

May 17, 1938.

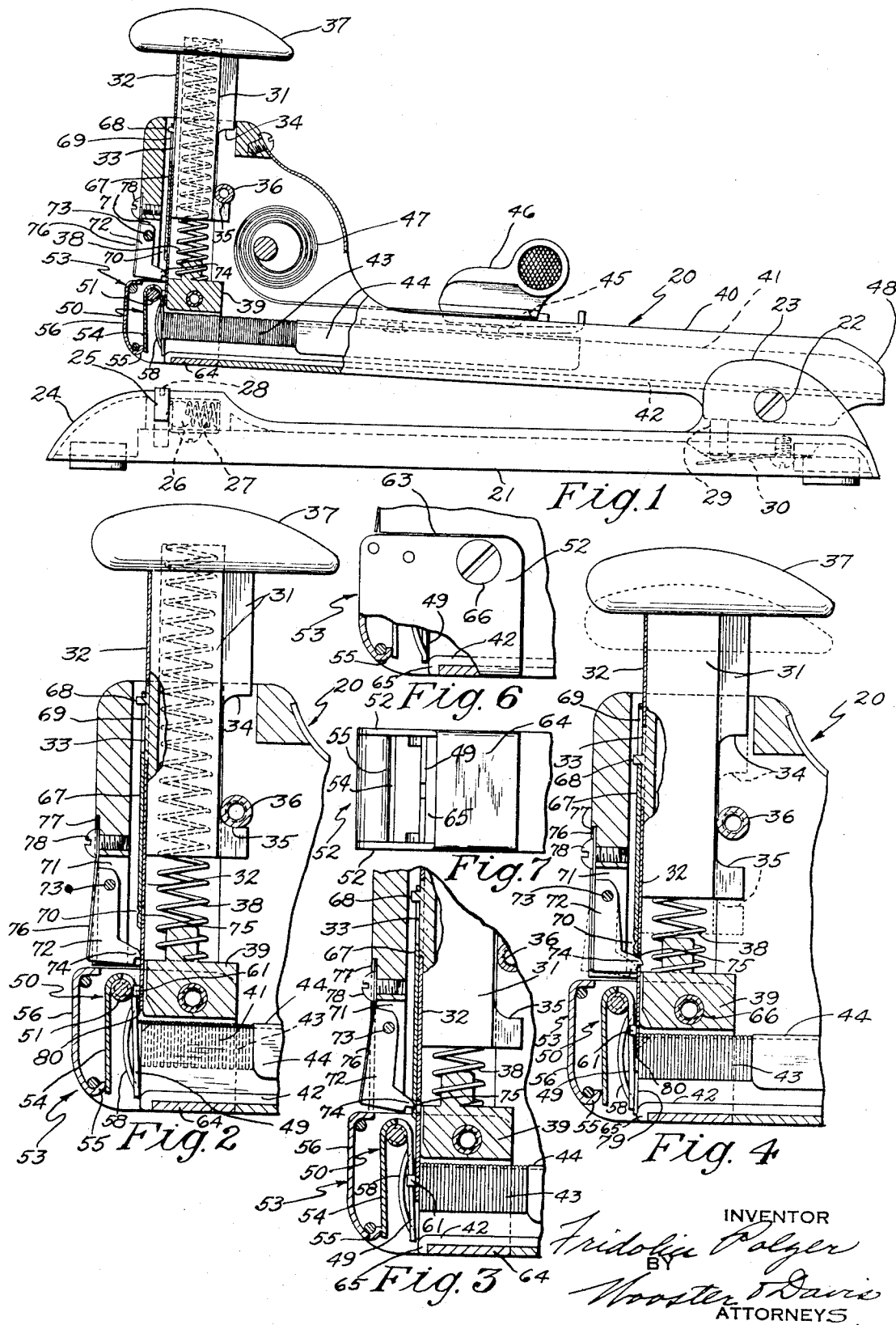
F. POLZER

2,117,743

STAPLE DRIVING MACHINE

Filed May 18, 1935

2 Sheets-Sheet 1



May 17, 1938.

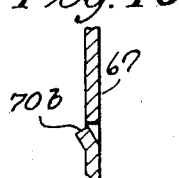
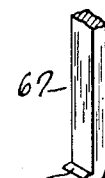
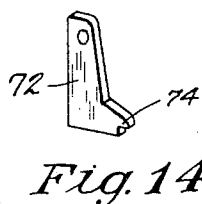
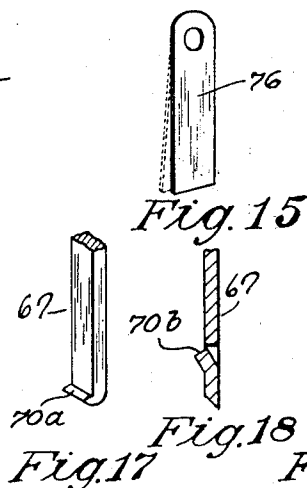
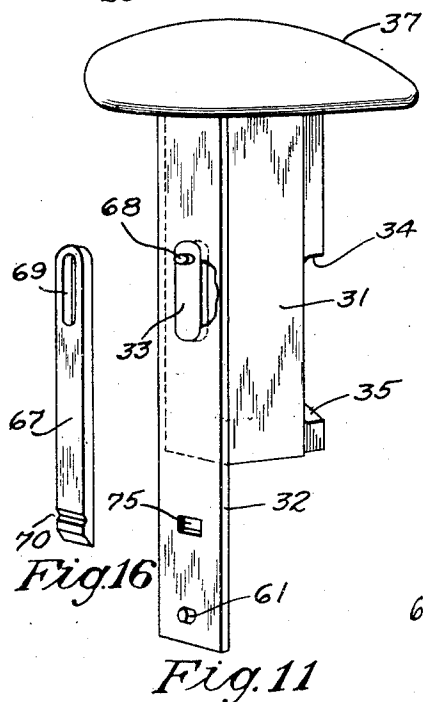
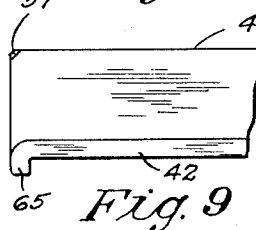
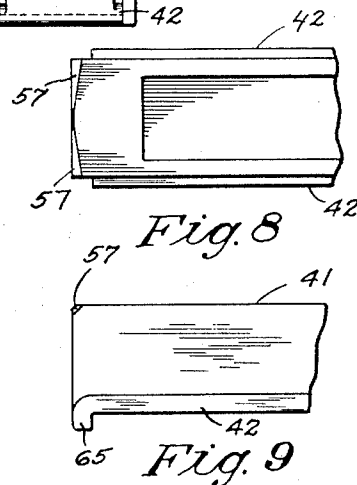
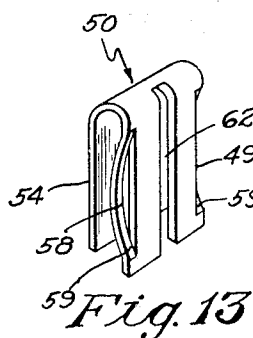
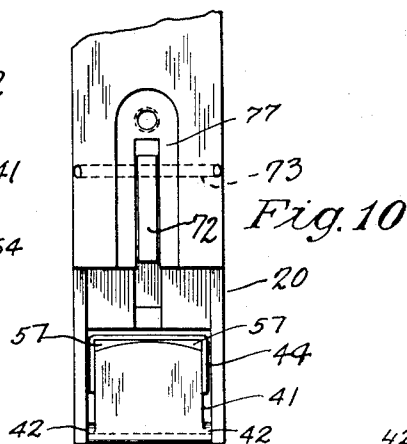
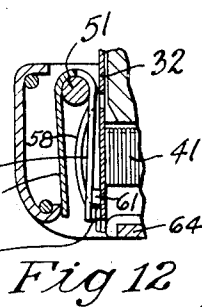
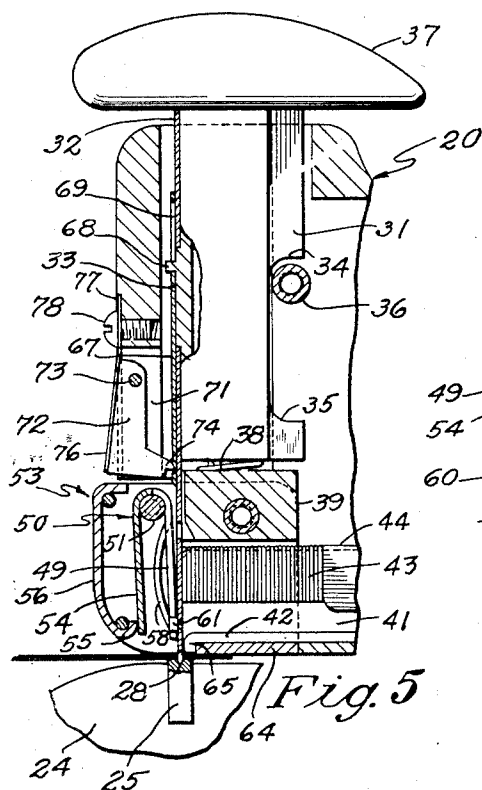
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STAPLE DRIVING MACHINE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,117,743

STAPLE DRIVING MACHINE

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Application May 18, 1935, Serial No. 22,130

12 Claims. (Cl. 1—3)

This invention relates to a staple driving machine, and has for an object to provide a machine which will accurately and effectively drive staples made of different widths, or that is of different thickness or gauge of wire without clog-
5 ging the machine and without destroying the staples.

It is another object of the invention to provide means to prevent the staple driving plunger from moving away from the entrance to the staple raceway unless the plunger has been fully depressed to staple driving position, so that should the plunger be only partly depressed so as not to force the forward staple from the raceway it will prevent a second staple being fed to the raceway until the first staple has been removed therefrom.

Another object of the invention is to provide a device which will permit staples which are inclined from the normal position to enter the raceway and will straighten them to the normal position before driving them.

Still another object of the invention is to provide a construction whereby should for any reason a staple get in front of the plunger within the raceway it will automatically be forced from the raceway on the next depression of the plunger.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings. However, it will be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In these drawings:

Fig. 1 is a side elevation of a staple driving machine showing one form of my invention applied thereto with a portion of the side wall of the housing broken away to more clearly show the construction;

Fig. 2 is a similar view of the front portion of the housing and the staple driving mechanism showing the staple driving plunger in its normal upper or retracted position and with parts shown on an enlarged scale;

Fig. 3 is a similar view of the lower part of the head and plunger but showing the plunger in the half raised or retracted position after it has been fully depressed to drive a staple;

Fig. 4 is a view similar to Fig. 2 showing the plunger locked in position to prevent a second staple from entering the raceway should the plunger be only partly depressed and without depressing it to the full staple driving position;

Fig. 5 is a view similar to Fig. 2 showing the

plunger fully depressed to the staple driving position;

Fig. 6 is a partial side elevation of the removable block carrying the yieldable front wall of the staple raceway with a portion of a side plate broken away;

Fig. 7 is a bottom view thereof;

Fig. 8 is a top plan view of the front end of the staple guide bar;

Fig. 9 is a side elevation thereof;

Fig. 10 is a front elevation of the lower part of the head with the removable block and the spring of the plunger locking means removed;

Fig. 11 is a perspective view of the plunger and its support;

Fig. 12 is a sectional view of the lower portion of the staple raceway showing the plunger adjacent its lowermost position and indicating how if a staple should get into the raceway forwardly of the plunger it would automatically be removed by depression of the plunger;

Fig. 13 is a perspective view of the spring member which forms the forward wall of the raceway;

Fig. 14 is a perspective view of the locking pawl for the plunger;

Fig. 15 is a perspective view of the spring for this pawl;

Fig. 16 is a perspective view of the pawl control slide;

Fig. 17 is a perspective view of the lower end of the slide showing a slight modification; and

Figs. 18 and 19 are a longitudinal section and a front elevation respectively of still another modified form of the lower end of this slide.

In the drawings I have shown by way of example the invention in Fig. 1 as applied to a stapling machine in which the staples are driven through the work such as sheets of paper, cloth and the like and the prongs folded over or clinched on the lower side thereof, but the invention is not limited to use on a stapling machine but may equally as well be used on a stapler or tacker where the prongs of the staple are not clinched, as for example where they are driven through a shipping tag into a wooden box for attaching the tag thereto, or it may be used in other forms of staple driving machines. In short it can be used in any staple driving machine of either the desk type, the plier type, tacker type, etc.

Referring now to Fig. 1 of the drawings in which is shown in side elevation a desk type stapling machine by way of example, the machine as illustrated comprises a housing 20 pivoted to a base 21 at 22 between upstanding lugs 23 adjacent the rear end of the base. At its forward end

the base is provided with a raised portion 24 having a transverse slot in which is slidably mounted an anvil bar 25. This bar is slidable laterally in the slot and has spaced recesses in its rear wall to receive a ball 26 held therein by a spring 27, whereby the anvil bar is held in different positions but may be slid from one position to the other, or may be removed from the base as desired. In the top of the anvil are the usual staple prong clinching recesses 28, this bar being provided with one set of recesses for folding the prongs inwardly toward each other for a permanent clinching of the staple and which are located under the raceway and staple driving plunger in one position of the anvil bar, and the bar also has another set of anvil recesses for folding one of the staple prongs inwardly and the other prong outwardly for a so-called temporary setting of the staple, and which latter recesses are located under the plunger in another position of the anvil bar.

Means is also usually provided in this type of machine for normally yieldingly holding the front end or forward end of the housing in a raised position above the anvil, as indicated in Fig. 1, to permit the insertion of the work between the lower side of the housing and the anvil preparatory to the stapling operation. In the present case this comprises a pin 29 which is slidable in an opening in the top wall of the base and is supported by a spring 30 which forces the end of the pin against the underside of the housing to hold the forward end of the housing in the raised position as shown. This pin and spring will be depressed by pressure on the operating hand knob for the plunger which carries the forward end of the housing down on to the work preparatory to the stapling operation.

At the forward end of the housing is an upright guideway for a plunger bar 31 which carries on the forward wall thereof the staple driving plunger 32. This forward wall of the plunger bar has a raised elongated lug 33 (Fig. 11) which seats in a similarly shaped opening in the plunger 32 so that the plunger will travel with the bar 31 in its up and down movements. The rear portion of the plunger bar is cut away to provide upper and lower shoulders 34 and 35 between which is located a cross pin 36 which cooperates with these shoulders to limit the downward and upward movements of the plunger. Secured to the upper end of the plunger bar is a hand knob 37 to receive pressure of the hand in depressing the plunger to drive the staple. The plunger and its bar is normally held in its upper position as shown in Figs. 1 and 2 by a spring 38 seating at its upper end within the plunger bar and supported at its lower end on a cross member 39 in the housing.

Within the horizontal lower portion 40 of the housing is a guide for a staple strip along which the strip is fed forwardly to feed the individual staples on the strip in succession to the raceway under the plunger in the driving position. In the form shown this guide comprises a bar 41 of substantially U-shape having longitudinal ribs 42 along its side edges to space the sides of the bar from the inner side walls of the housing to provide the necessary clearance space for the depending prongs of the staples as they are fed forwardly along the top of the bar. The bar may be of other shapes in cross section if desired. A strip of these staples of substantially U-shape and inverted so that the prongs are

located at 43 resting on the top of the guide bar 41. This strip is fed forwardly along the guide bar by an inverted U-shaped follower 44 slidable along the top of the bar and detachably connected by any suitable means, such as a catch 45, with a hand lug 46 connected to a coil spring 47 which tends to draw the hand member 46 forwardly toward the plunger and with it the follower 44 to feed the staple strip 43 forwardly. The rear end of the housing is open at 48 for insertion of the staple strip on to the guide bar 41 for loading the machine. The operation of loading comprises detaching the lug 46 from the follower 44 and then withdrawing this follower through the rear open end 48. The staple strip can then be inserted on the staple guide bar and then the follower inserted and connected to the hand piece 46.

It will be evident that the plunger 32 reciprocates vertically in a guideway in the housing, and the lower portion of this guideway forms a raceway or passage for the individual staples from the forward end of the staple strip at the top of the guide bar 41 downwardly to the staple driving position as the plunger is depressed, it being understood that the lower end of the plunger rests on the top of the connecting cross bar of the individual staple and forces it downwardly in the raceway and drives its depending prongs into the work. For this operation it is necessary that these prongs be either retained in the upright or vertical position during this downward movement in the raceway or that they be brought to this position immediately before they are forced into the work. The forward wall of this guideway or raceway is formed by a yieldable member 49, this member being mounted to yield forwardly away from the end of the guide bar 41. This yieldable wall may be mounted and formed in various ways, but in the present construction it comprises one leg of an inverted substantially U shaped spring member 50 shown in perspective in Fig. 13. This spring member 50 is supported on a cross pin 51 extending between the side plates 52 of a removable front lock 53 and located a suitable distance above the top of the guide bar 41. The forward leg 54 of this spring member rests against any suitable abutment, such for example as the lower end 55 of the front wall 56 of the removable block 53. The wall 49 of this spring member 50 is spaced forwardly of the top edge of the guide bar 41 a distance substantially equal to the thickness of the plunger, and it is preferred that the plunger be of a thickness substantially equal to the width or gauge of the wire of the narrowest staple it is intended to drive in this machine. It will, however, be seen that this wall 49 of the raceway will yield forwardly to permit wider staples, or that is, staples with a greater width or gauge of wire to enter the raceway. As the staples are usually formed of round wire which has been flattened somewhat on the top and bottom it will be evident the staples have rounded walls at the lower side edges of the cross bar and this will cooperate with the top edge of the guide bar 41 to provide a camming action to force a wider staple into the raceway as the plunger is depressed, the resilient wall 49 yielding forwardly to permit this. This action may also be facilitated by forming a bevel 57 on this forward edge of the bar 41. If this bevel tapers toward the opposite sides of the bar as indicated in Fig. 8 it will also straighten staples which come to the driving position

with their connecting top bar somewhat inclined to the axis of the staple strip.

It is also preferred to provide the wall 49 with forwardly curved recesses 58 in alignment with the depending prongs of the staples so that should the staple be brought to the raceway with the prongs inclined forwardly they will enter these recesses and permit the connecting top cross bar of the staple to move to its proper position in the raceway under the plunger. The lower ends of these recesses are curved backwardly as indicated at 59, so that when the staple inclined as described is forced downwardly by the plunger the prongs are guided by these lower ends of the recesses backwardly to an upright position in the raceway, so that the staples are driven in their proper upright position.

If for any reason a number of staples should be clinched in the raceway, as for example as someone playing with the machine and depressing the plunger several times without work inserted on the anvil, and if it should happen that one or more of these staples should be forced in front of the plunger as indicated for example at 60 in Fig. 12, the front wall 49 of the raceway will yield as indicated. In order to remove these staples by depression of the plunger a forwardly projecting pin or lug 61 is mounted on the plunger adjacent its lower end. On depression of the plunger this will engage any such staple and force it out of the raceway. In order to accommodate this lug and permit its upward and downward movement the yieldable wall 49 is provided with a vertical slot 62 into which this lug projects.

As above indicated the removable block 53 has opposite side plates 52 and the block is mounted on the housing by seating in recesses 63 in the side walls of the housing so as to embrace the cross portion 39. These side walls 52 are connected by a lower cross member 64 which seats behind a lower depending rib 65 at the forward end of the guide bar 41, it being evident as shown in Figs. 6 and 7 that the forward edge of this cross member engages the shoulder at the rear side of this depending rib. This effectively prevents the block 53 moving forwardly and it is otherwise secured in position by the screws 66. The block, however, may be easily removed by merely removing the screws 66 and then shifting the block downwardly to withdraw the cross member 64 from its position behind the rib 65.

Mounted on the forward wall or surface of the plunger 32 is a control slide 67 preferably in the form of a flat bar as indicated in Fig. 16. This slide moves with the plunger under certain conditions but has a lost motion connection with the plunger so that the plunger can have certain movement independently of this slide. In the present case this lost motion is secured by a pin 68 projecting forwardly from the plunger or the plunger bar into an elongated slot 69 in the slide 67. This slide has adjacent its lower end an inclined shoulder, formed in the construction shown in Fig. 16 by a cross groove 70 in its front wall, this groove being substantially V-shaped to provide an inclined lower wall.

Mounted in a slot or recess 71 in the front wall of the housing is a catch or pawl 72 pivoted at 73. At its lower end it has a lug 74 adapted to seat under certain conditions in the recess 70 to engage the lower inclined wall thereof, or under other conditions to seat in an opening or recess

75 in the plunger 32. The catch or pawl 72 is urged toward the plunger by means of a spring. In the present construction this comprises a flat spring plate 76 mounted in a recess 77 in the front wall of the housing by any suitable means such as a screw 78 so that it presses on the forward wall at the lower end of the pawl 72. The opening 75 in the plunger is so located as to be covered in certain positions by the control slide 67. The object of this slide, the pawl 72 and the opening 75 is to lock the plunger in a partially depressed position so that its lower end is below the top of the staple guide bar 41, as indicated in Fig. 4, to prevent a second staple from entering the raceway should the plunger after being depressed be released without being driven to its extreme lower position. In other words should it be pressed only part way so that the staple indicated at 79 in Fig. 4 is not driven from the raceway and the plunger should then be released, it will automatically be prevented from assuming its normal raised position and will be locked in such a position as to prevent a second staple entering the raceway until the plunger has been depressed to its extreme lower position so as to drive the staple 79 from the raceway. This operation is as follows:

As indicated in Figs. 1 and 2 the plunger 32 is in its normal extreme upper position, and it will be seen that its lower end 80 is spaced sufficiently above the top of the guide bar 41 to permit a staple to be fed into the raceway under the plunger. In this position the pin or lug 68 on the plunger bar is against the top end of the slot 69 (Fig. 16) of the control slide 67 and it therefore retains this slide in its uppermost position above the pawl or catch 72. If now the plunger is depressed to drive the staple the slide 67 moves downward with it until its lower end engages the lug 74 on the catch or pawl 72, and it is then held against further downward movement until the pin 68 engages the lower end of the slot 69. This is just before the plunger is fully depressed, or that is, shortly before its extreme lower or complete staple driving position. If the plunger is not further depressed to its extreme lower position it will be evident that the control bar 67 will not be further depressed; and if the plunger is released without being depressed further from this position, as it is forced upwardly by the spring 38 the lug 74 on the catch 72 will enter the opening 75 in the plunger as indicated in Fig. 4 and will lock the plunger against further upward movement. It will be seen that in this position the plunger is locked with its lower end 80 below the top of the staple guide bar 41 and therefore it extends across and closes the entrance for the staples into the raceway, and prevents a second staple entering the raceway until the plunger can be raised to its extreme upper position. As the plunger was not fully depressed there is still an undriven staple 79 (Fig. 4) in the raceway. If now the plunger is again depressed the top of the opening 75 in the plunger will engage the top of the curved lug 74 of the catch 72 and will force it out of the opening 75, and the plunger may be depressed to the full lower or staple driving position and set the staple 79.

It will, however, be seen from the above description that if the plunger is depressed below the position where the pin or lug 68 engages the lower end of the slot 69 in the control bar 67, this further downward movement of the plunger will carry the bar 67 with it, and the lower end of the bar by engaging the curved top of the lug 74 will

force the catch 72 outwardly so that the lower end of the bar 67 passes under the lug 74 as indicated in Fig. 5. The lug 74 now seats in the recess 70 and when the plunger is released the bar 67 is retained in this position by the lug 74 until the pin 68 engages the top end of the slot 69. Then further upward movement of the plunger will carry the control bar 67 with it, the inclined lower wall of the slot 70 having a camming action on the lug 74 under action of plunger spring 38 to release the bar. The bar 67, the recess 70, slot 69, lug 68 and opening 75 are so located relatively to each other that when the lug 74 is in the recess 70 this opening 75 passes under the lower end of the bar 67 and the lug 74, as shown in Fig. 3 at about the time the pin 68 engages the top end of the slot 69. In this position as shown in Fig. 3 it will be evident the bar 67 prevents the lug 74 from entering the recess 75 and therefore it does not catch or lock the plunger in a partially depressed position, but the plunger is allowed to continue on to its extreme upper position of Fig. 2. The movement of the plunger from the position of Fig. 3 to the position of Fig. 2 carries the bar 67 with it because of the pin 68 engaging the top of the slot 69. It will thus be evident that if the plunger is fully depressed to its extreme lower or full staple driving position the bar 67 prevents the lug 74 of the catch 72 from entering the recess 75, and the plunger is permitted to freely return to its extreme upper position, but if the plunger is only partly depressed anywhere between the position of Fig. 4 to a short distance above its extreme lower position the lower end of the control bar 67 is not carried under the lug 74 and therefore if the plunger is released there is nothing to prevent the lug 74 entering the recess 75, and the plunger will be locked in a position shown in Fig. 4 with its lower end above the top of the staple guide bar 41 to prevent another staple entering the raceway. Therefore if the plunger is fully depressed to its complete staple driving position it will when released be automatically shifted to its extreme upper position in preparation for the next staple driving operation, but if its previous downward movement is not completed so that the forward staple is not driven or removed from the raceway, then when the plunger is released it is automatically locked in the position of Fig. 4 to prevent a second staple entering the raceway, and it will not be so released as to be permitted to be shifted to its extreme upper position until it has been fully depressed to drive the staple indicated at 79 (Fig. 4) already in the raceway out of the raceway.

The principal object of lug 61 is to provide means on the plunger to prevent staples from getting between the plunger and the yieldable front wall 49.

It is not necessary that the inclined wall on the bar 67 coacting with the lug 74 be a transverse groove as shown at 70 in Fig. 16 but any inclined shoulder may be used. Thus in Fig. 17 it may be in the form of a transverse rib 70a, or as shown in Figs. 18 and 19 the bar may be lanced and a lug 70b bent laterally therefrom.

From the foregoing description it will be evident that this machine is adapted to drive staples made of different widths or gauges of wire; that should undriven staples become lodged in the raceway forwardly of the plunger they will be automatically removed therefrom on the next downward movement of the plunger; and that should the plunger be only partially depressed

so as not to complete the staple driving operation and is then released, it is locked against moving to its extreme upper position and is held across the entrance for the staples into the raceway to prevent a second staple entering the raceway until the previous staple has been removed therefrom. Therefore the liability of clogging of this machine is reduced to a minimum.

Having thus set forth the nature of my invention, what I claim is:

1. In a staple driving machine including a housing having a raceway, a plunger reciprocable in the raceway to drive individual staples and movable between extreme advanced and retracted positions, a shoulder movable with the plunger, means for feeding staples to the raceway and rendered ineffective by the plunger in an intermediate position, means mounted on the housing adapted to engage said shoulder for locking the plunger in said intermediate position, a control member carried by the plunger and movable relative to said shoulder to a position to render the locking means ineffective, and a lost motion connection between the plunger and the control member for shifting the latter member by movements of the plunger.

2. In a staple driving machine including a raceway, a plunger reciprocable in the raceway to drive individual staples and movable between extreme advanced and retracted positions, means for feeding staples to the raceway and rendered ineffective by the plunger in an intermediate position, a spring pressed pawl, a shoulder on the plunger to be engaged by the pawl to secure the plunger in the intermediate position, a control member mounted on and movable with the plunger to and from a position to prevent the pawl engaging said shoulder, and a lost motion connection between the plunger and the control member to shift the latter and permit limited movement of the control member on the plunger.

3. In a staple driving machine including a housing having a raceway, a plunger reciprocable in the raceway for driving the individual staples, a shoulder movable with said plunger, and means for feeding staples to the raceway to be driven, means mounted on the housing to engage said shoulder for locking the plunger in a position to prevent a staple entering the raceway if the plunger is not operated to the extreme staple driving position, a control member mounted on and movable with the plunger to and from a position between the locking means and the shoulder to render said locking means ineffective, and a lost motion connection between the plunger and said member to shift the latter by movements of the plunger.

4. In a staple driving machine including a raceway, a plunger reciprocable in the raceway to drive individual staples and movable between extreme advanced and retracted positions, means for feeding staples to the raceway and rendered ineffective by the plunger in an intermediate position, a spring pressed pawl, a shoulder cooperating with the pawl to lock the plunger in the intermediate position, a slidable bar carried by the plunger and movable to and from a position to prevent the pawl engaging said shoulder, and a lost motion connection between the bar and the plunger to shift the bar and permit limited movement of the bar on the plunger.

5. In a staple driving machine including a raceway, a plunger reciprocable in the raceway to drive individual staples and movable between extreme advanced and retracted positions, means

for feeding staples to the raceway and rendered ineffective by the plunger in an intermediate position, a spring pressed pawl, a shoulder cooperating with the pawl to lock the plunger in the intermediate position, a slidable bar movable to and from a position to prevent the pawl engaging said shoulder, a shoulder on the bar to engage the pawl to retain the bar in the pawl unlocking position, and a lost motion connection between the bar and the plunger to shift the bar.

6. In a staple driving machine including a raceway, a plunger reciprocable in the raceway to drive individual staples and movable between extreme advanced and retracted positions, means for feeding staples to the raceway and rendered ineffective by the plunger in an intermediate position, a movable pawl, a shoulder cooperating with the pawl to hold the plunger in the intermediate position, a control bar movable with the plunger to and from a position retaining the pawl away from said shoulder, a shoulder on the bar adapted to cooperate with the pawl to hold the pawl in the plunger releasing position, and a lost motion connection from the plunger to the bar to shift the bar.

7. In a staple driving machine including a housing having a raceway, a plunger reciprocable in the raceway for driving the individual staples and having a shoulder, a staple feed guide bar at one side of the raceway, means for feeding staples along said bar to the raceway, means mounted in the housing and movable to and from a position to engage said shoulder for locking the plunger in a position at the forward end of said guide bar to prevent staples entering the raceway, and a control device mounted on and operated by movements of the plunger to control the operation of said locking means.

8. In a staple driving machine, a movable plunger for driving the individual staples, a raceway in which the plunger is movable, a support and guide for the staples, means for feeding staples along said guide to the raceway, a yieldable resilient wall forming the front of the raceway beneath the plunger and adapted to yield outwardly, said wall being of sufficient width to guide the prongs of the staple being driven, a lug on the plunger adapted to engage staples which

may get in front of the plunger and remove them from the raceway, and said yieldable wall having a slot into which said lug projects.

9. In a staple driving machine, a movable plunger for driving the individual staples, a raceway in which the plunger is movable, a support and guide for the staples, means for feeding staples along said guide to the raceway, said plunger having a recess, a pawl adapted to enter said recess to retain the plunger at the front of the staple guide in position to prevent staples from entering the raceway, a control slide movable with the plunger to and from a position to retain the pawl out of the recess, said control slide having an elongated slot, and means on the plunger entering the slot to provide a lost motion connection between the plunger and the slide.

10. In a staple driving machine, a movable plunger for driving the individual staples, a raceway in which the plunger is movable, a support and guide for the staples, means for feeding staples along said guide to the raceway, a yieldable resilient wall forming the front of the raceway beneath the plunger and adapted to yield outwardly, said wall being of sufficient width to guide the prongs of the staple being driven, and means on the front wall of the plunger to engage a staple between the plunger and the yieldable front wall and force it out of the raceway.

11. In a staple driving machine, a movable plunger for driving the individual staples, a raceway in which the plunger is movable, means for feeding staples to the raceway, an inverted substantially U-shaped spring plate arranged with one leg forming a yieldable front wall for the raceway and of sufficient width to guide the staple prongs, said wall having a slot intermediate the prongs of a staple in the raceway, and a lug on the plunger movable in said slot.

12. In a staple driving machine, a guideway for staples being driven, a plunger movable in the guideway, means for feeding staples to the guideway, a spring plate forming a yieldable front wall for the guideway and of sufficient width to guide the staple prongs, said wall having a longitudinal slot, and a lug on the plunger projecting into said slot.

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