

Aug. 15, 1944.

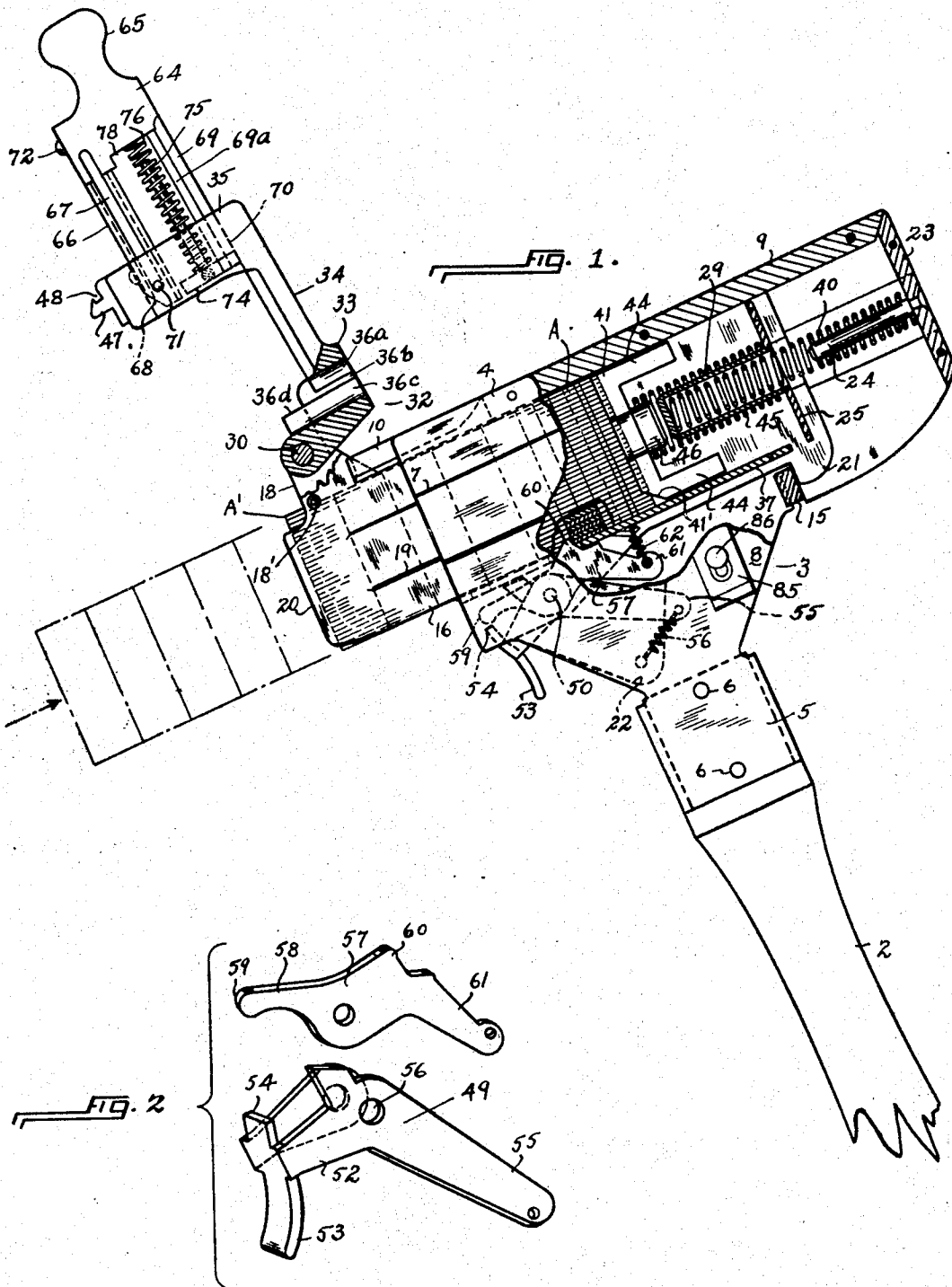
D. R. LA PLACE

2,355,807

STAPLING DEVICE

Filed April 2, 1941

5 Sheets-Sheet 1



INVENTOR

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Aug. 15, 1944.

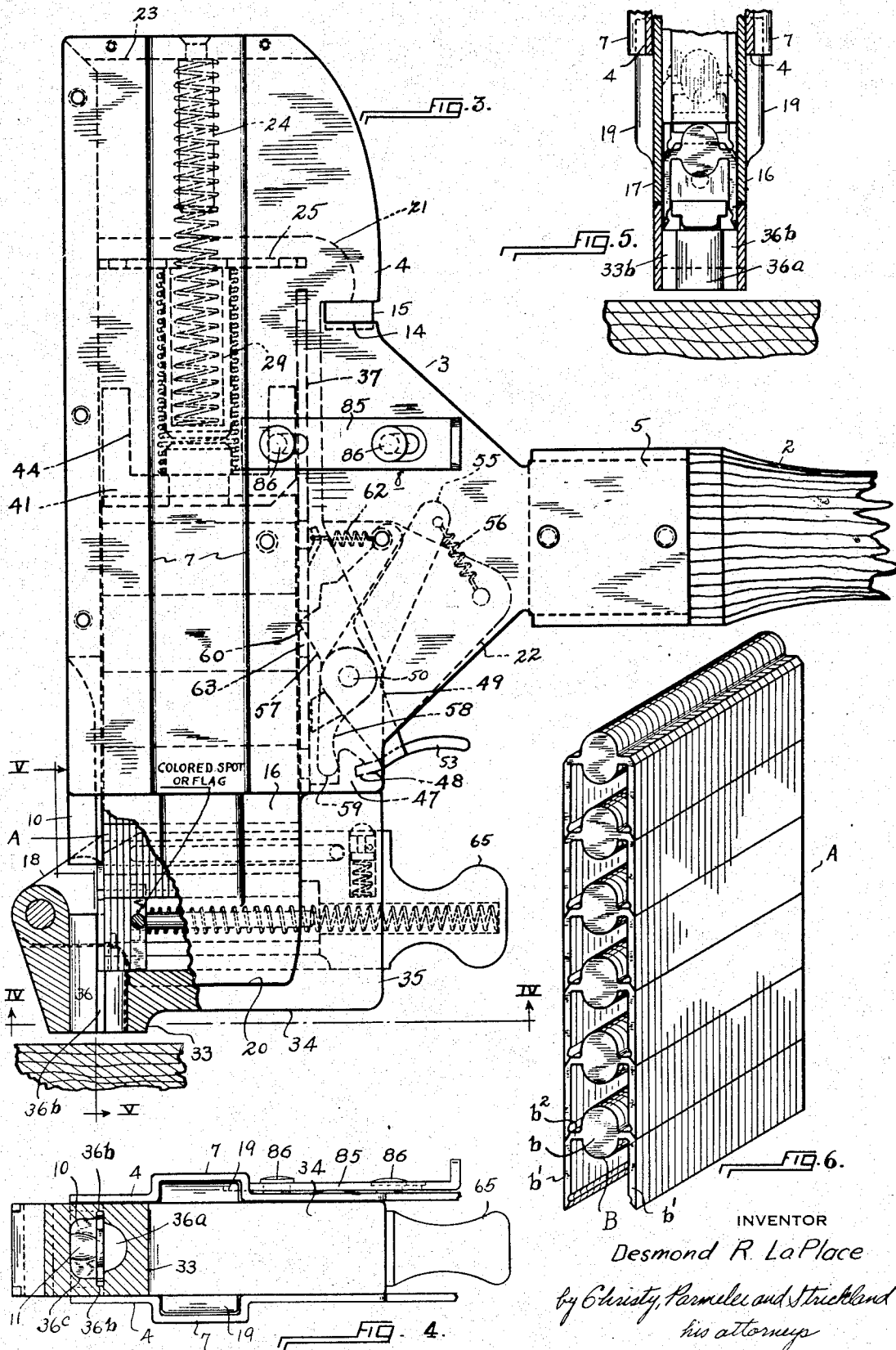
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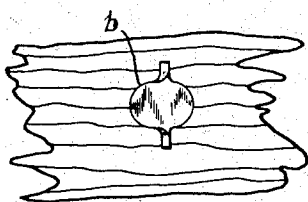


FIG. 9.

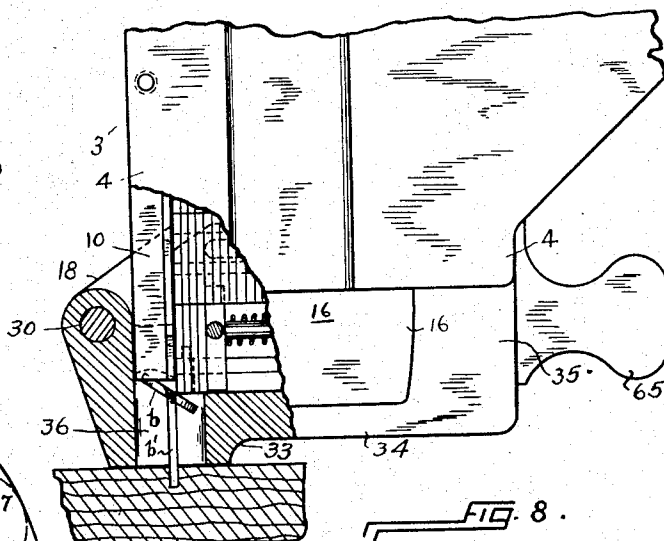


FIG. 8.

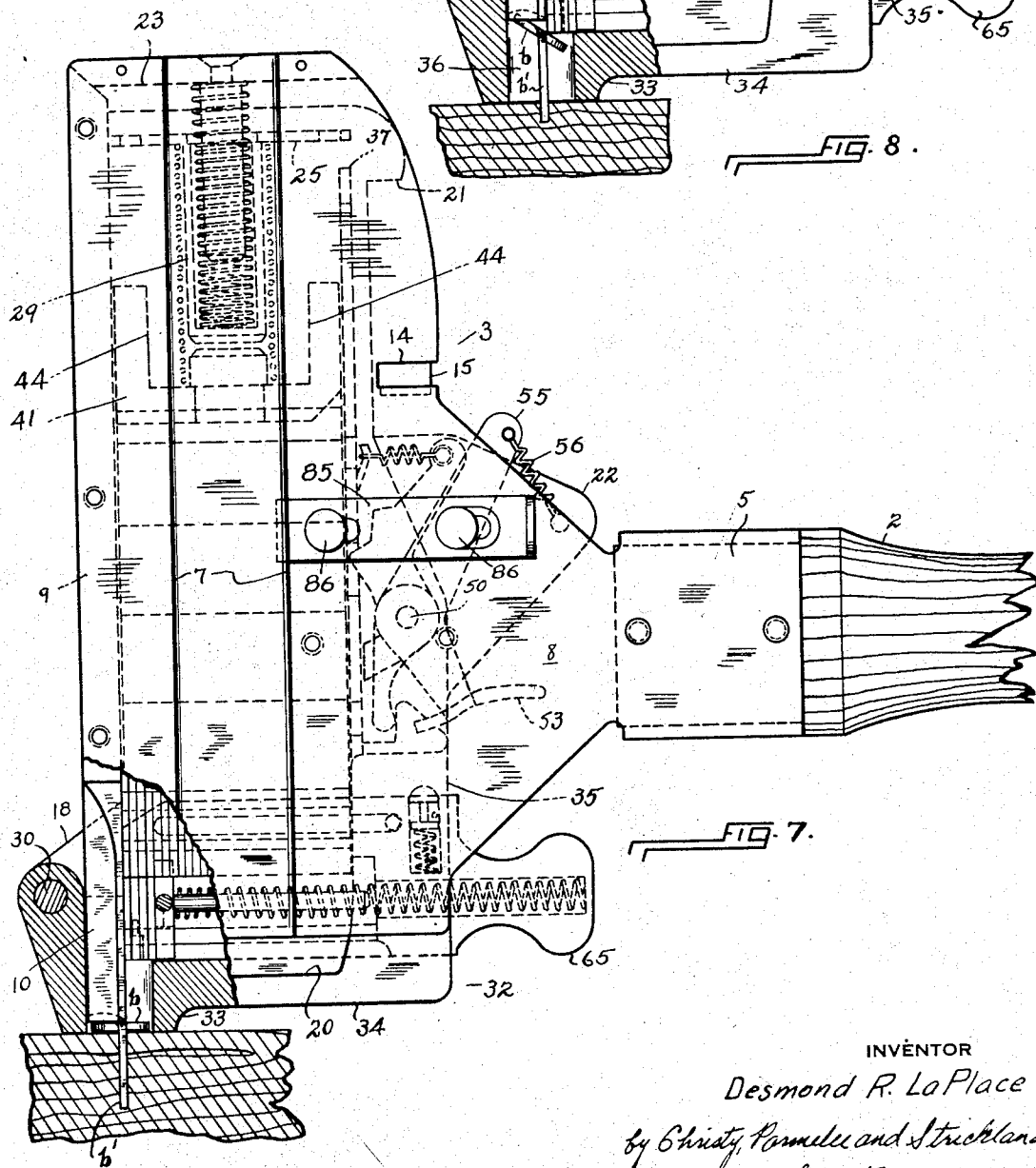


FIG. 7.

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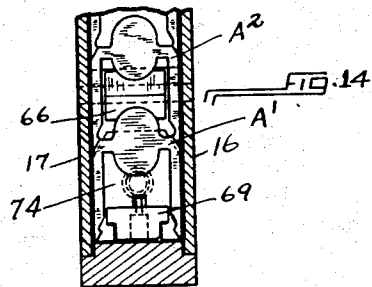
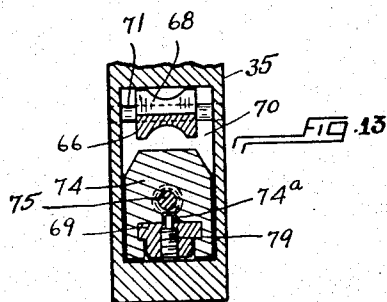
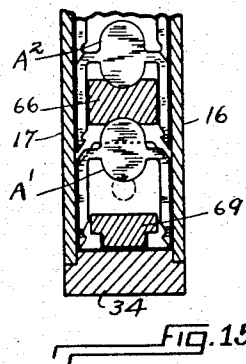
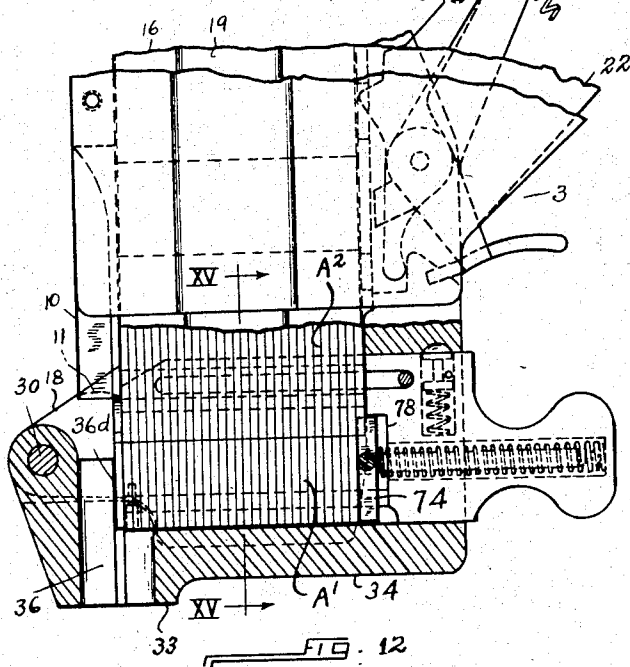
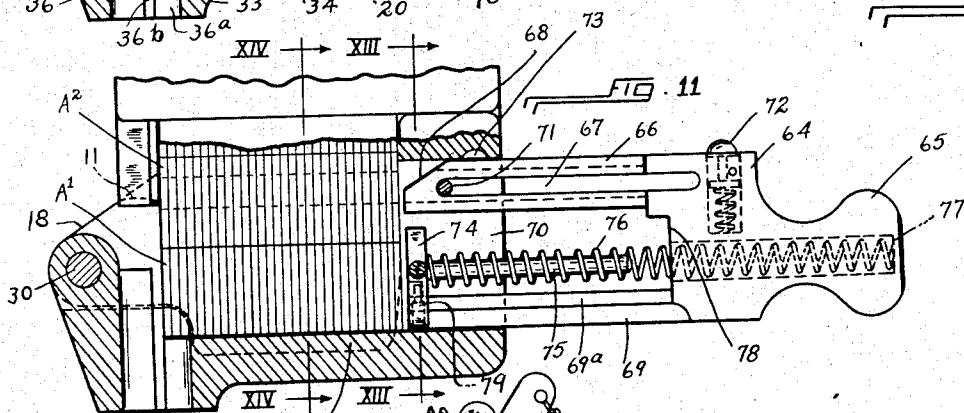
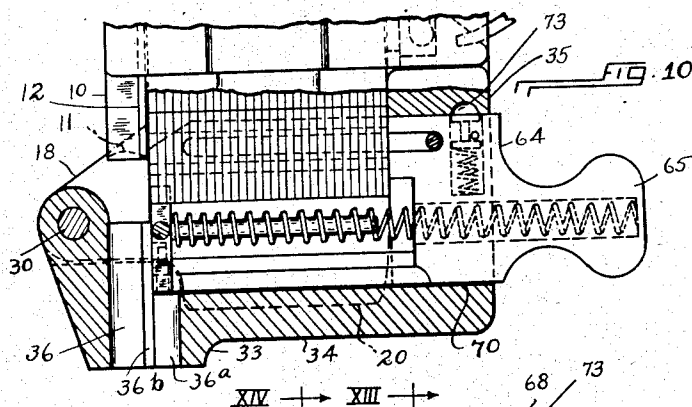
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5 Sheets-Sheet 4



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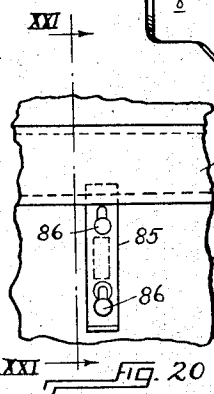
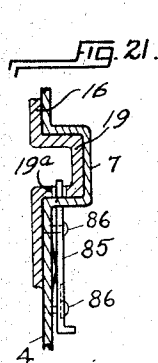
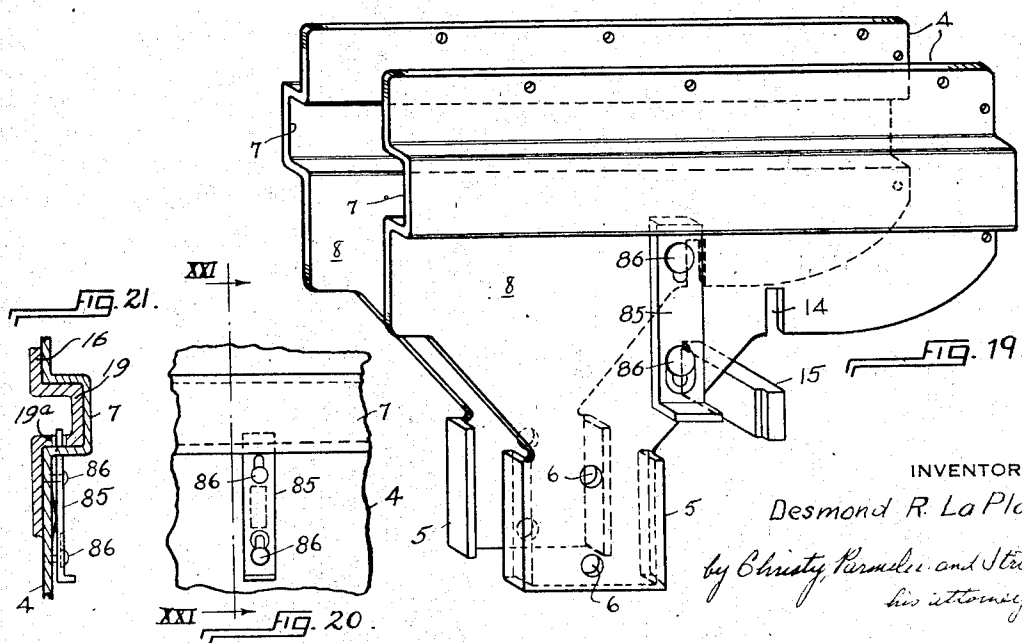
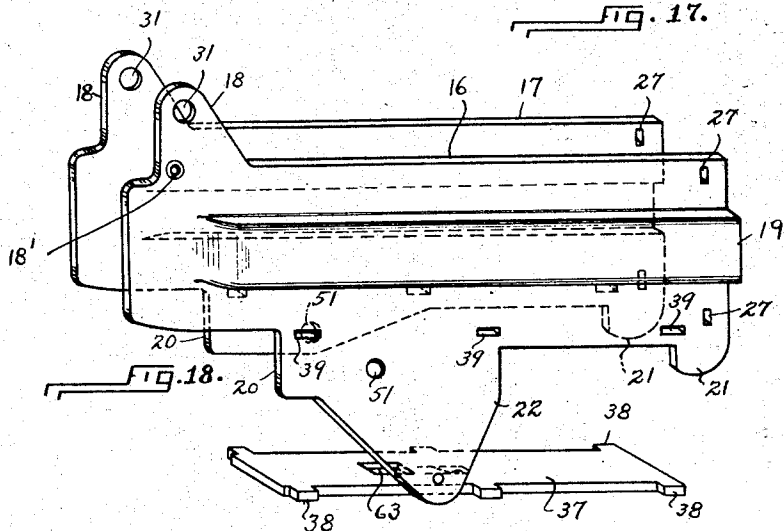
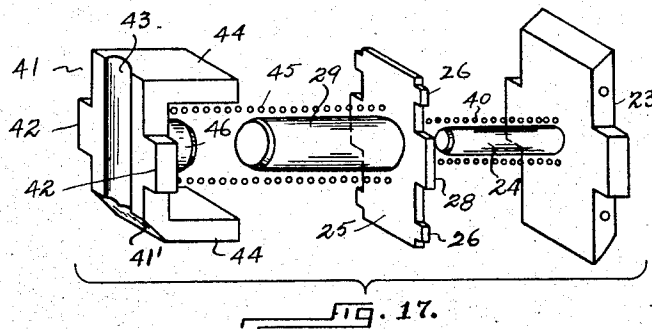
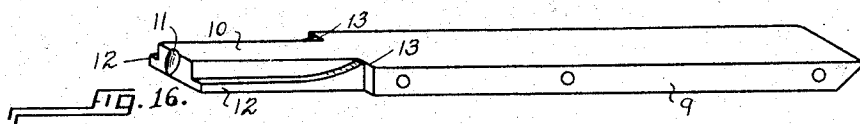
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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,355,807

STAPLING DEVICE

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Application April 2, 1941, Serial No. 386,498

21 Claims. (Cl. 1—49)

This invention pertains to an apparatus for stapling and, moreover, is for a hand tool for use in driving fasteners or staples. The apparatus disclosed in the present application is an improvement over the invention disclosed in my copending application Serial No. 323,551, filed March 12, 1940, and the present application is complementary to the subject-matter of my copending application, Serial No. 386,497, filed April 2, 1941, in which the particular form of fastener is more fully shown and described.

In the last-mentioned co-pending application there is disclosed a fastener preferably in the form of a two-legged staple having an enlarged head portion and in which the legs are attached to opposite sides of the head portion, the head and the legs being disposed in a common plane. As more fully described in the said application, the staple is driven by first applying driving pressure to the edge of the head of the staple causing it to initially penetrate the material into which it is being driven. The driver is arranged so that after the staple has initially penetrated the material the head of the staple is rotated to a plane substantially parallel to the plane of the material into which the staple is being driven after which the driving pressure to complete the driving of the staple is in a direction normal to the plane of the head.

Staples having relatively large heads as described in the last-mentioned co-pending application are particularly desirable for use in attaching thin, easily tearable sheets and fabrics to supporting structure as, for example, the tacking of sheathing paper to a building. The particular virtue of a staple of this character in which the head and the legs are initially disposed in a common plane is the fact that such staples can be compactly assembled and adhesively joined into rows and biscuits, and a unit containing a hundred or more staples will be very compact and can be easily charged into the magazine of a portable tool.

According to the present invention there is provided first a stapling mechanism or apparatus for driving the staples in such manner as to rotate the heads during the driving of the staples as above described. Secondly the present application provides a portable tool which may be conveniently used similarly to a hammer for so driving the staples. Finally the present invention embodies an apparatus provided with a magazine into which a biscuit or unit containing several rows of such staples may be charged and the staples dispensed therefrom one at a time.

In the first of the above-mentioned applications there is disclosed an apparatus resembling in the general form a hatchet or hammer. The head of the implement is provided with a driver and within the head is a magazine containing a clip of staples. A cross-feed is provided for detaching one row of staples from the biscuit and moving this row of staples transversely to successively present the individual staples in the row to the driver. The magazine is also provided with a feed mechanism by means of which the biscuit or charge of staples is advanced to the cross-feed so that as one row of staples is consumed another row will be moved into position to be detached and used. According to the present invention certain improvements are provided in the implement of said application Serial No. 323,551 and it has been specially designed and developed for use with staples of the kind hereinabove referred to but with slight modification may be adapted to the driving of conventional staples.

My invention may be readily understood by reference to the accompanying drawings in which—

Figure 1 is a view partly in side elevation and partly in section of a hand implement embodying my invention with the hinged parts at the driving end of the unit opened out to receive a charge of staples;

Figure 2 is a detail view showing co-related parts constituting a catch for holding said hinged end member in the closed position and for simultaneously preventing any staples which may be in the magazine from being forcibly ejected should the magazine be opened before the charge of staples is exhausted;

Figure 3 is a side elevation on a larger scale of the mechanism with the parts in the normal position which they assume when the magazine is charged and the hammer is ready for use, the lower end of the driving portion of the implement being shown in section;

Figure 4 is a section in the plane of line IV—IV of Figure 3 and looking in the direction of the arrows;

Figure 5 is a vertical section in substantially the plane of line V—V of Figure 3. The staple which is to be next driven is shown in place under the driver;

Figure 6 is a perspective view of a biscuit of staples prepared for loading into the magazine;

Figure 7 is a view similar to Figure 3 showing the position which the parts assume at the instant when the staple has been completely driven;

Figure 8 is a fragmentary view of the lower

portion of the apparatus shown in Figure 7 showing the driver in a stage intermediate the position shown in Figure 3 and the position shown in Figure 7;

Figure 9 is a top plan view showing the fastener driven into the material;

Figure 10 is a longitudinal section through the lower portion of the apparatus showing the cross-feed arrangement with the parts in the position which they assume when the last staple in one row has been driven and the biscuit is to be moved forward to present the next row for use;

Figure 11 is a view similar to Figure 10 showing the cross-feed arrangement retracted and with the biscuit advanced to bring the next row into position;

Figure 12 shows the position of the parts after the cross-feed has moved back and the bottom row of staples has been advanced to move the first staple in the row into the guide;

Figure 13 is a transverse section in the place of line XIII—XIII of Figure 11;

Figure 14 is a similar view in the plane of line XIV—XIV of Figure 11;

Figure 15 is a transverse section similar to Figure 14 in the plane of line XV—XV of Figure 12;

Figure 16 is a perspective view of the driving plate itself;

Figure 17 is an exploded view of the parts forming the end of the magazine opposite the driving end, the parts being shown in perspective and the springs being conventionally illustrated;

Figure 18 is a perspective view of the side plates of a part of the assembly forming the magazine;

Figure 19 is a similar view of the side plates forming the exterior shell of the driving mechanism;

Figure 20 is a fragmentary view showing in elevation a locking attachment which may be provided on the hammer to prevent relative movement between the magazine and frame elements; and

Figure 21 is a section in the plane of line XXI—XXI of Figure 20 showing the locking attachment engaged with the magazine.

By way of general explanation, it may be stated that the tool disclosed in the drawings is designed with a magazine to receive a mass or biscuit of fasteners wherein the fasteners are arranged in rows and the rows are superimposed. Such a biscuit of fasteners is shown in Figure 6 and is designated A. Each fastener, designated B, comprises a relatively large flat head portion *b* and leg portion *b*¹, the two leg portions pointing in the same direction and being connected to the head portion by transverse shoulder portions *b*². The head and the legs are initially in the same plane. The tool is provided with a magazine into which the biscuit is charged. In the tool the end row of staples is detached from the biscuit and it is moved transversely to successively deliver the staples in the row to the driving mechanism. Each time the driving mechanism is operated the end staple in the row is detached and driven, whereupon the row of staples is moved to present the next staple in the row to the driver. When one row of staples has been consumed the biscuit of staples as a whole is moved forward to present the next row of staples to a position to be used, the second row of staples in turn being detached from the biscuit. The driver is so arranged that in the driving of the staple the head portion *b* is rotated 90° so that when the driving is completed the head of the staple is parallel to

the surface into which the staple is driven as is clearly shown in Figure 9.

The general construction of the tool may be best understood by first making reference to

Figures 1 and 16 to 19, inclusive. In the drawings 2 designates a handle, preferably formed of wood, and of the general size and contour of a hammer handle. The driving head designated generally as 3 is secured to the end of this handle. It comprises a fixed head or frame structure which carries the driver and within which is a relatively movable member constituting the staple magazine, stapling guide and staple feeding mechanism. The fixed driving head is comprised of two similar plates 4 which are best seen in Figure 19. These plates have flanged extensions 5 which embrace the top of the handle 2. Rivets or other fasteners pass through holes 6 in these flanged extensions and through the top of the handle, thus rigidly securing the metal plates to the end of the handle. The plates 4 are preferably formed of sheet metal and are formed with longitudinally extending internal channels 7 in the sides thereof. Below the channels 7 are flat plate portions 8 which taper down to the extensions 5. Riveted between the upper edge portions of the plates 4 is a relatively heavy metal strip 9 (see Figure 16) which has a specially shaped end portion 10 constituting the driver. The specially shaped end portion 10 has a transversely extending recess 11 in the end face thereof. This recess, which may be seen on a larger scale in Figures 10 to 12, inclusive, is concaved in two directions so that it defines a portion of the surface of a spheroid. At each side of the extension 10 is a longitudinally extending laterally projecting rib or flange 12. The total width of the extension 10 with its flanges 12 is somewhat less than the total width of the body 9 so that there are shoulders 13 at the point where the extension merges into the body. The member 9 with its extension 10 properly spaces the two plates 4 and also forms a closure plate for the upper or outer end of the tool. The cheek portions 8 of the two members 4 are each provided with a notch 14 to receive a cross-bar 15 that has reduced end portions received in these notches. The cross-bar 15 is welded in place after the tool is assembled to prevent the dismemberment of the tool in the field. One function of this cross-bar is to hold the lower portions of the plate the proper distance apart and prevent them from pressing against the magazine. The space between the two main plates 4 serves to receive the magazine member. The magazine member is formed from two sheet metal plates 16 and 17 of generally similar construction, each of these plates having an upwardly extending lug 18 at the forward end thereof and each having an outwardly pressed rib or channel 19 extending longitudinally thereof throughout the greater portion of its length. Each of the plates 16 and 17 has an undercut shoulder portion 20 at the bottom thereof. Each of the two plates has a depending lug 21 at the rear or inner end thereof. The plate 16 has a downwardly projecting extension 22.

Riveted and brazed into the rear or right hand end of the structure as viewed in Figure 1 is a solid metal plate or abutment 23 which is of the form clearly shown in Figure 17 and which has an inwardly projecting pin 24 thereon. Set between the two plates 16 and 17 at the right hand end thereof as viewed in Figures 1 and 18 is a transverse plate 25, the detailed construction of which is clearly shown in Figure 17. This

plate has lugs 26 thereon that project into openings 27 in the plates 16 and 17 and which are brazed or welded into these openings to form a rigid transverse wall between the right hand ends of the two plates. The plate 25 also has laterally extending lugs 28 that project into the channels 19 and form a closure at the ends of these channels. The plate 25 has a sleeve member 29 secured to one face thereof which is in axial alignment with the pin 24.

A pivot pin 30 (see Figures 10 to 12) passes through holes 31 in the lugs 18 on the plates 16 and 17. This pin provides a pivoting support for a nose member designated generally as 32. The nose member 32 may be formed as a casting having a portion 33 in which the staple guide is formed, a bar portion 34 forming the end closure for the magazine and an arm portion 35 which, as shown in Figures 3 and 7, projects along a portion of the bottom of the magazine and abuts against the shoulders 20 on the plates 16 and 17. The staple guide 33 has an opening 36 there-through which is of the shape best shown in Figure 4, there being a rounded channel portion 36a, and there being parallel grooves 36b in which the legs of the staples are received as will be hereinafter more fully explained, and there being a U-shaped channel portion 36c along which the extension 10 of the driver may move with the flanges 12 on the driver received in the groove 36b. The driver is normally retracted to a position clear of the opening 36 and only during the driving of the staple does it slide down through this opening. The opening 36 and channel 36a provide clearance to permit the head to rotate from an edgewise plane to a flatwise position while it is being driven.

As previously pointed out, the plate 25 serves to rigidly space the two plates 16 and 17 at one end of the magazine while the portion of the nose between the lugs 18 through which the rivet 30 passes spaces these plates at the other end of the magazine. Plates 16 and 17 are also spaced by a longitudinally extending closure plate 37 (see Figure 18) which forms a closure for the bottom of the magazine and which is provided with lugs 38 that are received in openings 39 in the plates 16 and 17, the lugs 38 being welded or otherwise permanently secured in these openings.

The ribs or outwardly pressed channels 19 are of a dimension such that they have a sliding fit in the corresponding ribs or channels 7 in the two side plates 4. This enables the magazine structure to slide lengthwise along the fixed head structure between the two plates 4 with the interfitting ribs or channels on the plates 16 and 17 and on the plates 4 forming guideways. The sliding movement of the magazine is restricted by reason of the fact that the lugs 21 on the plates 16 and 17 engage the cross-bar 15, as clearly shown in Figure 1, to limit the extent to which the magazine may slide relatively to the fixed head toward the left of the tool. The end plate 23 limits the sliding movement of the magazine toward the right. In assembling the tool the cross-bar 15 is not secured in place until after the magazine has been slid into position.

Surrounding the pin 24 on the end plate 23 is a compression spring 40 which presses against the end plate 23 and which is received in the well formed by the closed tube 29 on the plate 25. This spring yieldably urges the magazine member toward the left as viewed in Figure 1. Slidable along the magazine between the plates 16

and 17 is a follower block 41 (see Figure 17), this follower block having lugs 42 projecting from opposite sides thereof, these lugs projecting into the channels 19 on the inner faces of the plates 16 and 17 so as to provide a guide for the follower block. The end face of the follower block is preferably transversely grooved as indicated at 43. The follower has rearwardly projecting flat extensions 44, one of which slides along the plate 37 and the other one of which slides against the inner face of the plate 9. The fit is a loose one so that the follower will easily move longitudinally of the magazine under the influence of a compression spring 45 which surrounds the sleeve member 29 and which, at its other end, surrounds an abutment 46 on the rear face of the follower 41. Thus the spring 45 yieldably urges the follower 41 toward the left as viewed in Figures 1 and 17. The movement of the follower toward the right as viewed in Figures 1 and 17 is limited by the contact of the abutment 46 at the end of the sleeve element 29 and the extent to which the follower may move toward the left is restricted by the fact that the channels 19 do not extend the full length of the plates 16 and 17, the ends of these channels forming abutments to limit the travel of the follower in this direction. The purpose of the follower, of course, is to yieldably press against the top of the innermost row of staples of the biscuit A which is charged into the magazine and yieldably urge the biscuit of staples toward the feeding mechanism which is at the left-hand end of the magazine as viewed in Figure 1. The groove 43 in the face of the follower is designed to conform partially to the curvature of the heads of the staples of this innermost row.

On the free end of the arm 35 forming a part of the piece 32 comprising the end or nose member of the implement is a projecting latch or lug 47 having a slot 48 therein. When the nose member is swung from the open position shown in Figure 1 to the closed position as illustrated for example in Figures 3 and 7 the latch 47 engages a trigger mechanism for releasably holding the nose member in the closed position. The trigger itself comprises a lever 49 pivotally supported at 50 by a transverse pin that is received in the holes 51 in the side plates 16 and 17. This lever has a forwardly extending arm 52 (see Figure 2) with a downwardly projecting trigger portion 53 which is preferably curved to accommodate the finger and which has an upwardly extending detent 54 that engages in the slot 48 of the latch. The lever 49 has a rearwardly extending arm 55 to which is attached one end of a tension spring 56, the other end of the tension spring 56 being anchored to the lowermost end of the depending portion 22 of the plate 16. The spring exerts a tension which tends to rock the lever 49 about its pivot yieldably urging the detent 54 into locking engagement with the latch 47—48. As long as the end member 32 is latched in place it cannot swing outwardly to the position shown in Figure 1 but to release the latch it is merely necessary to apply pressure to the trigger 53 which tends to rock the lever 49 in a direction to withdraw the detent 54 from engagement with the latch. When the end member is swung to the closed position the latch will automatically catch.

Associated with the trigger or latch mechanism and also pivotally supported on the transverse pivot pin 50 is a second lever 57 having a forwardly extending arm 58 with a lobe 59 at

the end thereof. On the top edge of the lever 57 is an upwardly extending lug 60. The lever is provided with a rearwardly extending arm 61 to which is attached one end of a tension spring 62, the other end of this spring being anchored to a tongue which is struck out from the plate 37.

The lobe 59 on the lever 57 engages the top face of the latch 47 when the end member is in the closed position. This tends to depress the opposite end of the lever and the lug 60, which is located under an opening 63 in the plate 37 is in the position shown in Figure 3 so that it does not project through the opening 63 into the magazine. When the latch is released and withdrawn from engagement with the lobe 59 the tension spring 62 rocks the lever 57 about its axis causing the lug or detent 60 to be projected into the magazine so as to project under the heads of some of the staples in one of the rows of staples comprising the biscuit A as clearly shown in Figure 1. This detent thus prevents the charge of staples in the magazine from being expelled under the action of the spring 45 and follower 41 in the event that the end member 32 should be opened while there is a charge of staples in the magazine. If this detent were not provided the biscuit of staples would be free to move toward the left as viewed in Figure 1 as soon as the end member 32 was swung to the open position. This detent also provides a ratchet-like catch to engage a new biscuit of staples when it is being shoved into the magazine to thereby prevent the biscuit of staples from being violently expelled when the operator releases the pressure against the biscuit and takes hold of the movable nose piece to close it.

The cross-feed mechanism which detaches the forwardmost row of staples from the biscuit and feeds its crosswise of the magazine to the driver is substantially the same as that disclosed in my co-pending application Serial No. 323,551. This cross-feed mechanism is mounted entirely on the pivoted end or nose member. The cross-feed and associated mechanism comprises a movable cross-head 64 having a knob 65 projecting outwardly therefrom. Projecting inwardly from the movable head 64 is an integral arm 66 which is slotted at 67 throughout the greater portion of its length. The inner end of the arm 66 is beveled as indicated at 68. Also projecting inwardly from the head 64 is a second arm 69 having rabbeted edges to provide flanges 69a. The part 35 of the nose member is provided with an opening 70. The two arms 66 and 69 are both slidable through this opening, there being a pin 71 engaging in the slot 67 providing a guide for the upper arm, the side walls of the opening 70 being shaped to conform to the cross-section of the arm 69 providing a construction wherein the cross-head 64 may be moved in and out from the position shown in Figure 10 to the position shown in Figure 11. Mounted on the cross-head 64 is a spring pressed detent 72 which engages in a notch 73 in the portion 35 when the head is at the inner limit of its movement, i. e., when it is in the position shown in Figures 10 and 12. This detent releasably holds the head 64 with its attached parts against accidental movement.

Fitted to slide along the arm 69 is a follower or pusher 74, this follower or pusher having an opening therethrough conforming to the cross-section of the arm 69 as clearly shown in Fig-

ure 13 so that the follower or pusher may slide along the arm 68 but cannot lift out of position with respect thereto. The follower or pusher 74 has a pin 75 secured thereto forming a guide for a compression spring 76, one end of this spring bearing against the follower 74. The other end of the spring is fitted against the inner end of a well 77 that passes through the cross-head 64 and back into the knob 65. The cross-head 64 is provided with an undercut portion 78 for receiving the follower when it is pushed against the compression of the spring 76 to the position shown in Figure 12. The front face of the follower 74 has a notch 74a therein. Near the extreme inner end of the arm 69 is a pin 79 that projects into the path of travel of the follower in such manner as to allow the follower to move to the extreme inner end of the arm 69. When the follower reaches this position, which is the position shown in Figure 11, the pin 79 engaging in the notch 74a permits the follower to move no further.

To understand the operation of this cross-feed mechanism reference may be had to Figures 10, 11 and 12. Figure 10 shows the position of the parts at the time a new clip of staples has just been charged into the magazine or at the time that the cross-feeding of the end row of staples has been completed and the last staple has been driven. At this time the biscuit of staples is being urged by the follower 41 downwardly as shown in Figure 10 but the movement of the biscuit of staples is obstructed by the arm 66 which projects under the heads of the row of staples at the end of the biscuit. As shown in Figure 13 the arm 66 is preferably concaved in transverse cross-section on both its upper and lower faces. The heads of the staples in the row rest in this concavity. The first operation is to grasp the knob 65 and pull it toward the right as viewed in Figure 10 to the position shown in Figure 11. This movement is sufficient to withdraw the arm 66 and the arm 69 and the parts carried by the arm 69 completely to one side of the lower portion of the magazine whereupon the biscuit of staples is instantly moved to the position shown in Figure 11 where the bottom row of staples designated A¹ rests against the inner face of the bar 34 of the end member. After withdrawing the knob 65 for an instant to permit a biscuit of staples to feed to the position shown in Figure 11, the knob is then shoved in the opposite direction to the position shown in Figure 12. When the knob is pushed in this fashion the underface of the bar 65 rides over the top of the heads of the staples of the row A¹ holding this row of staples down in position. The beveled nose 68 of the bar 66 rides under the heads of the staples in the second row of the biscuit A². This tends to cam the biscuit of staples back into the magazine but since the end row is prevented from movement the operation serves to break the row of staples A¹ away from the biscuit. This may be clearly seen in Figure 15 where the bottom row of staples A¹ has been separated from the row A² which has been moved a slight distance back into the magazine. The bevel 68 at the end of the arm 66 also engages a beveled surface 41' on the follower 41 to cam or force the follower back when the last row of staples in the magazine has been advanced to position to be used. The cross-bar 66 then forms an abutment under the row of staples A² which prevents the biscuit of staples from pressing against the staples of the bottom row A¹ so

that the bottom row may easily slide crosswise of the magazine.

When the knob 65 is shoved to the left from the position shown in Figure 11 to the position shown in Figure 12, the bar 69 of course slides inwardly but the follower or pusher 74 is obstructed from moving with the bar 69 because it abuts against the right-hand end of the row of staples A¹. Consequently the spring 76 is compressed to yieldingly apply pressure to the follower 74. The follower 74 transmits this pressure to the row of staples A¹ and the row of staples is shifted laterally a distance corresponding to the width of one staple so that the staple at the left-hand end of the row of staples A¹, as viewed in Figure 12, is over the feeding guide in the nose 33. At this time the legs of this staple are immediately above the grooves 36b in the nose of the implement. There is an abutment 36d against which the end staple presses that prevents the bottom row of staples from moving more than the width of a single staple at one time. When the parts have been thus operated they are in the position shown in Figure 12 and the implement is ready for the first stapling operation.

In the operation of stapling the implement is swung in the same way that the conventional hammer is swung. All of the parts move as a unit while the head of the implement is traveling through space. When the nose 33 strikes the surface into which the staple is to be driven it cannot move further, which means that the motion of the nose with its staple guide and the magazine and all of the other attached parts is instantly halted while the shell of the implement comprising the driver 9 and the side plates 4 continue to move. This relative motion between the driver and the nose causes the driver to engage the top of the left-hand staple in the row A¹ and drive it down into the material into which it is to be driven. Figure 3 shows the relative position of the parts just before the impact has occurred. Figure 8 shows the relative position of the parts shortly after the initial impact and before the staple has been completely driven. Figure 7 shows the position of the parts at the conclusion of the driving operation.

In the driving of the staple the spherically notched end 11 of the driver contacts the edge of the head of the staple to be driven. It initially applies force to start the points of the staple into the material into which the staple is to be driven. As the resistance of the staple increases the spherical surface 11 tends to cam or rotate the head about the arms b² as an axis. Figure 8 shows the head partially rotated and Figure 7 shows the head completely flattened out. The flattening out of the head is preferably accomplished before the staple has been fully driven. While the driving force is initially against the edge of the head of the staple, it is finally in a direction normal to the plane of the head of the staple. In the driving of the staple the head of the staple is rotated from the plane in which it is most convenient for packaging into the position where it is most effective for holding down the underlying material.

The holding operation takes place in an instant and with a single blow of the hammer. When the staple has been driven and the hammer is lifted away from the staple, the spring 40 immediately applies pressure to the magazine assembly, including the nose of the hammer, to restore the parts to the position shown in Fig-

ures 1 and 3. When the normal relation of the parts has been restored and the driver is retracted to its normal position, the pusher or follower 74 will feed the row of staples A¹ crosswise to present the next staple in the row to driving position. Figures 3 and 7 show the row of staples almost exhausted. The follower or pusher 74 can move clear to the end of the arm 69 where it will deliver the last staple to the staple guide but it is prevented by the stop pin 79 from itself being projected into the path of the driver. With this arrangement when the last staple in a row has been delivered a colored spot or flag on the follower 74 will be visible through an opening 18' to thereby indicate that another row must be fed into position.

When all of the rows of staples have been consumed the trigger 53 is released and the pivoted end or nose member of the structure is swung to the position shown in Figure 1. A biscuit of staples is then slipped endwise into the magazine and when the nose member 32 is closed the biscuit of staples will be forced back into the magazine. In Figure 1 the knob 65 is shown in its retracted position but it need not be in this position at this time.

For locking the tool to prevent relative sliding movement between the frame and the magazine, the arrangement shown in Figs. 20 and 21 may be employed. In this view, one of the plates 4 has a slotted bolt member 85 slidably secured to the exterior thereof by headed screws 86 passing through the slots in the member 85. A leaf spring on the underface of the bolt urges the bolt outwardly and depressions in the bolt adjacent one of the slots engaging with the head of the retaining screw releasably holds the bolt against movement. One end of the bolt passes through a slot on the side of one of the ribs or channels 7. When the bolt is advanced to locking position, the end enters an opening 19a (see Figure 21) in the side of channel 19 of the magazine. When the bolt is retracted the end of the bolt is clear of this latter slot. To slide the bolt it is first pressed down against the plate 4 and then moved in a horizontal direction. By providing the bolt, a safety catch is provided which enables the end plate 23 to be used as a hammer end without a staple being ejected with each blow. Thus if a staple is incompletely driven in one blow, the bolt may be slid to locking position and the staple can be struck a second time.

From the foregoing description it will be seen that my invention provides a convenient implement having a cooperating driver and staple guide so constructed as to provide for the driving of staples in which the head and legs of the staple are originally in a common plane but wherein, after the staple has been driven, the head is perpendicular to the plane of the legs. The provision of a suitable shaped surface on the end of the driver as, for example, the provision of the groove 11, provides for the turning of the head of the staple. With slight modification, the hammer may be constructed to use conventional staples. The invention further provides an implement of compact and ingenious construction into which a large number of staples may be charged and from which they may be delivered automatically, enabling the stapling to be rapidly proceeded with.

Moreover, my invention provides a method of stapling wherein staples are driven by initially applying force to the edge of the head of the staple

to start the driving of the staple after which the head of the staple is rotated, this method being accomplished with a single blow and in a short space of time, practically instantaneously. This method is the subject of my copending application Serial No. 457,166, filed September 3, 1942.

While I have illustrated and described one present preferred embodiment of my invention, it will be understood that this is only by way of illustration and that various changes and modifications may be made within the contemplation of my invention and under the scope of the following claims.

I claim:

1. Apparatus for driving fasteners in which the head of the fastener is rotated from the plane of the leg portion of the fastener during the driving of the staple to a plane approximately perpendicular thereto comprising a driver having an end face with an inclined surface thereon over a portion only of the area thereof arranged to cam the head of the fastener over, and a guide for holding the staple, the guide and the driver being movable relatively to each other.
2. Apparatus for driving staples wherein the staples which are specially formed have a head portion which is to be turned from the plane of the staple to the plane of the surface into which the staple is driven comprising a guide having parallel grooves therein adapted to receive the two legs of a staple, a driver slidable relatively to the guide in a direction parallel with the direction of the grooves, the driver having an end face with a relatively flat portion at each side of a transversely extending grooved portion, the grooved portion of the driver being inclined to rotate the head of the specially formed staple from a plane parallel with the legs of the staple to a plane approximately perpendicular thereto.
3. Apparatus for driving staples wherein the staples which are specially formed have a head portion which is to be turned from the plane of the staple to the plane of the surface into which the staple is driven comprising a guide having parallel grooves therein adapted to receive the two legs of a staple, a driver slidable relatively to the guide in a direction parallel with the direction of the grooves, the driver having an end face with a relatively flat portion at each side of a transversely extending grooved portion, the grooved portion of the driver being inclined to rotate the head of the specially formed staple from a plane parallel with the legs of the staple to a plane approximately perpendicular thereto, the guide being formed with clearance spaces therein to enable the head to rotate while it is being driven.
4. Apparatus for driving staples wherein the staples which are specially formed have a head portion which is to be turned from the plane of the staple to the plane of the surface into which the staple is driven comprising a guide having parallel grooves therein adapted to receive the two legs of a staple, a driver slidable relatively to the guide in a direction parallel with the direction of the grooves, the driver having an end face with a relatively flat portion at each side of a transversely extending grooved portion, the grooved portion of the driver being inclined to rotate the head of the specially formed staple from a plane parallel with the legs of the staple to a plane approximately perpendicular thereto, and means for feeding staples with head portions in the plane of the leg portions into the guide.
5. An implement of the class described having

a magazine element and a driver element, said elements being slidably interfitted for relative longitudinal movement, the magazine element having a nose piece pivotally attached thereto for closing one end thereof, said nose piece being movable from a closed position to an open position, the nose piece having a staple guide therein, the driver element having an extension adapted to be projected into said guide.

6. An implement of the class described having a magazine element and a driver element, said elements being slidably interfitted for relative longitudinal movement, the magazine element having a nose piece pivotally attached thereto for closing one end thereof, said nose piece being movable from a closed position to an open position, the nose piece having a staple guide therein, the driver element having an extension adapted to be projected into said guide, and a latch mechanism for releasably holding the nose piece in closed position.

7. An implement of the class described having a magazine element and a driver element, said elements being slidably interfitted for relative longitudinal movement, the magazine element having a nose piece pivotally attached thereto for closing one end thereof, said nose piece being movable from a closed position to an open position, the nose piece having a staple guide therein, the driver element having an extension adapted to be projected into said guide, and a detent member movable into and out of the magazine, the nose piece having a portion thereon for operating the detent member in such manner that the detent member is withdrawn from the magazine when the nose piece is in the closed position, there being spring means for moving the detent into the magazine when the nose piece is moved to the open position.

8. An implement of the class described having a magazine element and a driver element, said elements being slidably interfitted for relative longitudinal movement, the magazine element having a nose piece pivotally attached thereto for closing one end thereof, said nose piece being movable from a closed position to an open position, the nose piece having a staple guide therein, the driver element having an extension adapted to be projected into said guide, and a cross-feed mechanism mounted on the nose piece for moving a row of staples transversely of the magazine.

9. A stapling implement of the class described comprising a casing with a staple receiving chamber therein, said casing constituting a magazine element, a structure housing the magazine element and in which the magazine element is slidably carried, said structure constituting a driving element, a pivoted nose piece on the magazine element forming a closure for one end of the chamber in the magazine element and movable from a closed position to an open position, said nose piece having a stapling guide formed therein, and a member slidably mounted on the nose piece having parallel extensions thereon which normally project into the magazine, a staple feeding follower movable along one of said extensions, the second of said extensions being arranged to form a transverse barrier across the magazine above the path of movement of said follower.

10. A stapling element of the class described comprising a casing with a staple receiving chamber therein, said casing constituting a magazine

element, a structure housing the magazine element and in which the magazine element is slideably carried, said structure constituting a driving element, a pivoted nose piece on the magazine element forming a closure for one end of the chamber in the magazine element and movable from a closed position to an open position, said nose piece having a stapling guide formed therein, and a member slidably mounted on the nose piece having parallel extensions thereon which normally project into the magazine, a staple feeding follower movable along one of said extensions, the second of said extensions being arranged to form a transverse barrier across the magazine above the path of movement of said second follower, the free end of said extension being tapered.

11. A stapling implement of the class described comprising a casing with a staple receiving chamber therein, said casing constituting a magazine element, a structure housing the magazine element and in which the magazine element is slideably carried, said structure constituting a driving element, a pivoted nose piece on the magazine element forming a closure for one end of the chamber in the magazine element and movable from a closed position to an open position, said nose piece having a stapling guide formed therein, and a member slidably mounted on the nose piece having parallel extensions thereon which normally project into the magazine, a staple feeding follower movable along one of said extensions, the second of said extensions being arranged to form a transverse barrier across the magazine above the path of movement of said follower, and means for releasably holding said member in a position in the nose piece where said extensions extend across the magazine.

12. A stapling implement of the class described comprising a casing with a staple receiving chamber therein, said casing constituting a magazine element, a structure housing the magazine element and in which the magazine element is slideably carried, said structure constituting a driving element, a pivoted nose piece on the magazine element forming a closure for one end of the chamber in the magazine element and movable from a closed position to an open position, said nose piece having a stapling guide formed therein, and a member slidably mounted on the nose piece having parallel extensions thereon which normally project into the magazine, a staple feeding follower movable along one of said extensions, the second of said extensions being arranged to form a transverse barrier across the magazine above the path of movement of said follower, said second extension being longitudinally grooved on both faces thereof for engaging the head portions of specially formed staples which the magazine is designed to receive.

13. A stapling tool comprising a magazine element formed to provide a staple receiving chamber therein, a driver element, the driver element and the magazine element being telescopically engaged for relative axial movement, the chamber in said magazine being adapted to receive a plurality of transversely arranged rows of staples, said magazine element including a transverse end wall member, a sleeve on said transverse end wall member, extending axially into said chamber, a follower in the chamber for moving the charges of staples toward the end of the magazine opposite said plate, a compression spring

interposed between said plate and follower and positioned about said sleeve, the driver element having an end piece thereon parallel with said plate, a spring inside said sleeve engaging said end piece, means at the other end of said magazine element forming a staple driving guide, and means in the magazine for feeding staples into said guide, the driver element having a staple driving extension that cooperates with said guide.

14. A stapling tool comprising a driver portion and comprising a pair of spaced apart plates having outwardly pressed channels on the opposed inner faces thereof, a driver secured to said plates, a magazine slidably received between said plates, said magazine comprising a pair of spaced plates having outwardly pressed ribs thereon which engage in the channels of said first plates to provide an interfitting sliding engagement between the magazine and the frame, means for limiting the relative sliding movement between the magazine and the frame, one end of the magazine projecting beyond the end of the frame, a nose piece hinged to the projecting portion of the magazine, said nose piece being movable about said hinge from a position where it closes the end of the magazine to a position where the end of the magazine is open to permit a charge of staples to be inserted therein, the nose having a stapling guide therethrough, the driver having an extension which is adapted to be projected into the guide during the driving of the staple.

15. A stapling tool of the class described having a frame member and a magazine member interfitted for relative movement in a longitudinal direction, the magazine member being of substantially rectangular cross-section and a closure member at one end of the magazine extending in the direction of the width of the magazine and pivotally secured to the magazine for movement about an axis which is transverse to the length and width of the rectangular magazine, the closure member having a nose portion with the stapling guide therein adjacent one end thereof, the frame member having a driver which cooperates with the stapling guide and a trigger mechanism for releasably holding the nose in the closed position.

16. An apparatus of the class described comprising a hammer-like instrument with a stapling head having relatively movable frame and magazine elements, and a manually operable locking bolt on the one member, the other member having an opening into which the bolt may be projected, whereby the frame and magazine elements may be releasably held against relative movement when the implement is to be used only as a hammer.

17. A driver for a staple driving tool, said driver having a staple-engaging end face of generally rectangular contour, said staple-engaging face having a transverse recess therein which is sloped transversely to the width of said face to provide a cam surface for initially engaging a portion of the top of the staple to be driven and camming it transversely to the direction in which the driver moves in driving the staple after which the end face not so recessed may engage the top portion of the staple above the legs thereof.

18. A stapling tool for driving tilt-top staples comprising guide forming means to receive the legs of the staple and support said legs on both face of the staple, said guide forming means being recessed in the direction of travel of the staple to provide clearance for the top of the

staple when it is being and has been turned from the plane of the staple to a plane transverse to the legs.

19. A stapling tool for driving tilt-top staples, which staples have substantially parallel legs and a head portion of less width than the distance between the legs and projecting upwardly above the tops of the legs, said tool comprising guide forming means to receive and hold the legs of the staple, said guide forming means being recessed so that said head portion of the staple is clear of the guides and may be turned to a position at right angles to the legs, and a driver for first turning the head portion and then applying driving pressure to the staple.

20. A stapling tool for driving tilt-top staples comprising guide means arranged to hold the legs of the staple against movement except in the direction in which the staple is to be driven, said guideway being recesses to provide clearance for

the head of the staple when it is turned from the plane of the staple to a plane at right angles to the legs of the staple, said guide means serving to hold the staple during the turning of the head, and a driver for turning the head and driving the staple.

21. A stapling tool for driving tilt-top staples comprising guide-forming means to receive the legs of the staple and hold them in the plane of travel of the staple while it is being driven, said guide forming means being recessed to provide clearance for the top of the staple while it is being and after it has been turned from the plane of the staple to a plane transverse thereto, and a driver having a cam surface for engaging and turning the top of the staple while the legs are confined in the guides, said driver having a surface for applying axial pressure to the staple to drive it after the top has been turned.

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