Aug. 26, 1924. 1,506,073

A. H. MAYNARD

STAPLING MACHINE

Filed June 10, 1922

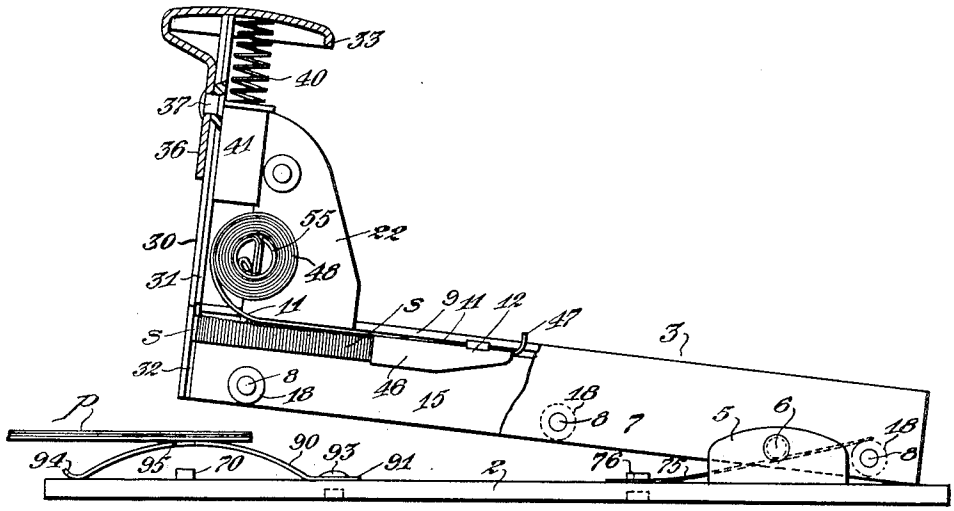


Fig. 1.

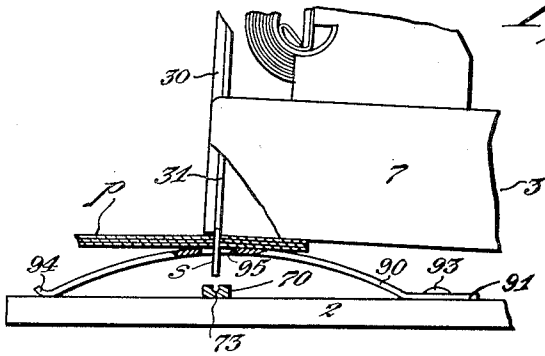


Fig. 2.

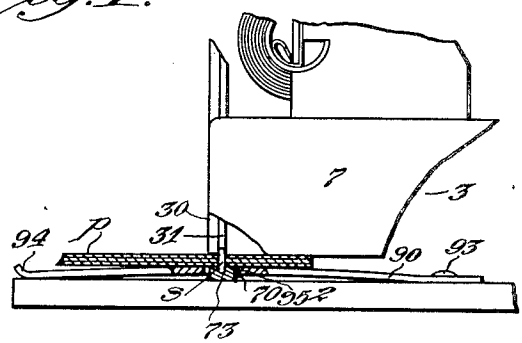


Fig. 4.

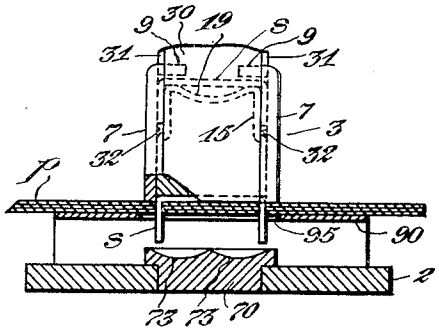


Fig. 3.

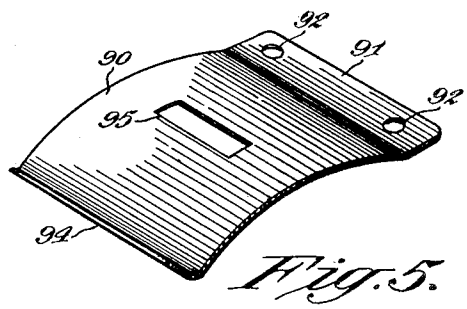


Fig. 5.

Inventor:
Arthur H. Maynard
By
Remington and White
Attorneys.

Patented Aug. 26, 1924. 1,506,073

UNITED STATES PATENT OFFICE.

ARTHUR H. MAYNARD, OF WARWICK, RHODE ISLAND, ASSIGNOR TO BOSTON WIRE STITCHER COMPANY, OF EAST GREENWICH, RHODE ISLAND, A CORPORATION OF MAINE.

STAPLING MACHINE.

Application filed June 10, 1922. Serial No. 567,305.

To all whom it may concern:

Be it known that I, ARTHUR H. MAYNARD, a citizen of the United States, residing at Warwick, in the county of Kent, State of Rhode Island, have invented certain new and useful Improvements in Stapling Machines, of which the following is a specification.

This invention relates to improvements in wire-stitchers or stapling-machines for fastening together sheets of paper or the like.

The principal object of the improvement is to provide for stitching through a greater thickness of work without danger of crippling or buckling the staple.

A further object of the improvement is to insure that the staples shall be inserted clear through the work before their legs are bent over and clinched thereagainst, whereby to prevent the under sheets from being left unfastened or only partly secured to those above.

The following specification describes a preferred embodiment of the invention which is illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a side elevation of one type of stapling-machine illustrating my improvements as applied thereto, the machine being shown with the fore part of the stapling-arm in vertical section to disclose the stapling-mechanism mounted thereon;

Fig. 2, an enlarged side view of the front part of the machine showing the manner in which the stapling-mechanism operates to drive the staple through the work;

Fig. 3, a front view of the stapling-mechanism showing the work-support and the clincher-block or anvil in section on a vertical plane;

Fig. 4, a view similar to Fig. 2 showing the stapling-mechanism at a later stage in its operation as the staple is being clinched in place; and

Fig. 5, a perspective view of the work-support which maintains the work raised above the clincher-means until the staples have been inserted clear through the sheets.

My present improvements are adapted for use with practically all types of wire-stitchers or stapling-machines, but I have preferred to herein illustrate them as applied to a hand-operated device, such, for instance, as that shown and described in my copending application, Serial No. 576,303, filed concurrently herewith. As shown in Fig. 1, this type of apparatus comprises essentially a relatively flat base 2, to which is hinged a stapling-arm 3 having a magazine for carrying a supply of staples *s*. The base 2 is preferably constructed from sheet-metal in the form of a flat strip having an opening at its rearward end with two integral ears 5 projecting from the sides thereof and bent upwardly at right-angles to adapt them to receive the cross-pin 6 on which the arm 3 is pivoted between the ears. The arm 3 comprises two opposite side-plates 7 provided with inturned flanges 9 extending along the top. The side-plates 7 abut the lower sides of a hollow core 15, see Fig. 3, which is constructed of sheet-metal bent into inverted U-shape in cross-section. Extending between the side-plates 7 are a plurality of rivets 8 which are inserted through suitable hubs or sleeves 18 bridging the space between the sides of the core 15. The ends of the hubs 18 abut the inner walls of the core 15 to hold the latter against the side-plates 7, and the ends of the rivets 8 are headed over on the outside of the plates, as shown in Fig. 1, to secure the parts together to form the hollow arm 3.

As shown in Fig. 3, the core 15 has its upper sides offset inwardly away from the walls of the side-plates 7 to provide relatively deep slots or guideways in which the legs of the staples *s* slide. The top of the core 15 is recessed or depressed at the center in the concaved portion 19 which provides that when the staples are straddled across it they will rest on its two opposite raised points so that less friction is encountered in sliding them along the core.

At the forward end of the arm 3 the opposite side-plates 7 are formed with vertical uprights 22 extended from the inwardly-bent flanges 9 and spaced apart in parallel relation a distance equal to the space between the edges of the flanges. The uprights 22 are provided with vertical guideways for supporting the reciprocable staple-driver 30 which is adapted to slide downwardly through opposite grooves 32 at the forward end of the side-plates 7, see Fig. 1. The arrangement of the upper guideways for the driver 30 is not herein shown or described in detail as this part of the mechanism may be of any usual construction, see for instance the disclosure in my copending

application above referred to. Suffice it to state that the driver 30 consists essentially of a flat plate of hardened metal having its vertical edges provided with relatively narrow flanges or fins 31 which slide in the grooves 32 at the forward end of the arm 3. Resting against the upper edge of the driver 30 is a presser or hand-knob 33 which has a depending extension or front-plate 36 riveted to the front face of the driver at 37. Held between the uprights 22 is a socket 41 in which is pocketed a helical spring 40 which bears against the under side of the knob 33 to normally maintain the driver 30 in raised position, as shown in Fig. 1. Suitable stops on the front-plate 36 of the knob 33 are adapted to engage with ears on the uprights 22 to limit the upward movement of the driver 30, but these elements are not herein shown as they are fully described in the copending application before referred to.

Adapted to slide on the core 15 within the sides of the arm 3 and beneath the overhanging flanges 9 is a staple-pusher 12 for feeding the staples forward in the magazine. The pusher 12 is formed of sheet-metal bent into inverted U-shape to provide opposite parallel legs or runners 46 for straddling the sides of the core 15. At the rearward end of the pusher 12 is an upwardly-bent T-shaped ear 47 which serves as a finger-piece for drawing the pusher back in the arm 3 whereby it may be removed from the end thereof to permit the insertion of the staples in the magazine.

Mounted between the uprights 22 at the forward end of the arm 3 is a spring 11 comprising a volute coil 48 wound from a flat band or ribbon which is attached at its free end to the top of the pusher 12. The coil 48 is held between the uprights 22 on a tubular hub 55 seated in notches in the edges of the uprights, and the outer free end of the spring 11 extends rearwardly therefrom between the edges of the top-flanges 9 on the side-plates 7. The tension of the spring 11 causes it to wind itself up to draw the pusher 12 forward on the arm 3 to feed the staples *s* successively into position beneath the driver 30. That is to say, after the leading staple has been driven down and clinched through the work the raising of the driver 30 allows the next staple to be fed forward by the pusher in the manner as more fully hereinafter explained.

At the forward end of the base 2 is an anvil or clincher-block 70 which cooperates with the staple-driver 30 to clinch the staples through the work. As shown in Fig. 3, the anvil 70 is provided with grooves 73 in its upper face for receiving the legs of the staples *s* as they are driven through the sheets *p*. The bottom of the grooves 73 are preferably of arcuate contour whereby they act to force the legs of the staples inwardly toward each other and to then bend their points upwardly against the under side of the work to effect a firm clinch.

The stapling-arm 3 is normally held in raised position above the base 2, to allow the work to be inserted beneath it, by means of a spring 75. As shown in Fig. 1, the spring 75 is anchored to the base at 76 and extends upwardly between the sides of the arm 3 to bear against the under side of the pivot-pin 6 with its free end acting against the top of the hub 18 on the end rivet 8. The spring 75 is thereby caused to exert a downward pressure on the rivet 8 to raise the forward end of the arm 3 until its rearward end strikes against the top of the base 2.

The above described details of construction comprise the essential mechanism of the stapling-machine which is disclosed in my copending application before referred to, and the improvement which forms the subject-matter of the present application will next be described. The present improvement consists in a flexible or yielding work-support for holding the work in elevated position with relation to the clinching device or anvil 70, whereby the legs of the staple may be driven clear through the several sheets or thicknesses of material before they are bent over and clinched on the under side thereof. In its simplest form the work-support 90 consists in a relatively thin plate of sheet-metal having a flat rest or flange 91 at one end, see Fig. 5, adapted to seat against the top of the base 2 of the machine as shown in Figs. 1 and 2. The flange 91 is provided with a plurality of holes 92 for receiving rivets 93 which fasten it down to the base in position beneath the forward end of the stapling-arm 3. From the rest 91 the plate extends forwardly beneath the staple-driver 30, and is bent or bowed upwardly in arcuate form to raise its mid-portion a considerable distance above the clincher-block 70. At its forward edge the plate or support 90 is curled upwardly at 94 where it rests against the base 2 to adapt it to slide easily thereon when its central portion is depressed under the pressure of the stapling-mechanism. Pierced through the central bowed portion of the support is a rectangular aperture 95 through which the legs of the staple *s* project as they are driven down through the work *p*. It will be observed from the above that normally the work-support 90 is held in raised position under its inherent spring tension to support the work in elevated relation to the clincher-block or anvil 70. After the staple has been driven through the work, however, the support yields to allow the protruding legs of the staple to be forced down against the anvil 70 to effect the clinching operation. The method of operation of the complete device is as next explained:

Referring first to Fig. 1, in preparing the machine for operation the staple-pusher 12 is withdrawn from the rearward end of the stapling-arm 3 and the staples *s* inserted in the magazine thereof with their legs straddling the core 15. The pusher 12 is then replaced upon the core 15 with its runners 46 sliding in the guideways between the sides of the core and the walls of the arm 3, and with its impeller-spring 11 tending to draw it forward against the staples. The alined staples *s* are thus caused to be pushed forward until the leading one is fed off from the end of the core 15 into the grooves 32 beneath the lower edge of the driver 30.

To apply a staple to the work the sheets or pages to be fastened together are slid into place above the work-support 90 and beneath the arm 3, as shown in Fig. 1. The operator then presses on the knob 33 to force the arm 3 down against the work, as shown in Fig. 2, to cause the sheets *p* to be gripped between the end of the arm and the top of the rest or support 90. It is to be understood that the work-support 90 is less resilient than the spring 40 which holds the driver 30 raised and therefore as the pressure on the knob 33 is continued the driver 30 will be slid downwardly to act on the staple *s* before the support 90 commences to yield. That is to say, the work-support 90 is sufficiently unyielding to adapt it to maintain the work *p* raised above the anvil 70 during the full descent of the driver 30 to drive the staple clear through the work. Stated briefly, the work-support 90 normally maintains the sheets *p* raised above the clincher-anvil 70 a sufficient distance to permit the legs of the staple to protrude through the work without striking against the anvil; the work-support being designed to sustain the pressure of the driver under the resistance encountered in forcing the staple through the work. After the staple has been driven clear through the work, as shown in Figs. 2 and 3, the continued pressure of the arm 3 against the work will overcome the spring-tension of the work-support whereby to flatten it against the base 2, as shown in Fig. 4. It will be understood that as the staple *s* is driven through the work its legs will project through the aperture 95 in the work-support 90. As the work-support is compressed or flattened its forward curled end 94 slides on the base 2, and the aperture 95 being of sufficient size to admit the clincher-block or anvil 70 through it, the ends of the legs of the staple will finally impinge upon the bottom of the curved grooves 73 in the anvil to cause them to be bent over and clinched against the under side of the work in the usual manner familiar to those skilled in the art. After the staple has been applied to the work in the manner above explained the pressure on the knob 33 is released to allow the driver 30 to be retracted by its spring 40 and the arm 3 will thereupon be raised under the action of its spring 75. Meanwhile the tension of the work-support 90 will cause it to spring back to raised position, the parts thus assuming the relation illustrated in Fig. 1 so that the machine will be ready for the next operation.

It will be observed from the foregoing that my improvement provides means for holding the work in raised position above the clincher-device to allow the staple to be driven completely through the work before its legs are bent over and clinched thereagainst. Through this arrangement the legs of the staple may be more easily driven through a greater thickness of work with a clean piercing action, without danger of crippling or buckling the wire of the staple. Furthermore, since the bending of the legs of the staple is delayed until the last operation the staple will have a stiffer support for holding its legs against too sharp a bend so that there will be less danger of the under sheets of material being torn or buckled.

The present improvement also insures that the staple shall be invariably clinched through all of the several sheets or thicknesses of material without leaving the under ones unattached. That is to say, whereas in previously known machines the staple sometimes fails to pierce through the last sheets, particularly if the material in the under thickness is tougher or offers greater resistance to being pierced, in my present improvement such incomplete application of the staple cannot occur because the legs of the staple are projected through all the sheets or thicknesses before they are operated upon by the clinching-means. My improved machine thus provides for neater and better work in applying the staples to all kinds of materials, and insures against tearing or buckling thin sheets of paper, or incomplete fastening of the sheets when heavier stock is being operated upon.

While I have herein described and illustrated by improvement in its preferred form and shown it applied to a single type of machine, it is obvious that the structure and mode of application of the device may be varied without departing from the spirit or scope of the invention.

Therefore, without limiting myself to the exact embodiment of the invention as herein disclosed, I claim:

1. In a stapling-machine, the combination of a base, a clincher-anvil on said base, an arm mounted above the base, a staple-driver reciprocable on the arm, and a work-support comprising a resilient plate fastened to the base with its main portion arched thereabove in raised relation to the clincher-anvil and provided with an aperture through

which the legs of the staple project as they are driven through the work.

2. In a stapling-machine, the combination of a base, a clincher-anvil on said base, an arm mounted above the base, a staple-driver reciprocable on said arm, and a work-support comprising an arched plate secured at one end to the base with its main portion in raised position above the anvil and provided with an aperture arranged beneath the staple-driver.

3. In a stapling-machine, the combination of a base, a clincher-anvil on said base, an arm mounted above the base, a staple-driver reciprocable on said arm, and a work-support comprising a resilient arched plate secured at one end to the base with its arched portion elevated above the anvil and its opposite end bearing against the base and adapted to slide thereon.

4. In a stapling-machine, the combination of a base, a clincher-anvil at the forward end of the base, an arm hinged to the rearward end of the base, stapling-mechanism carried by said arm, and a work-support comprising a resilient arched plate having a flat portion secured to the top of the base at one side of the anvil and a curled edge at its opposite end resting on the base at the opposite side of the anvil.

In testimony whereof I affix my signature.

ARTHUR H. MAYNARD.