May 6, 1947. A. H. MAYNARD 2,420,258

FASTENER-APPLYING IMPLEMENT

Filed Dec. 31, 1943 2 Sheets-Sheet 1

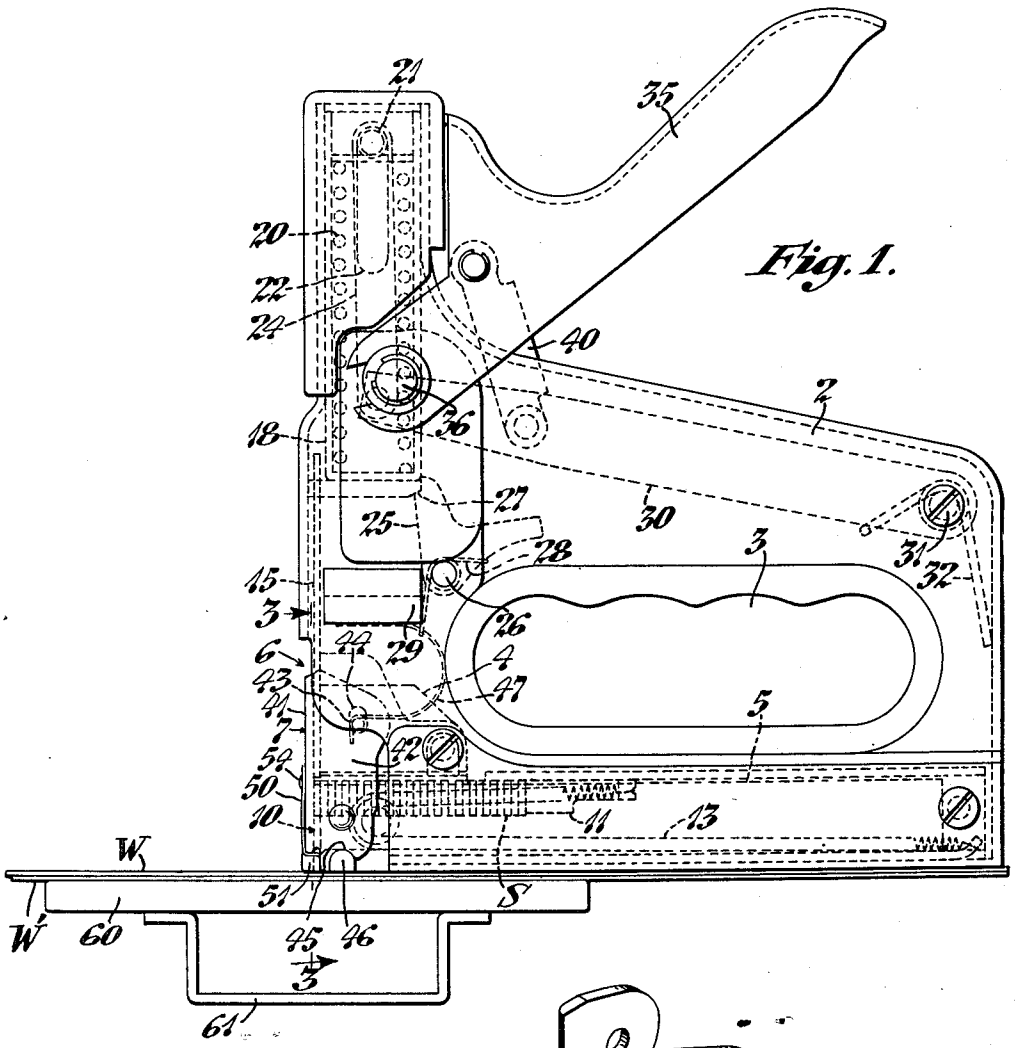


Fig. 1.

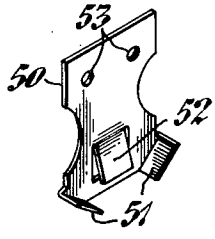


Fig. 8.

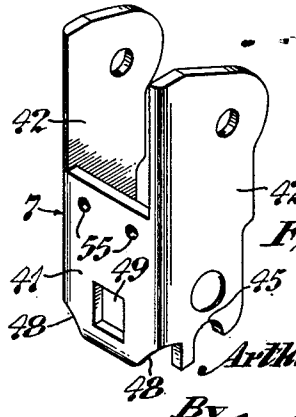


Fig. 7.

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FASTENER-APPLYING IMPLEMENT

Filed Dec. 31, 1943 2 Sheets-Sheet 2

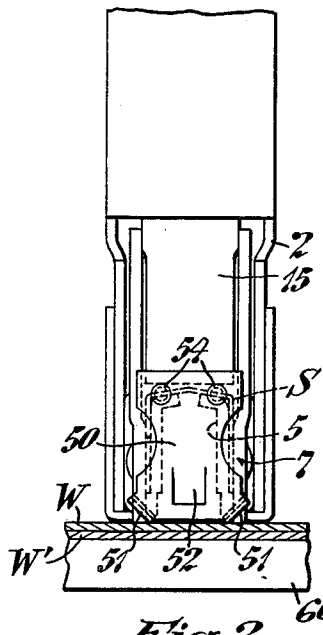


Fig. 2.

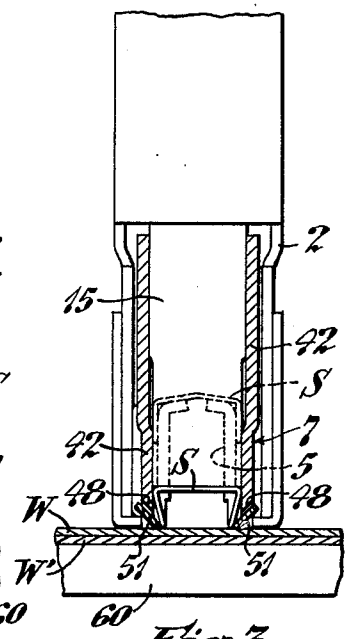


Fig. 3.

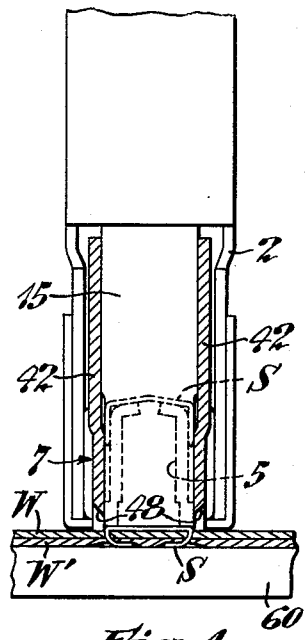


Fig. 4.

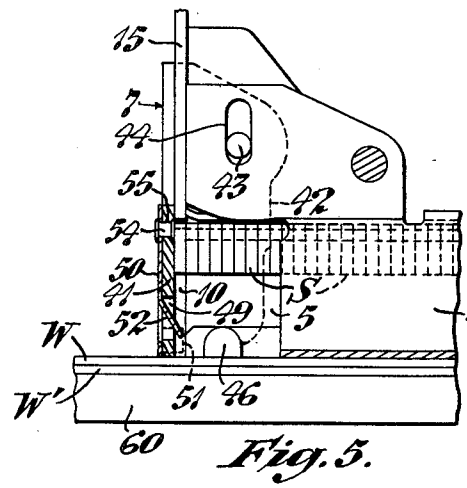


Fig. 5.

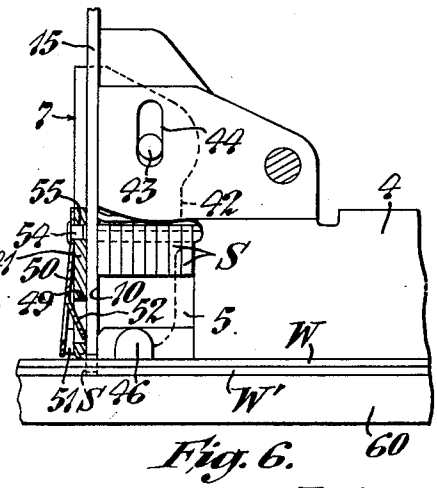


Fig. 6.

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Patented May 6, 1947 2,420,258

UNITED STATES PATENT OFFICE

2,420,258

FASTENER-APPLYING IMPLEMENT

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Application December 31, 1943, Serial No. 516,454

4 Claims. (Cl. 1—49)

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This invention relates to a method of and means for fastening together various objects or articles and particularly to a device adapted for attaching sheets or panels of material at points remote from the marginal edges thereof.

One object of the invention is to provide a method of fastening together sheets or the like which consists in driving a U-shaped staple toward the work, slightly deflecting the legs of the staple inwardly as the staple approaches the work, driving the deflected legs of the staple through the work, and thereafter completing the deflection of the staple-legs to cause them to be bent toward each other in substantially parallel relation to the crossbar of the staple whereby to effect a flat clinching of the staple-legs against the work.

Another object of the invention is to provide a portable staple-applying device for carrying out the improved method comprising means for initially deflecting the legs of the staples inwardly during the staple-driving operation, driving the deflected legs through the work and finally clinching them thereagainst to secure the parts of the work together.

Another object of the invention is to provide a staple-applying device of the type indicated comprising an implement of the so-called "tacker" type adapted to be operated at one side of the work to drive a staple therethrough at points remote from the edges of the material and a separate clincher-plate adapted to be held against the opposite side of the work and operative to clinch the legs of the driven staple thereagainst.

Another object of the invention is to provide a device of the type indicated having means incorporated in the staple-applying implement for engaging the legs of the staple and deflecting them inwardly toward each other as the staple is driven toward the work and automatically displaceable from operative position after completing the deflection.

Another object of the invention is to provide a device of the type indicated having resilient staple-deflecting means adapted to be sprung away or displaced from operative position after the legs of the staple have been deflected.

Another object of the invention is to provide staple-deflecting means of the type and for the purpose indicated which are extremely simple in construction, economical to manufacture and adapted for use on standard fastener-applying devices without material alteration in the structure thereof.

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

Fig. 1 is a side elevational view of a fastener-applying implement or tacker embodying the novel features of the present invention;

Fig. 2 is an enlarged partial front elevational view of the implement, illustrating the deflector-element as in position to bend the legs of the staple inwardly during the staple-applying operation;

Fig. 3 is a view similar to Fig. 2, part-sectional on line 3—3 of Fig. 1, illustrating a staple as being driven toward the work with its legs being deflected toward each other prior to entering the work;

Fig. 4 is a view similar to Fig. 3 showing the staples as driven through the work and its legs clinched against the under side thereof by means of the separate clincher-plate;

Fig. 5 is a longitudinal sectional view of the forward end of the staple-driving implement showing the deflector-element as in position to bend the legs of the staple;

Fig. 6 is a view similar to Fig. 5 showing the relation of the parts of the stapling implement at the completion of the stapling operation;

Fig. 7 is an enlarged perspective view of the door or gate for retaining the staples in the implement; and

Fig. 8 is an enlarged perspective view of the staple-deflecting element.

Fastener-applying devices are extensively used for attaching together sheets or layers of paper, cloth, wallboard, and other materials. When the sheets are to be fastened together at points adjacent their edges an ordinary staple-applying implement may be employed for driving the staples through the sheets and clinching their legs against the under side of the work. Such implements usually comprise staple-applying mechanism for driving the fasteners through the work and an anvil forming part of the implement and provided with grooves for clinching the legs of the staples against the under side of the work. It is sometimes desirable that large sheets or layers of the work be fastened together at points remote from their marginal edges. For example, when tents, tarpaulins, drop-curtains and other objects are composed of sheets or layers of relatively large area it is sometimes necessary to join the sheets together or attach other parts thereto at relatively remote distances from the marginal

edges of the material. In such case, it is impossible to employ an ordinary stapling implement because its anvil will not extend in under the work far enough to reach and clinch the legs of the staple. Various implements have been devised for applying fasteners at points remote from the edges of the work but such devices usually employ staples of the so-called "self-clinching" type. That is to say, the staples usually have crossbars of arcuate or other irregular configuration and converging legs which penetrate the material and tend to curl around against the under side of the work as their crossbars are straightened over an anvil during the staple-driving operation. In this manner the parts of the work are fastened together with what is termed a "blind" stitch with the legs of the staple embedded in the work. That is, with self-clinching staples the legs of the staple are clinched around and bent back into and sometimes through the material. It also happens that due to malformed staples or considerable resistance of the work to the penetration of the legs of the staple a secure fastening cannot be effected.

To avoid the use of fasteners of special, costly types and effect a more secure fastening of the work the present invention provides a fastener-applying implement in the form of a tacker for driving ordinary U-shaped staples through the work and a separate clincher-plate for bending or clinching the legs of the staple against the under side of the work to securely bind the parts of the work together. Means incorporated in the fastener-applying implement are adapted to initially deflect the legs of the staple inwardly to a slight extent as the staple is driven toward the work to provide that when the legs encounter the planar surface of the clincher-plate they will be further deflected and folded against the under side of the work with a flat clinch. The present fastener-applying implement may be placed against one side of the work at any distance from the marginal edges thereof and the separate clincher-plate held against the opposite side of the work in position to clinch the legs of the staple as they are driven through the work. With one person operating the fastener-applying implement at one side of the work and another holding the clincher-plate against its opposite side, in a manner similar to that in which rivets are applied, it is possible to fasten the parts of the work together at any desired location.

Referring to the drawings, the present improved means for deflecting and clinching the legs of the staples are herein shown as adapted for use with a fastener-applying implement of the type disclosed in United States Patent No. 2,137,642, issued November 22, 1938, to John F. Cavanagh, but it is to be understood that the improvements likewise may be applied to use with other implements, preferably of the tacker or hammer-tacker types. The tacker herein illustrated by way of example comprises, in general, a casing 2 having an opening 3 at its approximate center formed as a hand-hold. A horizontal magazine 4 held within the casing 2 is provided with a staple-core 5 adapted to support the fasteners supplied thereto through an opening 6 at the forward end of the magazine. As herein shown, the fasteners are preferably in the form of U-shaped staples S arranged with their legs straddling the sides of the core 5. The staples S may be manufactured from wire of rectangular cross-section and, as shown in Fig. 3, the terminal portions of their legs are pointed to adapt them to more easily penetrate the work. The staples S may be cemented together in a stick or refill-strip which is slid onto the core 5 through the opening 6 in the front end of the magazine 4. The opening 6 thereafter may be closed by means of a door or gate 7, to be described in detail hereinafter. Between the rearward wall of the gate 7 and the forward end of the core 5 is a vertically-extending throat 10 through which the staples S are driven into the work. The staples S are advanced into the throat 10 by means of a pusher 11 slidable along the core 5 and urged forwardly by means of a helical spring 13 or other suitable means.

Arranged for vertical reciprocation across the forward end of the core 5 is a staple-driver 15 in the form of a hardened flat blade. The upper end of the staple-driver 15 is connected to the lower end of a hollow plunger 18 arranged for vertical sliding movement in a guideway in the forward end of the casing 2. The plunger 18 is forced downwardly through an operative stroke by means of a helical spring 20 pocketed therein with its upper end engaged by a pin 21 extending laterally through elongate, vertical openings 22 in the sides of the plunger. The plunger 18 is normally held in elevated position by means of a latching member or trigger 25 which is pivoted on a pin 26 extending transversely of the casing 2, the latch being provided with a shoulder 27 engageable with the lower end of the plunger. The latching member 25 is adapted to be rocked in counter-clockwise direction to engage its shoulder 27 with the lower end of the plunger 18 by means of a spring 28 coiled around the pin 26 with one end bearing against an abutment 29 and its opposite end engaging the under side of the latch. The transverse pin 21 is adapted to be slid downwardly in the slots or openings 22 to compress the spring 20 in the plunger 18 by means of links 24 connected at their upper end to the ends of the pin and having their lower ends pivotally connected to the forward end of a rockable arm 30. The arm 30 is pivoted on a pin or stud 31 extending between the sides of the casing 2 and is normally held in raised position by means of a spring 32 surrounding the stud with one end bearing against the rearward wall of the casing 2 and its opposite end engaging the under side of the arm. The arm 30 is adapted to be operated by a handle-lever 35 pivoted on studs 36 projecting from the sides of the casing 2 adjacent its forward end; the lever and arm being connected by a link 40.

As thus far described the implement shown herein is identical with that disclosed in the patent previously referred to and is ordinarily used for tacking drawings to boards, fastening labels to boxes and for similar purposes wherein the legs of the staples are driven directly into the work without bending. In the present embodiment of the invention means are provided for deflecting the ends of the legs of the staples toward each other to a slight extent during the driving of the staple. A separate clincher-plate held against the rearward face of the work is employed for engaging the deflected ends of the staple legs as they are driven through the work to further deflect them whereby to clinch the legs against the work to effect a secure fastening of its parts.

The means for initially deflecting the legs of the staples S as they are driven toward the work comprise a deflector-element 50. The element 50 may be in the form of a leaf-spring constructed from thin resilient metal and shaped to the form

shown in Fig. 8. The element 50 is substantially rectangular in outline and provided with rectangular tabs at its lower corners which are bent rearwardly in opposite inclined relation to the vertical to provide converging deflector-fingers 51. The metal forming the element 50 is slitted adjacent its lower end with the portions enclosed by the slits bent rearwardly to provide an inclined projection or cam-plate 52. The element 50 is fastened to the implement by means of rivets 54 projecting through holes 53 adjacent its upper end and received in corresponding holes 55 in the door or gate 7 with their ends headed over. As shown in Figs. 5 and 6, the rivets 54 have heads abutting the outer face of the element 50 and are headed over in countersunk portions of the holes 55 in the gate 7.

The gate 7 is of a construction similar to that shown in the patent referred to above, being constituted by a front wall 41 and laterally-extending side walls or wings 42 folded rearwardly therefrom. The gate 7 is pivoted on a pin 43 extending transversely through vertical slots 44 in the sides of the magazine 4. The gate 7 is provided with notches 45 in the lower edges of its side walls 42 adapted for engagement with lugs 46 on the sides of the magazine 4, a spring 47 in the casing 2 bearing against the pin 43 to yieldingly maintain the notches in engagement with the lugs to latch the gate in closed position. As shown in Figs. 3 and 7, the lower forward corners of the gate 7 are cut away at an angle or chamfered as indicated at 48 to provide clearance for the rearwardly-projecting deflector-fingers 51 of the element 50. The front wall 41 of the gate 7 is provided with a rectangular opening 49 through which the cam-plate 52 of the element 50 projects to position its lower end beneath the staple-driver 15, see Fig. 5.

It has been explained that the present improved staple-applying implement is especially adapted for fastening sheets, panels or the like together at points remote from their marginal edges and for this purpose the invention provides means for clinching the legs of the staples against the rearward or under side of the work. In the present embodiment of the invention a clincher-plate 60 is provided as the means for bending the legs of the staple against the rearward or under side of the work. As shown in Fig. 1 of the drawings the clincher-plate 60 may consist simply in a metal plate of any desired configuration provided with a handle 61 to adapt it to be held against the work. It will be noted that the clincher-plate 60 constitutes a separate element, unattached to the fastener-applying implement. Through this provision it is possible to drive a staple through the work at a point remote from the edges thereof by means of the fastener-applying implement or tacker while clinching the legs of the staple against the under or rearward side of the work, as the case may be, by means of the clincher-plate which is held in position to engage the ends of the legs as they are driven through the work. The improved fastener-applying implement having been described in detail, its method of operation is explained as follows:

To prepare the fastener-applying implement for operation the door or gate 7 is first opened by raising it to disengage its notches 45 from the lugs 46 on the magazine 4. During this upward movement of the gate 7 the pivot-pin 43 will ride upwardly in the slots 44 against the action of the spring 47. With the gate 7 thus unlatched, it may be swung outwardly to uncover the forward end of the magazine 4 and the staple-core 5. A strip or stick of U-shaped staples S may then be slid onto the core 5 against the action of the spring-actuated pusher 11 with their legs straddling the sides of the core. After the magazine 4 has been loaded with a supply of staples S the gate 7 is swung to closed position and its notches 45 engaged with the lugs 46 to latch it in the position shown in Fig. 1. The implement is then ready for a fastener-applying operation.

Assuming that it is desired to fasten two relatively large sheets together, as examples: reinforcing strips, screen-cloth or a flap to the side wall of a tent, the staple-applying implement is placed against one side of the wall, represented at W in Fig. 1, and the clincher-plate 60 held against the strip, screen or flap W' at a point opposite the head of the implement. When the part W' is to be attached to a large sheet or wall W at a point considerably remote from its edges, the fastener-applying implement may be operated by one person and the clincher-plate held by a second person.

With the staple-applying implement or tacker and clincher-plate 60 held against the opposite sides of the work W, W' the handle-lever 35 is depressed and through means of the link 40 the arm 30 will likewise be rocked downwardly. The arm 33, acting through the links 24, will draw the pin 21 downwardly to compress the spring 20 in the plunger 18 which, at this point, is held in raised position by the latch 25. Further depression of the handle-lever 35 and the continued downward rocking movement of the arm 30 will cause the lower end of the link 40, or means carried thereby, to engage the rearwardly-extending arm of the latch 25 to rock the latter in clockwise direction whereby to release the plunger 18. Upon release of the plunger 18, the compressed spring 20 will act to force the plunger and the driver 15, connected therewith, downwardly. As the driver 15 descends, its lower edge will engage the crossbar of the foremost staple S positioned in the throat 10 and sever it from the remaining staples in the strip. Continued downward movement of the driver 15 thus will force the staple downwardly through the throat 10. During the downward movement of the staple toward the work the ends of its legs will engage the inclined fingers 51 of the deflector-element 50 to cause them to be deflected or bent inwardly to a slight extent as indicated in Fig. 3 of the drawings. That is to say, the inclined deflector-fingers 51 act to cam the staple-legs inwardly in converging relationship with the wire bending at the juncture of the legs with the crossbar. Adjacent the end of the downward stroke of the staple-driver 15, the crossbar of the staple S being driven will engage across the cam-plate 52 of the element 50 to rock the latter against its inherent resiliency to the position shown in Fig. 6. The deflector-fingers 51 of the element 50 thus will be carried forwardly out of the throat 10 of the implement to permit the staple S to penetrate the work W, W' without further bending or deflection of its legs.

As the legs of the staple S are driven through the work W, W' their lower terminal portions will bring up against the planar surface of the clincher-plate 60 to be further bent or folded toward each other and clinched against the under or rearward side of the work in the manner indicated in Fig. 4. It has been determined in practice that the impact of the rapidly driven staple against the clincher-plate 60 will momentarily

force the latter away from the work and as the plate rebounds it will act to fold the staple-legs flat against the work to effect a secure fastening of its layers. It will be understood that initially prebending or deflecting the legs of the staple inwardly to a slight extent before they finally engage the clincher-plate 60 tends to control the final bending or clinching action. That is to say, by deflecting the ends of the legs of the staple inwardly toward each other during the driving operation, when the legs finally engage the planar surface of the clincher-plate they will slide therealong to be bent or folded in the same direction as the original bend or deflection; in other words, in a direction toward each other as shown in Fig. 4 whereby to positively and securely fasten the parts of the work together.

After the work W, W' has been stapled in the manner as above explained, pressure on the handle-lever 35 may be relieved to cause the lever and arm 30 to be returned to inoperative position under the action of the spring 32. As the arm 30 is rocked upwardly the links 24 will raise the pin 21 and through engagement of the pin with the upper end of the slots 22 in the plunger 18, the latter will be slid upwardly in the casing 2. As the plunger 18 reaches its uppermost position the latch 25 will be rocked by the spring 28 to engage it therewith and latch it in elevated position. As the driver 15 ascends to inoperative position it will release the cam 52 of the deflector-element 50 to permit the latter to spring back into position to locate its fingers 51 beneath the driver 15. As the driver 15 is raised above the top of the staple-core 5 the strip of staples S will be fed forwardly by the pusher 11 to position the foremost staple in the throat 10 beneath the driver. The stapling operation may then be repeated in the manner as before explained.

It will be observed from the foregoing specification that the present invention provides an improved method and means for fastening or stapling together articles or objects of relatively large area. The device is particularly adapted for use in applying staples at points remote from the edges of large sheets or panels to effect positive clinching of the legs of the staple against the work to securely fasten together its parts. By prebending or deflecting the legs of the staple inwardly toward each other prior to their penetration into the work, it is possible to effect a flat clinching of the legs against the work with the use of an ordinary plate without clincher-grooves. Through the use of the deflector-element, inexpensive U-shaped staples may be employed as fasteners, thereby avoiding the necessity for using expensive staples of special construction. The deflector-element is of simple construction, durable in use and efficient in performing its intended function.

While the device is herein shown and described as embodied in a preferred form of construction, it is to be understood that various modifications may be made in its structure and the method of applying it to use without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. A device for fastening together various articles and objects comprising a fastener-applying implement having means for driving U-shaped staples into the work, a resilient deflector-element mounted on the implement and provided with inclined cam-faces positioned in the path of a staple being driven, said cam-faces being arranged to engage and deflect the legs of the staple inwardly in converging relationship as the staple is driven, and means for flexing the deflector-element to withdraw its cam-faces from engagement with the legs of the staple at the end of the driving operation.

2. A device for fastening together various objects and articles comprising a fastener-applying implement having means for driving U-shaped staples through the work, a resilient deflector-element mounted on the implement and provided with inclined cam-faces normally positioned in the path of the staple-driving means for deflecting the legs of a staple inwardly in converging relationship as it is driven, and means on the deflector-element engageable with the crossbar of the staple for flexing the element to retract its cam-faces from engagement with the legs of the staple.

3. A device for fastening together various objects and articles comprising a fastener-applying implement having means for driving U-shaped staples through the work, said implement having a throat through which the staples are driven, a resilient deflector-element mounted on the implement and provided with inclined cam-faces positioned in the throat, said cam-faces being engageable with the legs of the staple being driven through the throat to deflect them inwardly in converging relationship, and a second cam-face on the deflector-element normally positioned in the throat and adapted to be engaged by the crossbar of the staple at the end of the driving operation to flex the deflector-element and retract the first-named cam-faces from the throat.

4. An implement for fastening together various objects and articles comprising a magazine for containing U-shaped staples, said magazine having an opening at its end for supplying staples thereto, a movable door for closing the end of the magazine and forming a throat through which the staples are driven, means to drive the staples through the throat, and a yieldable deflector-element mounted on said door and having cam-means projecting into the throat, certain of said cam-means being adapted to engage the legs of a staple to deflect them inwardly toward each other during the driving operation, and other cam-means adapted to be engaged by the crossbar of the staple and operative thereby to retract the cam-means at the end of the staple-driving operation.

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