therein by a radial screw 45, the head of which works in a longitudinally extended slot 46 in said extension.

A tubular hand piece 47 having a closed outer end is telescoped onto the extension 43 and is held from turning about its axis therein by the head of the screw 45 which projects into a longitudinally extended slot 48 in said hand piece. That portion of the head of the screw 45 in the slot 48 is flattened on opposite sides for contact with the walls of the slot 48 to hold the screw 45 from turning in the ram 40 with which it has screw-threaded engagement. The outer end of the slot 48 is enlarged for the removal of the screw 45 from the ram 40.

A coiled compression spring 49 within the hand piece 47 normally and yieldingly holds said hand piece in its outermost position. One end of the spring 49 reacts against a spring cap 50 on the closed outer end of the hand piece 47 and the other end of said spring rests on a spring base 51 on the outer end of the extension 43. The engagement of the hand piece 47, at the inner end of its slot 48, with the head of the screw 45 limits the projecting movement of said hand piece on the extension 43 under the action of the spring 49.

A long propelling spring 52 extends axially through the spring 49, spring cap 50, spring base 51, and a deep bore in the ram 40. The outer end of the propelling spring 52 reacts against the closed outer end of the hand piece 47 as a base of resistance and its inner end bears against the closed inner end of the ram 40.

A long guide pin 53 for the propelling spring 52 is anchored at one end to the closed outer end of

the hand piece 47 and extends axially into said spring. Normally there is sufficient clearance between the inner end of the guide pin 53 and the closed inner end of the ram 40 to permit the required movement of said hand piece on the extension 43 to place the propelling spring 52 under compression, see Fig. 1.

In addition to the engagement of the screw 45 with the extension 43, to limit the retracting movement of the ram 40 and plunger 21, said plunger is provided with a stop shoulder 54, see Figs. 1 and 11, arranged to engage an abutment 55 in the housing 14 and which abutment, as shown, is a lug on one of the side plates 13.

As previously stated, the engagement of the hand piece 47 with the screw 45 limits the projecting movement of said hand piece by the spring 49. The outward pull of the hand piece 47 on the screw 45, produced by the spring 49, also normally and yieldingly holds the ram 40, and hence, the plunger 21 retracted. This retracting movement of the ram 40 and plunger 21 is limited by the engagement of the screw 45 with the extension 43 at the outer end of its slot 46.

A trip lever 56, having a dog 57 which normally engages a ratchet tooth 58 in the outer side of the ram 40 at the lower end thereof, is provided for holding said ram and the plunger 21 during the compression of the propelling spring 52 by the inward movement of the hand piece 47 on the extension 43.

The trip lever 56 extends substantially parallel to the axis of the extension 43 with its inner end portion in the housing 14 and is pivoted on the pin 16 for oscillatory movement toward and from said extension. The dog 57 is formed on the inner longitudinal edge of the lever 56, intermediate of its ends, and works through a slot in the extension 43. A coiled spring 59 mounted in a deep seat in the back of the lever 56 engages a screw plug 60 as a base of resistance and yieldingly holds said lever with the dog 57 in engagement with the tooth 58. The screw plug 60 closes a passageway in the back of the body 12 for the spring 59. Formed with the screw plug 60 is a guide pin 61 for the spring 59 which extends axially therein.

The outer end portion of the trip lever 56 is arranged to be engaged by the inner end of the hand piece 47, during its telescopic movement inward on the extension 43 to compress the propelling spring 52 and pivotally move said lever away from the extension 43 and draw the dog 57 out of engagement with the tooth 58 at the limit of said telescopic movement of the hand piece 47. At the time the dog 57 releases the ram 40 the compressed spring 52 becomes active and projects said ram and the plunger 21 causing the cutting edge 26 as it passes the cutting edge 25 to cut the staple Y in the chamber 22 and the strip X. The cut staple Y is moved by the plunger 21 in advance thereof and guided by the channels 24 and 36, in which its prongs extend, to the object into which it is to be driven by said plunger.

The manual movement of the hand piece 47 to compress the spring 52 also places the propelling spring 52 under tension and after the pressure on said hand piece is released, at the completion of the shearing and driving operation of the plunger 21, the compressed spring 49 will project said hand piece which, by its engagement with the screw 45, will retract the ram 40 and plunger 21. During the retracting movement of the hand piece 47 the ram 40 has moved out of engagement with the trip lever 56 which is actuated by the com-

pressed spring 59 to project the dog 57 into operative relation with the ratchet tooth 58.

Steps of endwise movement are automatically imparted to the staple strip X by a spring-pressed feed dog 62 to successively position the staples Y to be sheared from said strip and driven by the plunger 21. This feed dog 62 is channel-shaped in cross-section and provided with a pair of laterally spaced teeth 62 arranged to successively engage the staples Y one on each side of the body of the staple strip X. Said feed dog 62 is carried by a cam block 64 pivoted at 65 to the side plates 13 within the housing 14 and gravity suspended therefrom for oscillatory movement toward and from the plunger 21. The bottom portion of the cam block 64 extends between the sides of the feed dog 62 and said sides are pivoted thereto, as indicated at 66, and support said dog therefrom with its teeth 63 projecting toward the plunger 21.

A coiled spring 67 mounted in a seat in the under edge of the cam block 64 reacts against the transverse portion of the feed dog 62 and yieldingly holds its teeth 63 in engagement with the staple strip X with freedom to ride over the transverse portions of the staples Y during the feeding of said strip. The cam block 64 is reciprocated by a cam lug 68 on the back of the plunger 21. This cam lug 68 is arranged to engage a cam shoulder 69, on the front upper corner of the cam block 64 during the retracting movement of the plunger 21, and swing the cam block 64 forward to impart the operative stroke to the feed dog 62 and cause the same to slide the staple strip X on its guide-way 20 and position the foremost staple Y in shearing and driving position. During the shearing and driving movement of the plunger 21 the movement of the cam lug 68 is reversed, moves away from the cam shoulder 69 and over a cam surface 70 on the front edge of the cam block 64 and swing said block rearward to cause the dog 62 to ride over the second staple Y from the cutting edge 25 and engage the rear edge thereof, see Fig. 11.

To prevent the strip of staples X from being moved rearward during the retracting movement of the dog 62, as the same rides thereover, there is provided a holding dog 71 pivoted at 72 to the side plates 13 below the feed dog 62 with its free end portion extending between the teeth 63 and forward thereof. This holding dog 71 is in the form of an inverted channel, the free end portion of which is bifurcated and shaped to form a pair of laterally spaced teeth 73. These teeth 73 are arranged to successively engage the rear edges of the staples Y on each side of their neck Z. A spring 74 yieldingly holds the dog 71 with its teeth 73 in engagement with the staple strip X. During the feeding of the staple strip X the teeth 73 will successively ride over the staples Y and engage the rear edge of the first staple Y rearward of the cutting edge 25.

A pressure device in the form of a leaf spring 75 is provided for holding the staple strip X pressed onto the top of the guide-way 20. This spring 75 is attached at its rear end to the body 12, as indicated at 76, and its forward or free end portion yieldingly bears on the top of the staple strip X. A seat 77 is formed in the body 12 for the rear end portion of the spring 75 and holds said spring against edgewise movement and under the desired tension on the staple strip X. By reference to Fig. 11 it is important to note that the free end of the spring 75 terminates close to the cutting edge 25 and prevents the last staple of a strip from tipping and jamming the machine

as the same is fed by the dog 62 into the staple chamber 35.

To increase the staple strip holding capacity of the machine the guide-way 20 is provided with a rear extension 78 the front end portion of which extends into the inclined rear end portion of the body 12, has the same inclination, and is rigidly secured thereto by a pair of pins 79.

In case a staple Y jams in the staple chamber 35 it is only necessary to remove the chamber block 28, which is released simply by sliding the lock 30 into an inoperative position, to expose the jammed staple which may be readily removed. If it is necessary to adjust the staple strip X in respect to the dogs 62 and 71 the same may be drawn forward from the guide-way 20 before the chamber block 28 is replaced and again inserted into the machine from the rear thereof. This removing and replacing of the chamber block 28 is accomplished without the use of tools and with very little work and loss of time.

The connection 41-42 while rigidly holding the plunger 21 and ram 40 against relative endwise movement permits easy separation of these elements when removed from the machine and, as previously stated, also permits independent self-alignment of said plunger and ram in a lateral direction longitudinally of the tool and thereby prevents binding in case the ways in which they are mounted and guided are not in true alignment. This connection 41-42 also permits independent formation of the plunger 21 and ram 40 and the tempering of the plunger 21 for the peculiar work it is required to perform, to wit: the shearing of the staples from the strip and the driving of the same. In case the plunger 21 becomes worn a new one may be readily substituted therefor.

The elements 62, 64, 71 and 75 are of a rugged structure so as to withstand the work they are required to perform and the mounting and nesting thereof keeps the same in proper relation and alignment for action on the staple strip X to insure an even and accurate feed thereof.

From the above description the stapling machine may be easily held and manipulated by the use of one hand while the other hand holds the objects or materials to be secured in position by staples cut and driven by the machine.

What I claim is:

1. In a machine of the class described, a body having an enclosed staple chamber and a staple strip guide-way leading thereto, means for feeding a staple strip on the guide-way to successively position the staples comprising said strip in the staple chamber, mechanism including a plunger for cutting the staples from the strip as they are successively positioned in the staple chamber and for driving the same, said body having an open guide-way for the plunger and also having a displaceable section mounted thereon for sliding movement to and from normal position, and a sliding lock on the body for holding the displaceable section in normal position and affording a guard for the open guide-way for the plunger.

2. In a machine of the class described, a body having a staple strip guide-way, mechanism including a cutting edge for cutting staples from the staple strip and for driving the same, means comprising a pivoted cam block actuated by the cutting mechanism and a pair of laterally spaced feed dogs carried by the cam block for feeding the staple strip to said mechanism, a pair of laterally spaced holding dogs mounted on the

body for holding the staple strip against rearward movement, and a spring pressure device extending longitudinally between the feeding dogs and the holding dogs of each pair and anchored at its rear end to the body with its free end portions constantly resting on the staple strip and with its front end closely positioned to the cutting edge.

3. In a machine of the class described, a body having a staple strip guide-way and an upstanding tubular extension, a reciprocatory ram mounted in the body extension, a tubular hand piece telescoped onto the body extension, a compression spring in the hand piece normally holding the same retracted, a propelling spring for the ram reacting against the hand piece as a base of resistance, mechanism including a plunger carried by the ram for cutting the staples from the staple strip and for driving the same, means actuated by the plunger for feeding the staple strip to said mechanism, and a dog-equipped lever on the body normally holding the ram against the action of its propelling spring during the compression thereof by the hand piece during its projecting movement, said lever being constructed and arranged to be operated by the hand piece during its projecting movement to release the ram.

4. The structure defined in claim 3 which further includes a fixed stud on the ram and a slot in the body extension into which said stud projects and holds the ram against turning movement in the body extension and limits its retracting movement.

5. The structure defined in claim 3 which further includes a fixed stud on the ram and slots in the body extension and the hand piece into which the stud projects and holds the ram and the hand piece against relative turning movement and with respect to the body extension.

6. The structure defined in claim 3 which further includes a screw-stud on the ram and slots in the body extension and the hand piece into which the stud projects and holds the ram and hand piece against turning movement with respect to each other and the body extension, the slot in the hand piece having an enlarged portion for the passage of the screw-stud therethrough, said screw-stud having a flat surface which engages the hand piece at its slot and holds the stud from turning except when in the enlarged portion of the slot and hand piece.

7. In a machine of the class described, a body having a staple strip guide-way and an upstanding tubular extension, a reciprocatory ram mounted in the body extension, a tubular hand piece telescoped onto the body extension, the outer end of the hand piece being closed, a spring base seated on the outer end of the body extension, a spring cap seated on the closed outer end of the hand piece, a compression spring in the hand piece between the spring base and cap, said spring base and cap having axial passageways and said ram having in its outer end an axial bore, a guide pin anchored at one end to the closed end of the hand piece and extending through the passageways in the spring base and cap and into the bore in the ram, a propelling spring encircling the guide pin for compression between the closed end of the hand piece and the ram at the bottom of its recess, mechanism including a plunger carried by the ram for cutting staples from the staple strip and for driving the same, means actuated by the plunger for feeding the staple strip to said mechanism, and a dog-equipped lever on the body normally holding the

ram against the action of its propelling spring during the compression thereof by the hand piece during its projecting movement, said lever being constructed and arranged to be operated by the hand piece during its projecting movement to release the ram.

8. In a machine of the class described, a body having a passageway, a staple driving plunger mounted for movement into the passageway, said body being transversely divided through its passageway, the sections of the body being detach-

ably connected with freedom for relative longitudinal separating movement, and a slide mounted on one of the sections of the body and normally projecting in the path of movement of the other section of the body.

9. The structure defined in claim 8 in which the slide is channeled and has on its side members flanges that work in grooves in the respective section of the body.

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