Sept. 27, 1938. W. DRYPOLCHER 2,131,473

STAPLING MACHINE

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Fig. 1.

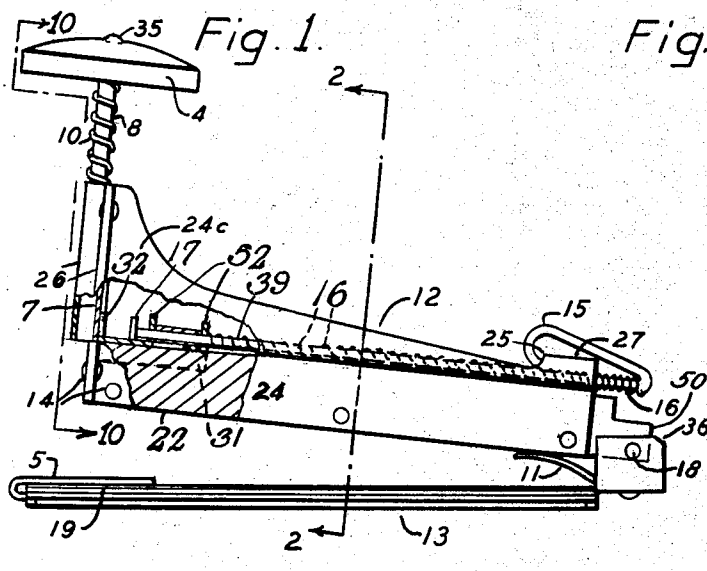


Fig. 2.

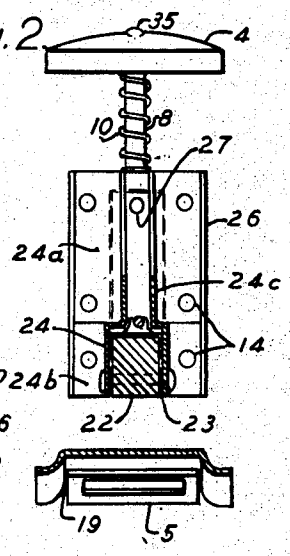


Fig. 3.

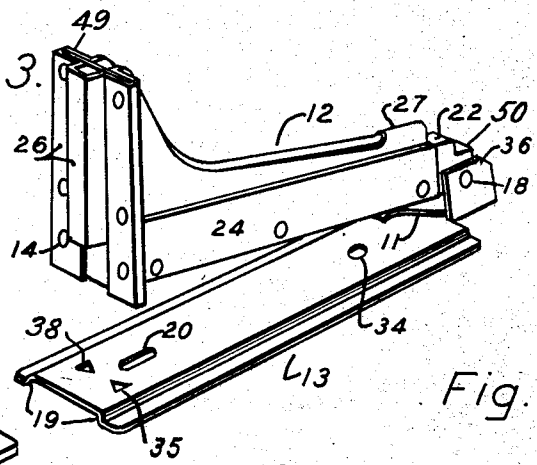


Fig. 4.

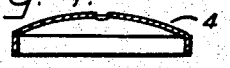


Fig. 5.

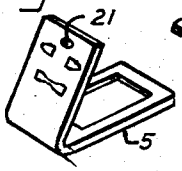


Fig. 8.

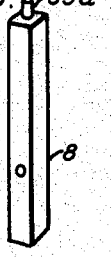


Fig. 7



Fig. 6.

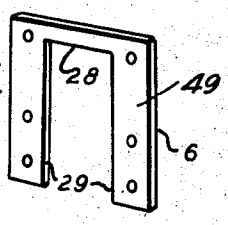
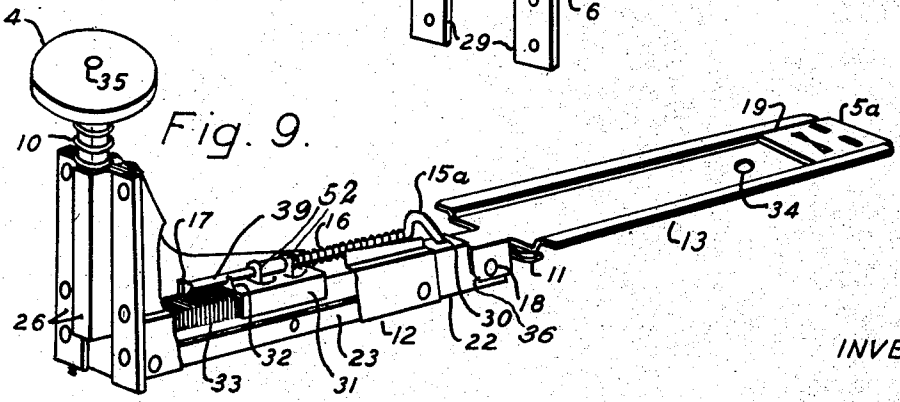


Fig. 9.



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Fig. 10.

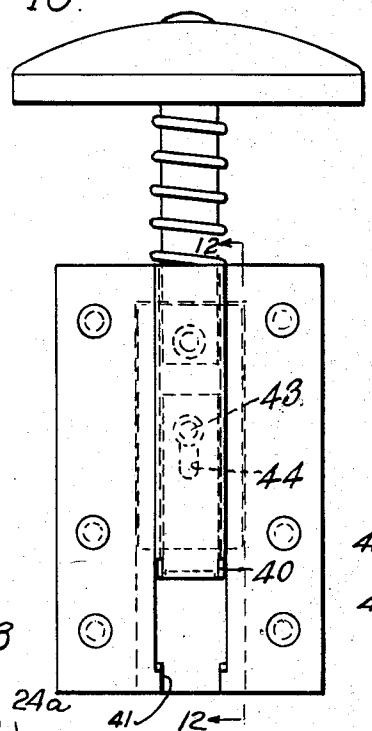


Fig. 11.

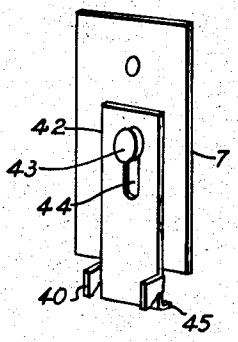


Fig. 8a

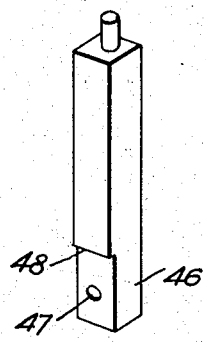


Fig. 15

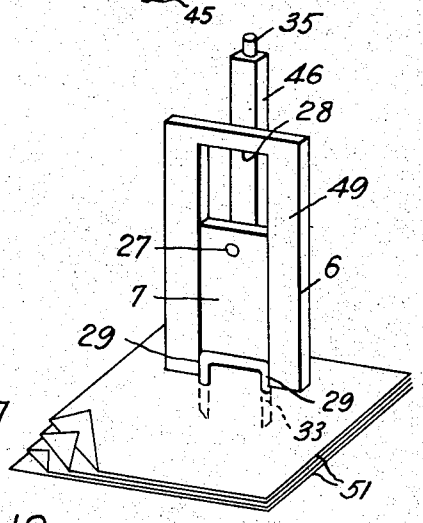


Fig. 13

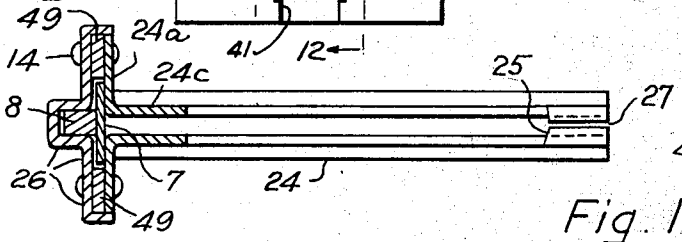


Fig. 12a.

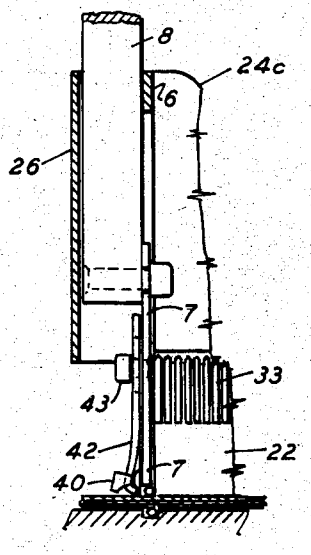


Fig. 12

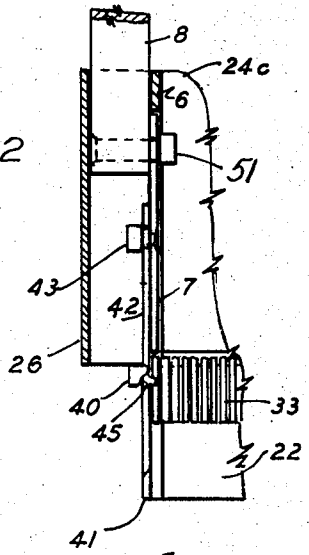
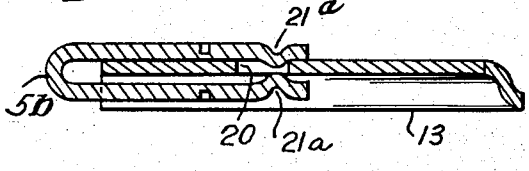


Fig. 14



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UNITED STATES PATENT OFFICE

2,131,473

STAPLING MACHINE

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Application September 19, 1934, Serial No. 744,654

18 Claims. (Cl. 1—3)

This invention is concerned with a stapling machine and has for its object the improvement in stapling machines, particularly in connection with the trend toward incorporating many different types of staple clinching arrangements in one machine.

Stress has also been placed upon a construction which tends to eliminate clogging of the staples.

A further feature of the invention is embodied in the simplicity of design allowing for economical construction and continual trouble-free functioning of the machine.

One embodiment of my invention is illustrated by way of example in the accompanying drawings in which:

Figure 1 of the drawings shows a side view of one assembly of the device as used for stapling.

Figure 2 is a cross section taken on line 2—2 of Figure 1.

Figure 3 shows the perspective view of the base and the top of the device, with some of the parts removed, using the assembly as of Figure 1.

Figure 4 is a cross section through the plunger knob.

Figure 5 is a perspective view of one type of removable clinching plate distorted and partially spread open and roughly indicating that more than one clinching die may be shifted to align under the stroke of the driving blade, and also shows two of the more frequently used die shapes for clinching the staple. The normal shape of the plate assembled on the machine is shown in Figures 1 and 9.

Figure 6 is a perspective view of a channel spacer, used to maintain a definite space through which the driving blade and staple moves.

Figure 7 is a perspective view of a form of driving blade used.

Figure 8 is a perspective view of a plunger shaft.

Figure 8A shows a modified plunger shank.

Figure 9 shows the stapler with its base swung back to use the device to drive staples without clinching them.

Figure 10 is a front view on line 10—10 of Figure 1 showing a modified form of the machine assembled with a staple retractor member.

Figure 11 is a perspective view of a retractor attached to a driving blade showing the method of assembly.

Figure 12 is a partial section on line 12—12 of Figure 10 but with the near side of the casing removed to expose the interior mechanism with the plunger at the top position of its stroke.

Figure 12A is the same as Figure 12 except that the mechanism shows the plunger and driving blade at the bottom of its stroke and also discloses the action of the retractor.

Figure 13 is a section of the stapler on a horizontal line above the magazine. Figure 14 is a vertical section through a modified construction of the clinching die and its mounting. Figure 15 is a perspective view of the plunger and some adjacent parts with staple and sheets in place.

As shown in Figure 1, the device consists of a staple carrying arm 24 pivoted to a guide plate or base 13, the base being of rectangular construction with downwardly bent flanges 19 running along both sides, so as to afford greater rigidity.

At the forward part of the base, is stamped slot 20 (see Fig. 3) which co-acts with the clinching plate shown in Figure 5 as will be described later. Just forward of slot 20, there is stamped a clinching die 38, which is shaped so as to bring the legs of the driven staple together in a clinch. At the rear of said base there is turned upward from the material composing the base, a pair of brackets with pivot holes 18. In between these upturned brackets is riveted in position spring 11, the function of which will be explained later.

The staple carrying arm consists of magazine 24, which is composed of two similarly shaped pressed metal side pieces. These are riveted to a core 22 (Fig. 2), said core holding the side pieces rigidly in position. The side pieces, however, rest against spacing plates 23, which serve to keep the core substantially separated from the side plates, so as to allow the passage of staples which ride on the core and feed between the core and the side plates.

The core is pivoted to the base at 18.

The side plates 24 of the magazine are flanged inwardly so as to house the outside and the top of the staple clip. The flanges then turn upward as web members 24c to effect structural stiffness.

At the forward part of the housing, the side plates and webs are bent outward at substantially right angles as shown in 24A and 24B, acting as a backing for the plunger unit.

The spacer plate 49 shown in Figure 6 is assembled to the front bent portions of the side plates and a cover plate 26 is riveted thereon holding the entire assembly in position. The plunger unit consists of a drivng blade as shown in Figure 7, riveted by means of rivet 27 to the plunger shaft as shown in Figure 8, the top of said shaft having an extension which projects

through the plunger knob, as shown in Figure 4, the extension then being riveted over.

Figures 1 and 2 show the assembled plunger knob 4 held in position by the riveted portion 35 of the plunger shaft 8. Spring 10 is mounted on the plunger shaft 8 and serves to return the plunger knob to its uppermost limit, after said knob has been pressed downward as in operating the machine.

In Figure 1 the staple-feeding arrangement is shown as consisting of an inverted U-shaped pusher 31 with bent up ears 52 having openings which carry the guide rod 39.

The front end of the pusher rod 39 is headed or riveted as at 17 forming a stop which limits the travel of the pusher along the drive rod. As a result the pusher is not pushed off the end 17 of pusher rod when the pusher and rod are removed to insert a fresh supply of staples.

To arrest the pusher 31 while still clear of the path of the driving blade 7, the top of the pusher 31 is provided with a front bent up ear 32 which strikes the back of the driving blade 7 as the pusher 31 thrusts the last staple under the driving blade 7, and thus arrests the pusher before it gets under the driving blade 7.

Mounted on said rod is spring 16 which serves to force the staple pusher forward, thereby feeding staples 33 toward the staple driving position. The staple pusher rod may be held fixed in position by several methods, two of which are shown in the accompanying drawings.

In Figure 1 staple pusher rod is shown with bend 15 which engages against inwardly turned flaps 27, thereby holding rod in position. Another method is shown in Figure 9, in which flaps 27 are eliminated and staple pusher rod provided with a bent end 15a is inserted downwardly in hole 30 in the core.

The spacer plate as shown in Figure 6 has several functions, one of these is to provide sufficient space between the cover plate 26 and the outwardly bent shoulders of 24 to allow passage of the driving blade and staple.

Another function of the spacer plate is for the side edges 29 to act as guiding edges so that the staple, during the operation of driving, will be firmly supported on the sides. Still another function is carried out by the cross piece 28 which extends directly in the path of the upward stroke of the driver. The top edge of the driver (see Figure 15) impinges against edge 28 and is, thereby, prevented from further vertical upward movement. In other words, 28 acts as a stop.

One form of clinching plate is shown in Figure 5, the upper surface of this plate has embossed in it the die slots into which the staple legs descend and are thereby clinched in various fashions.

21 (see Figs. 5 and 14) represents an indent formed by the metal being punched downwardly, so as to protrude and engage in slot 20. The side edges of the clinching plate contact against the edges formed by the downwardly bent flanges 19 and are guided thereby. The protruding metal from 21 engages in the slot 20, said slot acting as a stop to limit the motion of the clinching plate in either direction so as to properly align either type of clinching die slot directly under the staple driving channel.

Another form of clinching plate is shown in Figure 9 in which it will be seen that clinching die slots are embossed in both sides of the plate so that the user may have a choice of one of several different types of clinching simply by aligning the desired die slot under the staple driving blade.

A third form of clinching plate is shown in Figure 14 bent at 5b to embrace opposite sides of the base 13 and indented both on top and below at 21a to engage the slot 20.

The open end of the clinching plate is snapped over the front of the machine and pushed backwardly until indent 21 drops into slot 20. It may be forced in either direction so as to align different types of clinching slots on its surface. The alternate type shown in Figure 9 has clinching slots embossed on top and bottom surfaces; therefore, it may be removed and reversed so as to bring uppermost whatever clinching slots have been stamped on the reverse surface of the clinching plate; then pushed back into operable position on the base of the machine.

This feature is of considerable importance as it makes available a wide variety of different types of clinching slots on a single machine. It should be noted also that the clinching plate is removable and should the user desire only the standard type of clinching die, this is available in the clinching die embossed directly in the base.

The staple core 22 is provided with step 50. It will be seen that the base may be swung backward through an angle of approximately 180 degrees. When in this position, the base is held snugly by means to be described, and the rear edge of that portion of the base which acts as brackets comes to a stop against the step in the core. When the base is in this position, the machine may be used as a tacking machine.

It will be noted that the upper rear corners 36 of the pivoting brackets of the base are bent inwardly toward each other. Ordinarily these corners are not in contact with the core. However, when the base is swung around, as shown in Figure 9, the corners tend to press against the core and hold it by friction so that the base remains firmly in position and may be used as an auxiliary handle permitting the use of the device as a tacker.

Refer to Figures 10 and 11. One modification of the machine is shown in which the front plate 26 has at its lower cut-out portion two projecting wings 41. Slidably attached by means of a rivet 43 to the driver 7 is a strip 42 substantially rectangular in shape with an elongated slot 44 provided near one end and at the opposite end being provided with ears 40 and bent tongue 45. This attachment works in conjunction with the staple driving mechanism to retract a staple which has not been completely expelled from the staple driving channel. It is called a staple retractor. In the present invention, this retractor, being slidably mounted on the blade, has its tongue 45 protruding under the cross-bar of the staple so as to support said staple during the stroke of the blade. Its position at rest is clearly indicated in Figure 12 which shows the relative positions of the driving blade, the staple and the retractor tongue. At the bottom of the stroke of the blade, the ears 40 engage and ride over the wings 41 thereby bending the retractor in such fashion so as to disengage the tongue 45 from underneath the staple crown permitting said staple to be driven flush into the material. As continued pressure is applied on the plunger during the downward stroke, the retractor tongue 45, even though bent outwardly by wings 41, strikes against the material being stapled and as further continued pressure on the plunger forces

it downwardly, the retractor 42 remains fixed against the material and the changing relative position of the two parts is compensated for by the motion of pin 43 sliding in slot 44. As the blade starts its upward motion, the retractor is carried along with it until the upper edge of the ears 40 engage against the under edge of the plunger housing 26 and retain the retractor against further upward motion while the relative position between the blade and retractor is again compensated for by the motion of the pin 43 through slot 44.

In operation, the machine is loaded by disengaging the feed rod 16 from the latching means and extracting the rod, thereby removing the staple pusher at the same time. Staples are then inserted on the core and slid as far toward the front as possible. The pusher 31 is again placed on the core and pressure exerted on the rod 16 toward the direction of the front of the machine. The action forces the pusher forward, thereby feeding the staples so that the foremost staple on the clip is directly under the driving blade. Further forward pressure of rod 16 results in compression of the feed spring, thereby storing up enough pressure to feed the staple clip forward as the foremost staples are used up. The rod is now latched in position in accordance with one of the methods shown, and the device is ready to be used.

Pressure on plunger knob 4 results in the entire magazine pivoting at point 18 and revolving against pressure of spring 11 until the bottom of the magazine rests on the material to be stapled.

Further continued pressure on the plunger knob drives the staple downward through the material and into whatever type of clinching slot is aligned under the blade, thereby clinching the legs of the staple.

The retractor is so arranged that in its normal position as shown in Figure 12 the tongue remains underneath the cross-bar of the staple. As the plunger is depressed, the tongue continues in its position underneath the cross-bar of the staple and should the stroke be uncompleted and the plunger returned to its top position, the tongue follows along under the cross-bar of the staple, thereby bringing it back with the blade. As the stroke is carried further downward toward completion, the bent out ears on the side opposite the tongue engage in wings on the face plate of the machine with the result that the entire retractor is lifted outward, disengaging the tongue from under the cross-bar of the staple. The staple, having now been released, is ready for the final clinching motion of the plunger. During this final clinching motion, however, the retractor is pressing against the material to be stapled and if some method were not provided for release of the further pressure, there would be a tendency to bend the retractor out of position. To avoid this, a slot has been incorporated in the retractor and so arranged that the retractor can slide backward by means of the co-action between the slot and the pin which holds the retractor assembled to the blade. During the upward stroke, the retractor follows the blade in its upward motion. However, since it has been displaced upwardly by the completion of the stapling stroke, it must again be displaced downwardly so as to return it to its original position of support beneath the staple cross-bar and this downward displacement is accomplished when the bent out ears 40 impinge against the bottom of the plunger housing, thus holding the retractor in its effective position while the plunger itself completes its stroke.

To use as a tacker, the base is simply swung back, through an angle of approximately 180 degrees where it is held frictionally and can now be used as a handle while the remainder of the machine is used as a tacker.

Although the drawings show my invention in several of its diverse forms, it is to be understood that there is no intention to limit this invention to these forms, as there may be many modifications made without departing from the principles and the scope of my invention.

What I claim is as follows:

1. A stapling machine comprising a base, a magazine over the base, a core located in spaced relationship to the side and top surface of the magazine and pivoted to the base, means for feeding staples along the core toward the front of the machine, a staple driver at the front end of the machine to drive the foremost staple, and a clinching die in the base adapted to clinch over the legs of the staple, said core having a step at the rear end to act as a stop for the pivoting motion of the base when base is swung back approximately 180 degrees.

2. A stapling machine comprising a base, a magazine over the base, a core located in spaced relationship to the side and top surface of the magazine and pivoted to the base, means for feeding staples along the core toward the front of the machine, a staple driver at the front end of the machine to drive the foremost staple, and a clinching die in the base adapted to clinch over the legs of the staple, said core having a step cut out above the pivoting point, and said base being adapted to be swung backward through an arc to allow the rear end of the base to stop against the cut out portion of the core.

3. In a stapling machine the combination of a staple carrying arm containing a core to support the staples, means to feed the staples forward on the core, and a staple driving means at the forward end of the arm with a clinching base pivoted to the core at the opposite end, said base having downwardly bent side flanges, and an auxiliary U-shaped stapling die plate with upper and lower side edges slidable along said base and guided along its lower side edges by the downwardly bent side flanges of the base.

4. In a stapling machine, a base having downwardly bent longitudinal flanges, a magazine, a driving blade, a clincher plate having an upper face with diverse clinching dies to variously clinch staples driven by the blade, said plate having an arm extending beneath the plate and between the flanges, and means on the arm bearing against the bottom of the base for holding the plate upon the base holding it in a set position.

5. In a stapling machine, a relatively long and narrow base having a slot and downwardly bent flanges at its long edges, a magazine above the base, a slidably mounted clincher plate with arms and having an upper face with diverse clinching dies to variously clinch staples driven by the blade, an arm of the clincher plate extending beneath the base to hold the plate upon the base, guiding means for the clincher plate, and a detent on the clincher plate entering the slot on the base to limit its travel.

6. In a stapling machine the combination with a base and a magazine, of a device for feeding staples along the magazine, a clincher die in the base, a driving blade adapted to drive the staple set under it by the feeding device to clinch it on

the clincher die, a retractor travelling with the driving blade, a tongue forming part of the retractor and adapted to swing under the staple driven by the driving blade so that it holds the staple against the driving blade, ears on the retractor, and cam surfaces carried by the magazine, said ears sliding the cam surfaces to carry the tongue clear of the staple after it enters the sheet to be stapled.

7. In a stapling machine the combination with a base and a magazine, of a device for feeding staples along the magazine, a clincher die in the base, a driving blade adapted to drive the staple set under it by the feeding device to clinch it on the clincher die, a retractor having a tongue normally lying under the staple ready to be driven so that it travels downward with the driven staple, an ear on the retractor, and cam surfaces on the magazine to carry the tongue clear of the staple as the staple head contacts with the sheet to be stapled.

8. In a stapling machine, a staple carrying arm, a core in said arm, a base, upstanding ears on the base having resiliency, a pin forming a pivot for the core carried in the ears so that the core turns easily on the base, said core adapted frictionally to engage the ears to hold the base after the base has been swung as much as a right angle away from the core.

9. In a stapling machine, a core forming a staple support, sheet metal plates fixed to the core and spaced from it to accommodate staples sliding on the support, and converging above the core to form shoulders to hold the staples on the support, said plates having laterally extending wings, a driving blade to cause the staples to attach papers, a pusher for the staples including a top member above the support and side members between the support and the plates, a spring driving the pusher to feed the staples to the blade and lying above the support and between the plates, said wings forming back guides for the driving blade, and a front sheet metal guide fast to the wings.

10. In a stapling machine, a solid bar forming a staple support, sheet metal plates riveted to the support and spaced from it to accommodate staples sliding on the support and converging above the member to form shoulders to hold the staples on the support, said plates having laterally extending wings, a driving blade to cause the staples to attach papers, a pusher for the staples including a top member above the support and side members between the support and the plates, a spring driving the pusher to feed the staples to the blade and lying above the support, said wings forming back guides for the driving blade, a front sheet metal guide fast to the wings, a sheet metal base, having upstanding ears, and a pivot for the support on which it turns between the ears.

11. In a stapling machine, a base having downwardly bent longitudinal flanges, a magazine, a driving blade, a clincher plate having an upper face with diverse clinching dies to variously clinch staples driven by the blade, said plate having a bent over bottom arm lying between the flanges to be guided by them and underlying the bottom of the base to hold the upper face upon the base.

12. In a stapling device, a magazine, a plunger means for feeding staples along the magazine beneath the plunger so the plunger may drive a staple, a retractor tongue slidable on the plunger and normally underlying the bridge of the staple so as to hold a staple to the plunger but adapted to travel with the plunger, a casing, wings on the casing, ears on the tongue adapted to strike the wings to swing the tongue to free it from the staple as the tongue reaches the limit of its travel with the plunger, and a plunger housing forming part of the casing adapted to be struck by the ears to arrest it under the cross-bar of the next staple as the plunger rises above the level of that cross bar.

13. In a stapling machine, a base, a magazine, a driving blade, a clincher plate having an upper face with diverse clinching dies to variously clinch staples driven by the blade, said blade having a bent over bottom arm lying against the bottom of the base to hold the upper face upon the base.

14. In a stapling machine, a staple carrying arm, a core in said arm, a base, upstanding ears on the base having resiliency and pivoted on the core and normally turning easily on the core, said core adapted to frictionally engage the ears to hold the base after the base has been swung as much as a right angle away from the core.

15. In a stapling machine, a relatively long and narrow base having a slot, a magazine above the base, a slidably mounted clincher plate with arms and having an upper face with diverse clinching dies to variously clinch staples driven by the blade, an arm of the clincher plate extending beneath the base to hold the plate upon the base, guiding means for the clincher plate, and a detent on the clincher plate entering the slot to limit its travel.

16. In a stapling machine, a base, a magazine, a driving blade, a clincher plate having a die to clinch staples driven by the blade, said plate having a bent over bottom arm, said arm being provided with a clinching die, and lying against the bottom of the base to hold the upper face upon the base and reversible to bring in position under the blade its die to otherwise clinch staples.

17. In a stapling device a magazine, a driving blade slidable across the magazine, a clincher plate having an upper face with diverse clinching dies to variously clinch staples driven by the blade, a guide plate on which the clincher plate is slidable, downwardly bent longitudinal flanges on the guide plate, a pivot connecting the guide plate and magazine to bring the blade and clincher plate into alignment, said clincher plate having a bent over bottom arm lying between the flanges to be guided by them and lying against the bottom of the guide plate to hold the clincher plate upon the guide plate.

18. In a stapling device a magazine, a driving blade slidable across the magazine, a clincher plate having an upper face with diverse clinching dies to variously clinch staples driven by the blade, a guide plate on which the clincher plate is slidable, an arm of the clincher plate extending beneath the guide plate to hold the clincher plate upon the guide plate, a pivot connecting the guide plate and magazine to bring the blade and clincher plate into alignment, guiding means for the clincher plate, and a detent upon the clincher plate entering a slot in the guide plate to limit its travel.

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