

May 9, 1933.

A. H. MAYNARD

1,907,849

STAPLING MACHINE

Filed March 13, 1930

2 Sheets-Sheet 1

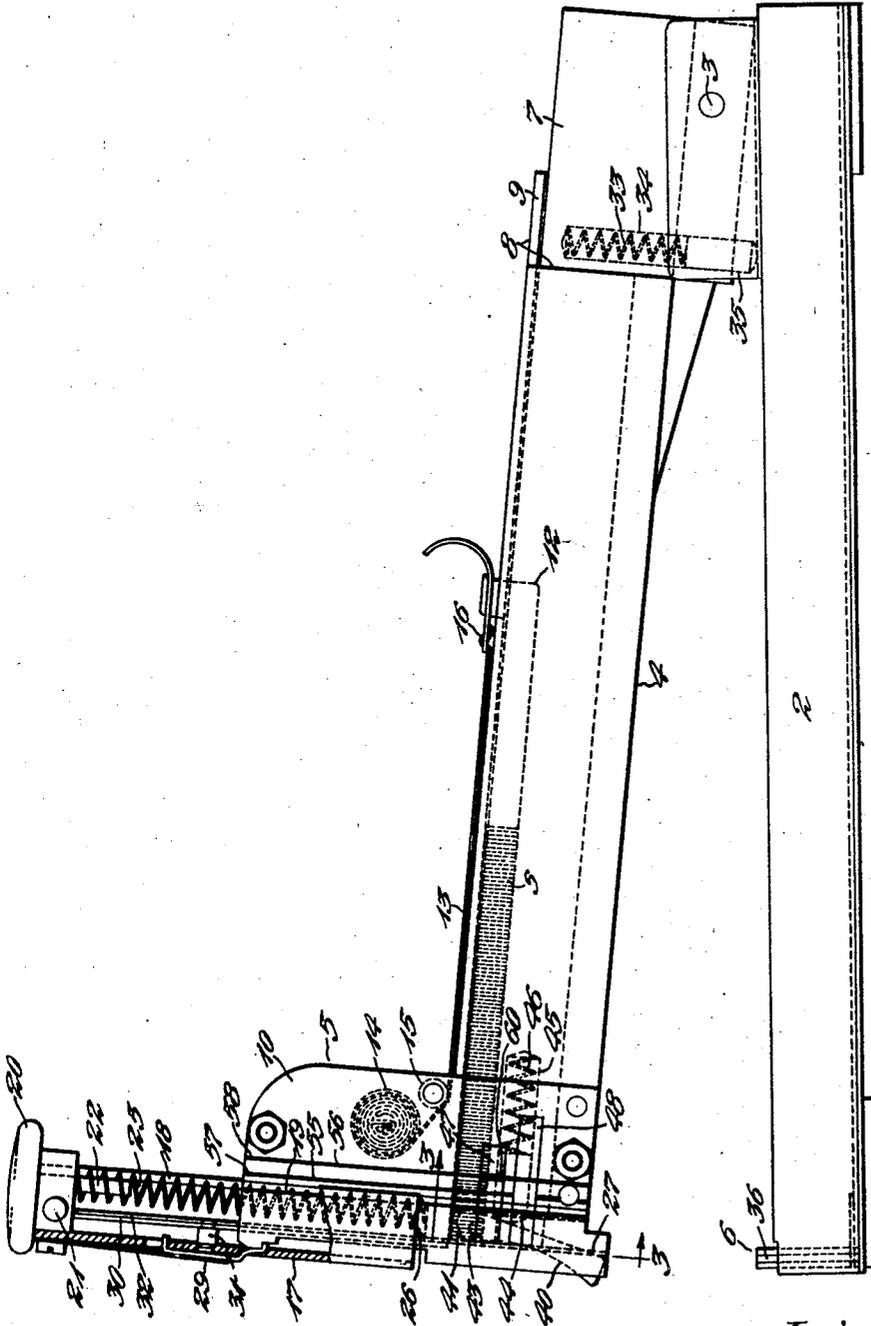


Fig. 1.

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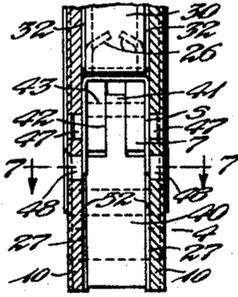
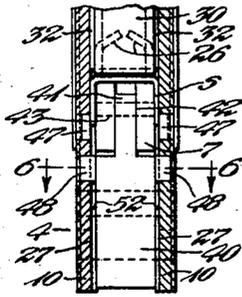
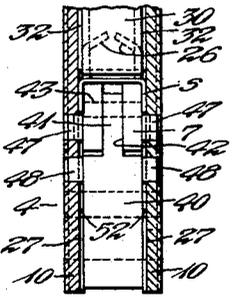


Fig. 3.

Fig. 4.

Fig. 5.

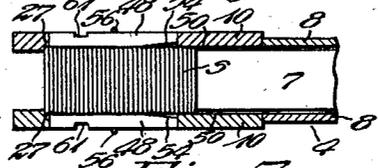
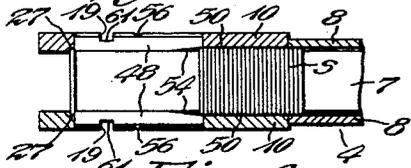


Fig. 6.

Fig. 7.

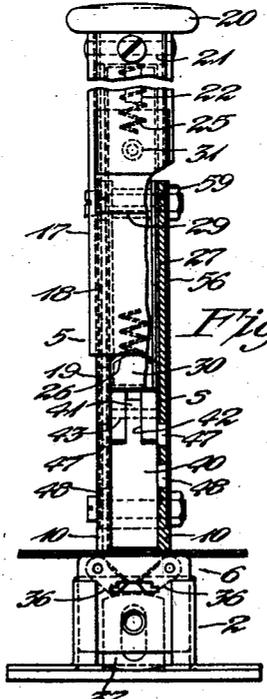
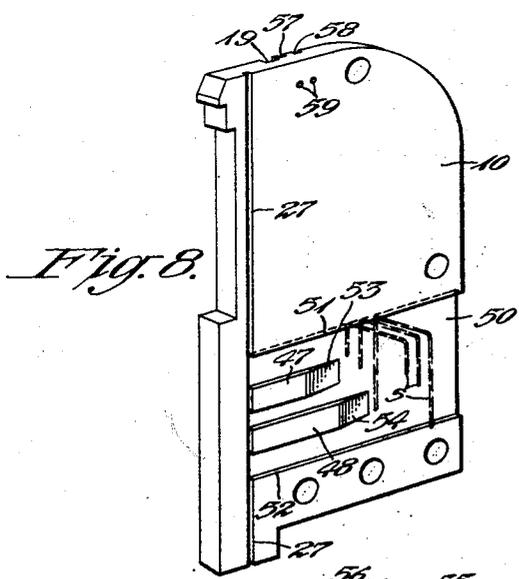


Fig. 2.

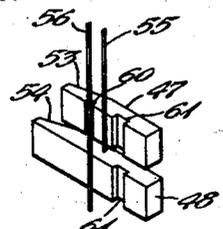


Fig. 9.

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UNITED STATES PATENT OFFICE

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STAPLING MACHINE

Application filed March 13, 1930. Serial No. 435,561.

This invention relates to improvements in wire-stitchers and stapling-machines for use in attaching sheets of paper and other objects, securing tags and labels to various articles, and for similar purposes.

A prime object of the invention is to provide a machine of the type specified which is adaptable for use with staples of different sizes.

Another object of the invention is to provide a machine of the type specified having self-adjusting means, herein termed "adapters", for conforming the machine to operate on staples of different lengths.

Another object of the invention is to provide a machine of the type specified wherein the adapters are arranged in cooperative relationship with the guiding-grooves through which the staples slide and act to support the legs of the staples to prevent them from canting as they are driven toward the work.

Another object of the invention is to provide a machine of the type specified having the so-called adapters arranged to come into play when relatively short staples are being operated upon in the machine and to be automatically displaced from operative position when staples with longer legs are used.

Another object of the invention is to provide a machine of the type specified having adapter-means in-built in the machine and of simple construction and proof against derangement or getting out of order.

Further objects of the improvement are set forth in the following specification which describes a preferred form of construction of the invention, by way of example, as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a view in side elevation of a conventional type of stapling-machine and illustrating the present improved adapter-means as applied to use therewith;

Fig. 2 is a front elevation of the machine showing the stapling-head depressed against the work with the staple-driver in raised position, and illustrating the fore part of the head in part section to disclose the present adapter-means;

Fig. 3 is an enlarged detailed view of the

fore part of the stapling-head showing it in section on line 3—3 of Fig. 1 and illustrating the adapter-means as operative with staples having relatively short legs;

Fig. 4 is a similar sectional view showing the method of operation of the adapters when staples with longer legs are used;

Fig. 5 is a similar sectional view showing two pairs of adapters displaced from operative position when staples with still longer legs are used;

Fig. 6 is a plan view, part sectional on line 6—6 of Fig. 4, showing the lower pair of adapters in operative position with staples having legs of medium length;

Fig. 7 is a similar view, part sectional on line 7—7 of Fig. 5, showing the adapters displaced from operative position by staples having relatively long legs;

Fig. 8 is an enlarged perspective view of the inside channeled face of the side-plate of the stapling-head which encloses the stapling-mechanism; and

Fig. 9 is a perspective view showing the construction of the adapter-elements and illustrating the manner in which they are yieldingly held in operative position by means of wire springs.

The present improved adapter-means may be used with various types of wire-stitchers and stapling-machines, being herein illustrated, by way of example, as applied to a hand-operated device of the construction shown and described in my copending application for United States patent, Serial No. 241,591, filed December 21, 1927.

As shown in Fig. 1 of the present drawings the stapling-machine comprises, in general, a horizontal base 2 mounting a stapling-arm 4 which is hinged or pivoted to its rearward end at 3. The stapling-mechanism is carried at the forward end of the arm 4, being housed in the stapling-head 5, and at the forward end of the base are suitable clincher-devices 6, to be later described. The stapling-arm 4 consists of a bar 7 of rectangular cross-section constituting a staple-core, across which the staples *s* are straddled to adapt them to slide forwardly thereon. Sheet-metal strips 8 are welded or otherwise

suitably attached to the sides of the staple-core 7 with their upper portions 9 folded across the top thereof in spaced relation thereto to form a magazine in which the staples are held.

The stapling-head or housing 5 is constituted by opposite vertical side-plates 10 riveted or otherwise suitably attached to the forward end of the staple-core 7. A staple-pusher 12 of U-shaped formation straddles the top of the core 7 and is urged forward to feed the staples into driving position by means of a spring 13. The spring 13 is constituted by a flat strip of tempered metal coiled into a volute 14 and supported between the side-plates 10 of the head 5. The free end of the spring 13 extends from the volute coil 14 under a roller 15 and thence leads rearwardly for attachment to the staple-pusher 12 at 16.

Embracing the forward portion of the head 5 is a hollow plunger 17 constructed from a folded strip of sheet-metal and provided with inwardly-projecting runners 18 which slide in vertical grooves 19 on the outer faces of the side-plates 10. Seated in the top of the hollow plunger 17 is a knob or presser-cap 20 which is secured in place by a cross-pin or rivet 21. Depending from the bottom of the knob 20 is a pin 22 which projects through the upper coils of a helical spring 25, the lower end of the spring being supported on prongs 26 extending inwardly from the side-plates 10 whereby it acts to maintain the plunger 17 in raised position.

A staple-driver 30 is attached to the forward wall of the plunger 17 by means of a rivet 31 with its upper edge bearing against the under-side of the knob 20. The staple-driver 30 is formed with narrow fins or splines 32 on its opposite edges which are received in vertical grooves 27 on the inner faces of the side-plates 10, see Fig. 8, whereby the driver is adapted to slide up and down in the staple-head when operated from the plunger 17. As usual in machines of the present type the staples *s* are fed off from the forward end of the staple-core 7 into the grooves 27 to present them beneath the driver 30 which, when the plunger 17 is forced downwardly against the resistance of its spring 25, acts to drive the staples down through the grooves into the work. The plunger 17 is provided on its forward side with latching-devices, indicated generally at 29, which operate in the manner as explained in my pending application, above referred to, to prevent the staple-driver from being returned to first position unless or until the staple being operated upon has been inserted clear through the work.

The stapling-arm 4 is maintained in elevated position above the base 2 as shown in Fig. 1, to provide for inserting the work

under the stapling-head 5, by means of a spring 33 located at the rearward end of the arm. The spring 33 is pocketed in a bore 34 on the under-side of the staple-core 7 and acts against a slidable plunger 35 which bears on the top of the base 2. The spring 33 has less tension than the plunger-spring 25 so that when pressure is applied to the knob 20 it will first cause the stapling-arm 4 to be swung down to bring the stapling-head 5 against the work before the plunger 17 starts to move downwardly on the head.

The clincher-device 6 comprises a pair of pivoted clinchers 36, shown most clearly in Fig. 2, which are operated from a vertical sliding plate 37 to swing their free ends upwardly to bend over the legs of the staple and clinch them against the work as the staple-driver completes the driving action. These parts are fully illustrated and described in my pending application above referred to and therefore need no further explanation herein.

Suspended from the forward end of the staple-core 7 is a staple-supporter 40, shown in Figs. 1 and 2, which acts to support the staple beneath the driver 30 as the latter descends in the head 5. As herein illustrated the staple-supporter 40 has a tongue 41 pivoted in a slot 42 at the end of the staple-core 7 by means of a cross-pin 43. A plunger-pin 44, see Fig. 1, is slidable in a bore 45 in the end of the core 7 with a spring 46 pocketed behind it to urge it outwardly against the staple-supporter 40 whereby to normally maintain the forward curved face of the latter disposed across the grooves 27 in which the staples are guided down into the work. As the staple-driver 30 is slid down through the grooves 27 the legs of the staple being driven straddle the sides of the supporter 40 and the latter retains the staple against the bottom edge of the driver during the last end of the stroke thereof to guide the staple into the work. As the staple is driven into the work it forces the supporter 40 back against the pressure of the spring-plunger 44.

As before indicated, the present invention is concerned with means for adapting the stapling-machine to operate on staples of different lengths and for this purpose it comprises a plurality of yieldable elements 47 and 48, called for convenience "adapters", which are held in slots in the side-plates 10 with their forward ends forming a continuation of the grooves 27. Referring particularly to Fig. 8 of the drawings, it will be noted that the inner face of the side-plate 10 is milled out or cut away to form a channel 50 extending along the side of the staple-core 7. The channel 50 is of a depth substantially equal to the thickness of the wire of the staples and its width corresponds to the length of the longest staple to be used so that the legs thereof may slide through the channels

of both side-plates as the staples feed forwardly on the core 7 to advance them through the head into position to be driven. The cutting of the channel 50 through the faces of the side-plates 10 interrupts the grooves 27, that is to say, each groove extends down to the edge 51 of the channel and then its rearward side is cut away by the channel to the bottom edge 52 thereof.

Now, it is to be observed that when staples of maximum length, say with legs three-quarters of an inch long, are being used in the machine as illustrated in Fig. 5, the staples will slide forward on the core 7 with their legs passing through the channels 50 and the foremost staple in the series bringing up against the forward side of the grooves 27 in the two opposite side-plates. A staple of this size when fed off from the end of the staple-core will be held in erect position by the pressure of the other staples behind it so that the points of its legs will be properly guided into the lower portions of the grooves 27. Staples with shorter legs, however, for example one-quarter inch staples such as illustrated in Fig. 3 of the drawings, must be carried down a considerable distance, that is, across the width of the channels 50 before the points of their legs enter the lower portions of the grooves 27, and it has been found that unless the staple being driven is given some support or backed up on the rearward side of its legs it will have a tendency to rock and cant. After it passes down beyond the control of the staples in back of it its legs are liable to cant back so that their points will strike against the edges 52 of the channels 50 in the side-plates 10 instead of entering the lower portions of the grooves 27. In such case the force of the staple-driver will cause the staple to be bent or buckled so that it will stick in the machine and clog its action.

To prevent such misalignment or canting of the staples as they are carried down in the stapling-head the adapters 47 and 48 are provided, the latter being slidable in their slots in the side-plates 10 and yieldingly pressed against the sides of the staple-core 7 in the manner as shown most clearly in Fig. 6 of the drawings. The present embodiment of the invention illustrates two pairs of adapters, the upper ones 47 being spaced below the upper edge of the channel 50 to an extent corresponding substantially to the length of the legs of the shorter staples; and the lower pair 48 being arranged in opposite relation at a slight distance below the upper pair. The adapters 47 and 48 are so located in their slots in the side-plates 10 that their forward ends aline with the rearward sides of the grooves 27 in the plates. At their rearward ends the adapters are beveled off at 53 and 54, or inclined to meet the side face of the recessed portions 50 of the plates 10, whereby when the staples being used are long enough

to reach down across the adapters their legs will slide along the inclines or beveled portions 53 and 54 and press the adapters back into their grooves.

The adapters 47 and 48 are normally pressed inwardly toward the sides of the staple-core 7 through the means of wire springs 55 and 56 which are held in grooves 57 and 58 in the outer faces of the plates 10. As shown in Fig. 2, each spring 55 or 56 has its upper end bent over and inserted into a hole 59 in the side-plate 10 whereby to fasten it in place. The springs 55 extend downwardly through the grooves 57 across the sides of the upper adapters 47 and terminate at a point slightly therebelow; while the springs 56 reach down across both pairs of adapters with their ends pressing against the sides of the lower ones 48. In order that the springs 56 for the lower adapters 48 may not be influenced by the outward movement of the upper adapters 47 the sides of the latter are slotted at 60 to provide a free space for the springs. It will also be noted from Fig. 9 of the drawings that the adapters 47 and 48 of both pairs are slotted on their sides at 61, these latter slots alining with the grooves 19 in which the runners 18 of the plunger 17 slide.

In Fig. 3 of the drawings the two pairs of adapters 47 and 48 are shown as pressed inwardly against the sides of the staple-core 7 under the action of their springs 55 and 56, the staples *s* being here illustrated as of the smallest size having legs approximately one-quarter inch long. In Fig. 4 a longer staple is shown in the machine, its legs being approximately three-eighths of an inch in length, and in this case the upper pair of adapters 47 are forced back into retracted position by the ends of the legs of the staples which reach part way thereacross, while the lower pair of adapters 48 are below the legs of the staples and are pressed inwardly against the sides of the staple-core by the springs 56. In Fig. 5 both pairs of adapters are forced back or retracted by the staples, the legs of which are of maximum length, approximately three-quarters of an inch long. The method of operation of the machine with staples having legs of the lengths indicated is as follows:

Assuming that the machine is filled with the one-quarter inch size staples as shown in Fig. 3, both pairs of adapters 47 and 48 will be pressed inwardly against the sides of the staple-core 7 and the staples will be slid along the core above the upper pair of adapters. As the foremost staple is slid off from the staple-core 7 it will be held against the forward sides of the grooves 27 under the pressure of the staple-pusher 12 acting against the whole series of staples on the core. In this position of the staple *s* the points of its legs will be positioned just above the top of

the adapters 47 so that when the staple-driver 30 descends to drive the staple down the points of its legs will enter the openings between the forward end of the adapters 47 and the forward side of the grooves 27. The short staples will thus be guided on the rearward side of their legs after they are carried down beyond the control of the staples behind them, being supported by the adapters 47 until the points of their legs enter the space between the forward ends of the lower adapters 48 and the forward side of the grooves 27. As the staple thus guided passes downward the points of its legs finally enter the lower portion of the grooves 27 and thus the staple is guided throughout the complete stroke of the staple-driver 30 to prevent it from canting rearwardly. With staples having longer legs such as shown in Figs. 1, 2 and 4, the method of operation is as follows:

The longer staples will slide forwardly on the core 7 with their legs riding along the beveled faces 53 of the upper pair of adapters 47 to force the latter back into the position shown in Fig. 4. Now, when the foremost staple is carried down by the staple-driver 30 the points of its legs will enter the openings between the forward ends of the adapters 48 and the forward side of the grooves 27 to be guided thereby until the points of the legs enter the lower portions of the grooves 27.

When the longest staples, such as shown in Fig. 5, are used in the machine their legs will slide across the bevels 53 and 54 on both pairs of adapters 47 and 48 to force them back into the position shown in Fig. 5, the adapters being thus rendered inoperative in this case and having no function to support the staples since the legs thereof are immediately entered into the lower portions of the grooves 27 as the staple-driver 30 starts to descend.

It will be understood that in the operation of the machine the work is placed across the top of the clincher-device 6 on the base 2 and the staple-arm 4 carried downwardly by manual pressure on the knob 20 whereby to bring the bottom of the stapling-head against the work to hold it in place. Thereafter, continued pressure on the knob 20 slides the staple-driver 30 down through the grooves 27 until its lower edge impinges against the head of the foremost staple *s* in the series which has been fed off from the end of the staple-core 7, and through this action the staple is driven down into the work. During the latter portion of the stroke of the staple-driver 30 the staple being operated upon is supported in straddled relation across the supporter 40 and as its legs are driven through the work the clinchers 36 are swung upwardly to bend them over to clinch them on the under-side of the article being stapled or stitched.

It will be observed from the foregoing that the present invention provides a particularly simple yet ingenious means for adapting wire-stitchers or stapling-machines to operate on staples of varying sizes, while insuring that each type of staple will be properly guided as it is driven down through the head of the machine and into the work. By means of the adapters, which come into play automatically in accordance with the size of staple being used, the shortest or longest staple is properly supported on the rearward side of its legs so that it cannot rock or tilt to cause it to be bent or buckled and thereby clog the machine. The present device may be applied to practically all types of stapling-machines wherein the staples are fed along a core or through a magazine, and its parts are so constructed and related as to guard against their becoming deranged or getting out of order. Moreover, the device may be in-built in the stapling-machine at very little added cost and through its employment the machine will be given a wider range of usefulness for applying different lengths of staples in accordance with the requirements of the work.

While the device is herein illustrated as embodied in a preferred form of construction and applied to a machine of certain type, it is to be understood that modifications may be made in the structure and arrangement of its parts and in its method of application without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. In a machine of the type specified, the combination of a magazine for containing a supply of staples, means for driving the staples into the work, means for successively feeding the staples to the driving-means, and means for engaging the rearward sides of the legs of a short staple being operated upon as it moves toward the work to prevent it from rocking or canting, said means being held laterally outward in inoperative position by engagement with the legs of longer staples when such are used in the machine.

2. In a machine of the type specified, the combination of a magazine for containing a supply of staples, means for driving the staples into the work, means for successively feeding the staples into position to be operated upon by the driving-means, and means slidably mounted for lateral movement into position at the rear of the leg of a short staple being operated upon to prevent it from rocking or canting, said means being arranged to be engaged by the legs of longer staples to force it outwardly into inoperative position.

3. In a machine of the type specified, the combination of a magazine for containing a supply of staples, means for driving the staples into the work, means for successively feeding the staples into position to be oper-

ated upon by the driving-means, and means slidably mounted to move laterally inward to engage in back of the legs of a short staple being operated upon as the latter is carried toward the work to prevent it from canting or rocking as it is relieved of the support of the staple next behind it, said means being automatically slid outwardly by engagement with staples having longer legs.

4. In a machine of the type specified, the combination of means for driving staples, means for successively feeding the staples into position to be operated upon by the driving-means, and opposed means held inoperative by staples having relatively long legs and automatically moved laterally inward toward each other with staples having shorter legs to engage the staple being operated upon as it is carried beyond the control of the staple next behind it whereby to prevent it from rocking or canting.

5. In a machine of the type specified, the combination of means for driving staples, means for successively feeding the staples into position to be operated upon by the driving-means, slidably mounted staple-guiding means normally held inoperative when long staples are used in the machine and adapted to be automatically moved laterally inward at the rear of a short staple being driven to hold the latter from canting or rocking as it is carried beyond the control of the staple next behind it, and resilient means for operating said staple-guiding means.

6. In a machine of the type specified, the combination of means for driving staples, means for successively feeding the staples into position to be operated upon by the driving-means, staple-guiding means slidably mounted to adapt said means to be moved into position to support the legs of a short staple being driven to prevent the latter from canting as it is carried beyond the control of the staple next behind it, and resilient means for moving said staple-guiding means laterally inward into position at the rear of the legs of a short staple and to permit said staple-guiding means to be moved laterally outward to inoperative position when staples of greater length are used in the machine.

7. In a machine of the type specified, the combination of means for supporting a series of staples arranged in alined relationship, a staple-driver for operating on the foremost staple in the series to drive it into the work, and adapter-means normally disposed in position at the rear of the staple-driver to support the legs of a short staple being driven to prevent the latter from canting as it is carried beyond the control of the staple next behind it, said adapter-means being held laterally outward with respect to the staple-supporting means by staples having legs of sufficient length to extend thereacross.

8. In a machine of the type specified, the combination of a staple-core for supporting a series of staples in straddled relationship therealong, a staple-driver reciprocable with respect to the core to operate on the foremost staple in the series, and adapter-means automatically movable laterally inward with respect to the sides of the staple-core beneath the legs of the staples held thereon into position to support the legs of a short staple being driven to prevent it from canting as it is carried beyond the control of the staple next behind it, said means being held away from the sides of the staple-core when engaged by the legs of longer staples.

9. In a machine of the type specified, the combination of a staple-core for holding a series of staples straddled across its top, a staple-driver reciprocable with respect to the staple-core to drive the staples into the work, adapter-means movable laterally inward toward the sides of the staple-core into position to support the legs of a short staple being driven to prevent the latter from canting, and resilient means for maintaining said adapter-means in operative position when relatively short staples are used in the machine while permitting said means to be held outward away from the sides of the staple-core by engagement with the legs of longer staples.

10. In a machine of the type specified, the combination of a staple-core for supporting a series of staples straddled across its top, a staple-driver reciprocable with respect to the core to drive the staples into the work, and a plurality of permissively-operated adapter-elements arranged one above another and automatically movable into position to support the legs of the staple being driven to prevent it from canting as it is carried beyond the control of the staple next behind it.

11. In a machine of the type specified, the combination of a staple-core for supporting a series of staples in alined relationship, a staple-driver reciprocable with respect to the staple-core to drive the staples into the work, guideways through which the staples are driven, and a series of adapter-elements arranged one above another and movable into cooperative relationship with the guideways to support the legs of the staple being driven to prevent it from canting, said adapter-elements being yieldable to permit them to be moved out of operative position by staples having legs of sufficient length to extend across their sides.

12. In a machine of the type specified, the combination of a staple-core for supporting a series of alined staples, a staple-driver reciprocable across the end of the core to drive the staples into the work, adapter-elements slidably mounted at the sides of the staple-core and having portions for supporting the legs of a short staple being driven to prevent

it from canting as it is carried beyond the control of the other staples on the core, and means for resiliently urging said adapter-elements inwardly toward the sides of the core while permitting them to be moved outwardly away from the sides of the core by staples having legs reaching across the adapter-elements. 70

13. In a machine of the type specified, the combination of a staple-core for supporting a series of alined staples, a staple-driver movable with respect to the core to drive the staples into the work, adapter-elements slidably mounted at the sides of the staple-core and movable laterally with respect thereto, and resilient means for normally maintaining said adapter-elements in position abutting the sides of the staple-core at the rear of the staple-driver to support the legs of a short staple being driven to prevent it from canting, said adapter-elements having inclined faces engaged by staples having legs of sufficient length to overlap their sides whereby to force said adapter-elements laterally outward from the sides of the staple-core when relatively long staples are used in the machine. 75

14. In a machine of the type specified, the combination of a staple-core across which the staples are straddled, a staple-driver movable with respect to the staple-core to drive the staples into the work, adapter-elements slidably mounted in slots at the sides of the staple-core, and resilient means for normally maintaining the adapter-elements in position to support the legs of a short staple being operated upon to prevent it from canting as it is driven toward the work while permitting said adapter-elements to be retracted into the slots by the legs of longer staples when the latter are used in the machine. 80

15. In a machine of the type specified, the combination of a staple-core across which the staples are straddled, a stapling-head overlapping the sides of the core, a staple-driver reciprocable in the stapling-head to operate on the staples fed off from the end of the core, adapter-elements slidably supported in slots in the sides of the stapling-head to adapt them to be held in retracted position by the legs of relatively long staples straddling the core, and resilient means for sliding the adapter-elements in their slots to press them toward the sides of the staple-core whereby they act to guide the legs of a short staple being driven to prevent it from canting or rocking. 85

16. In a stapling-machine, the combination of a staple-core across which the staples are straddled, a stapling-head having side-plates abutting the sides of the staple-core and slotted on their inner faces to provide channels through which the staples slide, a driver reciprocable in the stapling-head to operate on the staples as they are fed off from the 90

core, adapter-elements slidably mounted in slots in the side-plates of the stapling-head to adapt them to be retracted into the slots by the legs of relatively long staples straddling the core, and resilient means for sliding the adapter-elements in their slots to press them toward the sides of the staple-core whereby they act to guide the legs of a short staple being driven to prevent it from canting or rocking. 75

17. In a stapling-machine, the combination of a staple-core, a stapling-head comprising side-plates attached to the sides of the staple-core and slotted to provide channels through which the staples slide, a staple-driver reciprocable in the stapling-head to operate on the staples fed off from the end of the core, rectangularly-shaped adapter-elements held in slots in the side-plates and slidable bodily towards the sides of the core, and springs on the side-plates bearing against the outer faces of the adapter-elements to normally maintain them in contact with the sides of the staple-core. 80

In testimony whereof I hereunto affix my signature. 90

ARTHUR H. MAYNARD.

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