April 24, 1934. A. H. MAYNARD 1,956,174

STAPLING MACHINE

Filed Nov. 28, 1931

Fig. 1.

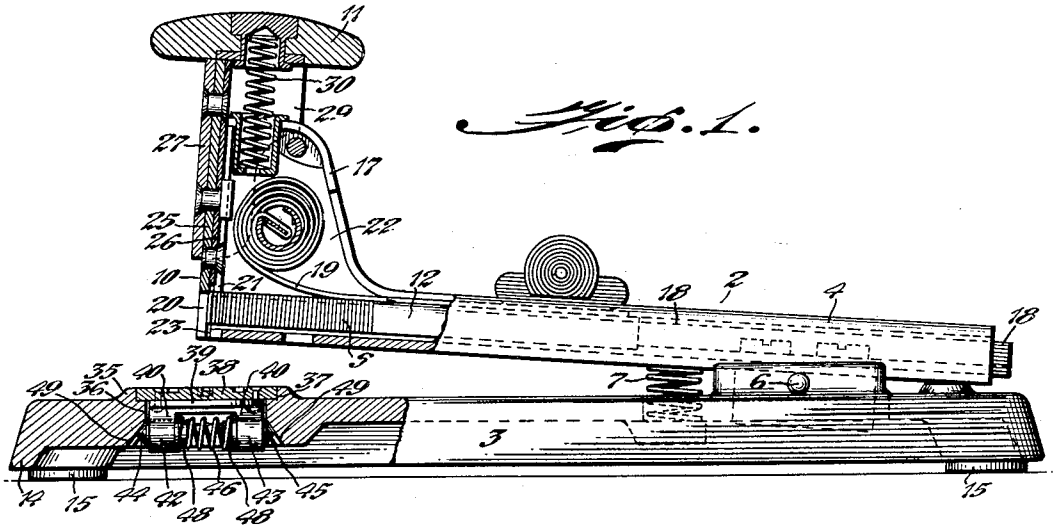


Fig. 2.

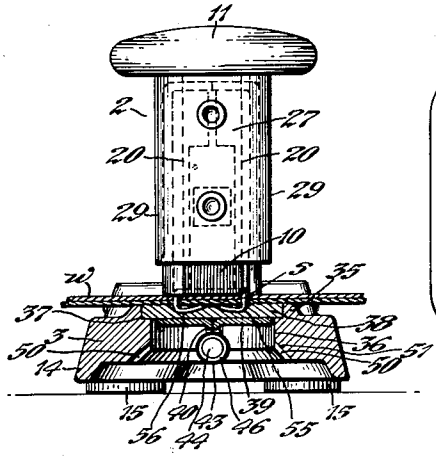


Fig. 3.

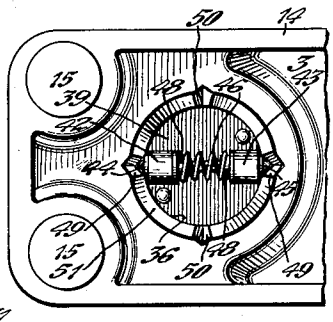


Fig. 4.

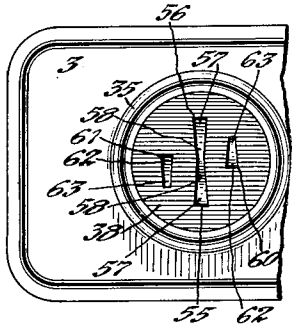


Fig. 5.

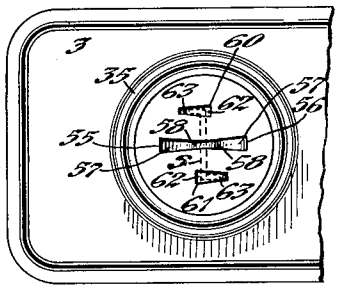


Fig. 6.

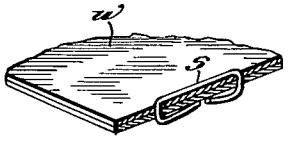
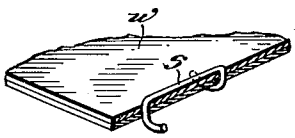


Fig. 7.



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1,956,174

STAPLING MACHINE

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Application November 28, 1931, Serial No. 577,759

5 Claims. (Cl. 1—3)

This invention relates to improvements in wire-stitching or stapling machines for use in attaching sheets of paper, stitching or stapling tags, labels and the like to articles of commerce, and for applying staples to other articles to fasten them together. The present invention also contemplates a novel and improved method of applying the staples whereby they may be readily removed from the articles which they fasten.

A particular object of the invention is to provide a method of applying staples in such manner that the work will be securely fastened and the staple adapted to be easily removed therefrom without mutilating the work or deforming the staple.

Another object of the invention is to provide in a stapling machine an adjustable anvil or clincher-device which may be set to clinch the opposite legs of the staples in different directions; specifically, to bend both legs inwardly toward each other, or to bend the legs in opposite directions at right-angles to the head or crossbar of the staple.

Another object of the invention is to provide a machine or device of the type specified which is simple in construction, compact in size, convenient to operate and efficient and durable in use.

Further objects of the invention are set forth in the following specification which describes the novel method of applying the staples and a preferred form of construction of the adjustable clincher-device, by way of example, as illustrated by the accompanying drawing. In the drawing:

Fig. 1 is a side elevation of a conventional form of hand-operated stapling machine showing the fore part of the stapling-arm partly broken away and illustrating the present improved clincher-device as applied to use therewith;

Fig. 2 is a front view of the stapling machine, showing the base thereof and the clincher-anvil in section with the anvil in one position of adjustment;

Fig. 3 is a bottom plan view of the forward portion of the base of the machine, showing the anvil in the position illustrated in Fig. 2;

Fig. 4 is a top plan view showing the anvil in position corresponding to that of Fig. 2;

Fig. 5 is a top plan view showing the anvil or clincher-device in another position of adjustment;

Fig. 6 is a sectional view, in perspective, showing several layers of material fastened together by a staple having its legs bent inwardly and clinched against the underside thereof; and

Fig. 7 is a similar view showing the legs of the staple clinched in a different manner with its legs bent in opposite directions at right-angles to its head.

In the present drawing the improved form of anvil or clincher-device is shown as applied to use on a hand-operated stapling machine of a type employed as an office or desk appliance, but it is to be understood that the invention is adapted for use with other varieties of machines; for example, on stitching machines in which the staples are formed from a length of wire and applied to the work at one operation.

As shown in Fig. 1 of the drawing the stapling machine is of a design and construction similar to that described and illustrated in my pending application for patent, Serial No. 466,768, filed July 9, 1930. In general, the stapling machine or device 2 comprises a base 3 adapted to rest on any suitable support; a swinging stapling-arm 4 pivoted at 6 to the rearward end of the base 3 and normally held in raised position by a spring 7 to adapt the work *w* to be placed under its forward end; a magazine for holding a supply of staples *s* in the stapling-arm 4; a staple-driver 10 on the arm with a hand-rest 11 for manually operating it to drive the staples *s* individually through the work; and a staple-pusher 12 for successively feeding the staples to the staple-driver 10.

The base 3 of the machine may be of hollow construction comprising a flat top bordered by an overhanging beveled flange or rim 14 with rubber corner plugs 15 which hold the device from slipping on the desk or other surface on which it is used.

The stapling-arm 4 is preferably constructed from a single strip of sheet-metal folded into channel-shape with the sides extended upwardly at its forward end to form a stapling-head or casing 17 for the stapling-mechanism. The sides are bent inwardly at the top with their edges abutting to close the upper part of the head. Extending longitudinally within the hollow arm 4 is a staple-core 18 constructed of sheet-metal folded into channel- or U-shape with its sides spaced away from the opposite sides of the arm. The staple-core 18 supports the staples *s* in straddled relation thereacross to adapt them to slide within the arm 4 as they are fed to the stapling-mechanism at its forward end. A staple-pusher 12 is slidable on the core 18 to feed the staples forwardly therealong. A volute coil-spring 19 secured in the head 17 is connected to the staple-pusher 12 to urge it forwardly on the core 18.

The forward edges of the sides of the head 17 are bent inwardly to provide vertical flanges 20 which cooperate with flanges 21 on a pair of inner lining-plates 22 to provide vertical grooves or guideways 23 which receive the lateral edges of the staple-driver 10.

The staple-driver 10 is formed of two overlying flat plates 25 and 26, the rearward one 26 being of less thickness than the forward one 25 with its lateral edges projecting therebeyond to slide

in the grooves 23 at the opposite sides of the staple-head 17. The forward plate 25 slides in the space between the vertical flanges 20 on the opposite sides of the head, being of less width than the rearward plate 26 and also extending slightly below its bottom edge as shown in Fig. 1. As shown in Fig. 2, the forward plate 25 is thus adapted to press against the top of the work as the lower edge of the staple-driver 10 proper, that is, the plate 26, rides on the top of the staple being driven at the completion of the driving operation.

The staple-driver 10 is operated from a reciprocable plunger 27 having sides 29 straddling the sides of the stapling-head 17 and carrying a hand-rest or knob 11 at its top. As herein shown the staple-driver 10 is riveted or otherwise suitably secured flat against the inner side of the front wall of the reciprocable plunger 27. The plunger 27 is normally maintained in raised position, as illustrated in Fig. 1, by means of a helical spring 30.

It will be noted by reference to Fig. 1 of the drawing that the staple-core 18 extends clear through the channel of the arm 4 with the forward edges of its sides forming a continuation of the grooves 23 in which the staple-driver 10 slides. The staples *s* are urged by the pusher 12 to slide along the core 18 into position beneath the staple-driver 10 when the latter is elevated as shown in Fig. 1. It will be understood that the pressure of the staple-pusher 12 holds the foremost staple pressed against the flanges at the forward end of the arm 4 with its legs in the grooves 23, thereby preventing the staple from dropping down out of position until it is acted upon by the driver.

The structure and arrangement of the herein illustrated stapling machine is disclosed more fully in the pending application before referred to, being in accordance with a well-known type of device in common use, but it is to be understood that this part of the apparatus is not directly related to the present invention and may take other forms.

In stapling machines of the present and other types it is customary to provide a hardened clincher-block or anvil on the base of the machine arranged beneath the stapling-mechanism and adapted to bend over the legs of the staple to clinch them against the work. In the application for patent above referred to the anvil or clincher-device is shown as swiveled or pivoted on the base 3 of the machine to adapt it to be turned into different positions to bring into play several different forms of clincher-grooves or depressions which act on the legs of the staple to bend them in different directions in accordance with the character of the work to be performed. Where the sheets of paper or other articles are to be permanently attached the legs of the staple are bent inwardly toward each other, or in other cases bent outwardly away from each other; but where it is desired to have the staples applied in such manner that they may be more easily removed from the work, one leg may be bent inwardly and the other outwardly so that they both extend in the same direction. As has been indicated, these different methods of clinching over the legs of the staple are accomplished by providing the anvil with different forms of clincher-faces or grooves for acting on the ends of the legs as they are driven down through the work.

The present invention concerns a method of stapling wherein the staples are clinched through the work in such manner as to be removable therefrom much more easily and conveniently than possible with previous methods and with less liability of tearing or mutilating the work. The present improved method of clinching the staples is accomplished by providing the anvil with a novel form of clincher-faces for bending the legs of the staple as they are driven down through the work.

In the present preferred embodiment of the invention, the forward end of the base 3 is provided with an upstanding circular boss 35, through which extends a circular hole 36 counterbored at the top to provide a recessed seat 37 for the disk-like clincher-anvil 38. Riveted to the underside of the clincher-anvil 38 is a plate 39 folded at its center to provide downwardly extending ears 40 which are formed at their ends with cylindrical bearings 42 and 43. Adapted to slide in the bearings 42 and 43 are two opposite plunger-pins 44 and 45 having pointed ends which are projected radially outward from their bearings. The plunger-pins 44 and 45 are forced apart under the action of a helical spring 46 extending between their rearward ends. The plungers 44 and 45 have annular flanges engaging against the inner ends of the bearings 42 and 43 to limit their movement under the action of the spring 46, the ends of which surround a reduced portion 48 of each plunger. The points of the plungers 44 and 45 are adapted to engage with V-shaped notches 49 and 50 disposed at intervals around the edge of the hole 36 in the base 3 as shown in Fig. 3 of the drawing. It will be noted by reference to this view that the bottom edge of the opening 36 in the base 3 is beveled outwardly at 51 so that the engagement of the ends of the plungers therewith maintains the anvil 38 in place in its seat while adapting it to be rotatively adjusted with the points of the plungers riding out of one set of notches and reengaging in another set.

Figs. 4 and 5 of the drawing are plan views of the clincher-anvil 38 showing its upper face provided with two sets of clincher-faces or grooves which extend parallel to each other. The grooves 55 and 56 constitute one such set and it will be noted that they are located end to end extending diametrically of the anvil 38 with their outer ends at equal distances from the axis of rotation of the anvil. This common form of clincher-grooves provides for bending both legs of the staple inwardly in the manner most generally used for permanently attaching sheets of paper or for other work, being operative when the clincher-anvil is in the position shown in Fig. 4.

Each of the grooves 55 and 56 is provided with a concave bottom or well 57 and an upward inclined portion or loft 58. The former of these formations is the deeper portion of the groove and the portion into which the staple leg travels perpendicularly to the face of the anvil in its downward movement through the work; and the loft 58 is the portion whereby the end of the leg is caused to be bent diagonally upward to clinch it against the lower surface of the work.

The second set of clincher faces comprises grooves 60 and 61 which extend parallel to the grooves 55 and 56 and are spaced laterally, one on either side thereof. Each of these grooves 60 and 61 is provided with a well 62 and a loft 63 similar to the corresponding formations of the grooves 55 and 56. The grooves 60 and 61 are so positioned on the face of the clincher-anvil as to be parallel to each other and equidistant

from the diametrically-alined grooves 55 and 56 so that they extend across the face of the clincher-anvil in opposite directions.

A staple *s* driven through the work when the anvil is in the position shown in Fig. 4 will be clinched in the manner shown in Fig. 6 with its legs bent inwardly or toward each other on the underside of the work in alinement with the head of said staple. When the anvil is rotated from the position shown in Fig. 4 through ninety degrees, to adjust it to the position illustrated in Fig. 5, the staple being driven will be clinched by the anvil in the manner indicated by dotted lines in Fig. 5. With this arrangement of the clincher-anvil 38 the staple will be clinched in the manner indicated in Fig. 7 with the legs extending in opposite directions at right-angles to the head of the staple.

If desired, the face of the clincher-anvil 38 may be modified from the form shown in Figs. 4 and 5, without departing from the spirit of the invention, whereby to cause one leg of the staple to be bent at right-angles to the head of the staple as shown in Fig. 7, while the other leg is caused to be bent inwardly or outwardly in alinement with a plane parallel to the head of the staple.

Other forms of clinching-grooves may be provided on the face of the anvil 38 for bending the legs of the staples in still different directions, it being noted that the notches 49 and 50 in the base 3 of the machine are so disposed relatively to the different sets of clincher-grooves as to lock the anvil in any position to which it is adjusted with one set of grooves adapted to cooperate with the staple-driver 10 as the staples are driven down through the work.

In the operation of the machine the staples *s* are fed along the magazine in the arm 4 by the pusher 12 to successively position them beneath the staple-driver 10 in the well-known manner. To cause the staples to be clinched in the conventional manner the anvil is positioned as shown in Fig. 4. The work, which may comprise a plurality of laminations, such as sheets of paper to be joined together, is placed across the anvil 38 and the stapling-arm 4 is brought down thereagainst to hold the work in place. The staple-driver 10 engages the foremost staple in the magazine and forces it downwardly to cause its legs to perforate through the work. During this operation the legs of the staple move in a path coinciding with the path of the staple-driver and the head of the staple. Emerging on the underside of the work the legs of the staple enter the diametrically arranged clincher-grooves 55 and 56, impinge against the bottom thereof, and are bent toward each other radially of the axis of the anvil to be clinched in the manner shown in Figs. 2 and 6 for a permanent fastening.

A staple clinched in the above described manner may be removed by inserting a knife blade or other similar thin instrument under the bent-over legs of the staple to pry them apart. This method of removing the staple requires considerable effort and care, the only alternative being to tear the staple out without bending back the legs which results in mutilating the work.

It is frequently desired to staple articles together for ordinary handling with a temporary fastening, that is with the staple set in such manner as to permit its easy and convenient removal from the work without injury thereto. Such a fastening may be accomplished with the present form of clincher-anvil adjusted to the position shown in Fig. 5. When the anvil is in this latter position operation of the staple-driver 20 causes the staple *s* to be driven through the work *w* and its legs clinched against the underside thereof in the manner indicated in Fig. 7. The dotted lines in Fig. 5 indicate the respective positions assumed by the head and legs of the staple upon completion of the driving operation. With this method of applying the staple its legs are bent in opposite directions at right-angles to its head. A fastening formed in such manner holds the work securely enough for ordinary use, such as for mailing and filing, where the articles stapled are not to be subjected to frequent and rough handling yet permits of its being easily withdrawn. With this method of clinching the staple its head may be grasped and turned or swung around to slide its legs out of the perforations in the work to withdraw the staple therefrom. In this manner the staple may be removed without tearing the paper or otherwise mutilating the articles which it fastens.

While the invention is herein described and illustrated as embodied in a preferred form of construction, it is to be understood that various modifications may be made in the construction and arrangement of the parts of the stapling device and in the manner of clinching the staple without departing from the spirit or scope of the invention. Therefore without limiting myself in this respect, I claim:

1. In a stapling machine, the combination of stapling-mechanism, and an adjustable clinching anvil having two sets of clincher-faces adapted to be used interchangeably, the clincher-faces of one set being disposed for positioning them in alinement with the head of the staple being driven and those of the other set being disposed for positioning them at right-angles to the head of the staple being driven.

2. In a stapling machine, the combination of staple-driving means, and a rotatable anvil arranged in cooperative relation to the staple-driving means and having two sets of clincher-faces, the clincher-faces of one set extending across the axis of rotation of the anvil and those of the other set arranged in parallel spaced relation to the first-mentioned faces.

3. In a stapling machine, the combination of a reciprocable staple-driver, and a clinching anvil rotatable on an axis substantially coincident with the plane of the staple-driver and having two sets of clincher-faces, the faces of one set extending radially of the axis of rotation of the anvil and the faces of the other set extending in parallel spaced relation to those of the first set.

4. In a stapling machine, the combination of a reciprocable staple-driver, and a clinching anvil rotatably adjustable beneath the staple-driver and having two sets of clincher-grooves, the grooves of one set extending radially of the axis of rotation of the anvil and the grooves of the other set arranged in substantial parallelism therewith and spaced laterally from the first grooves.

5. In a stapling machine, the combination of a base, stapling-mechanism mounted above the base, and an anvil rotatably adjustable on the base beneath the stapling-mechanism and provided with two sets of clincher-grooves, the grooves of one set extending radially of the axis of rotation of the anvil and the grooves of the other set extending in opposite directions substantially parallel with the grooves of the first set and spaced laterally away therefrom.

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