April 11, 1939. E. R. POSNACK 2,153,874

STAPLING DEVICE AND METHOD

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Fig. 1.

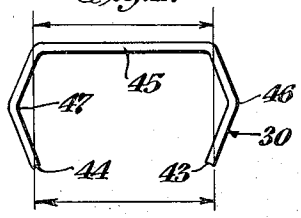


Fig. 2.

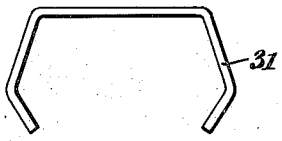


Fig. 3.

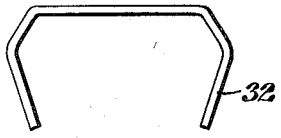


Fig. 4.

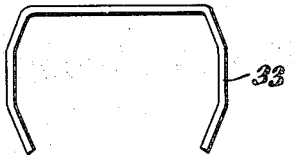


Fig. 5.

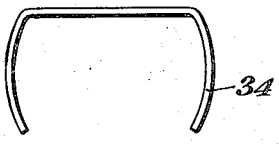


Fig. 6.

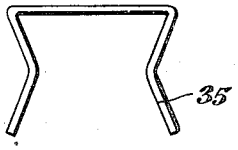


Fig. 7.

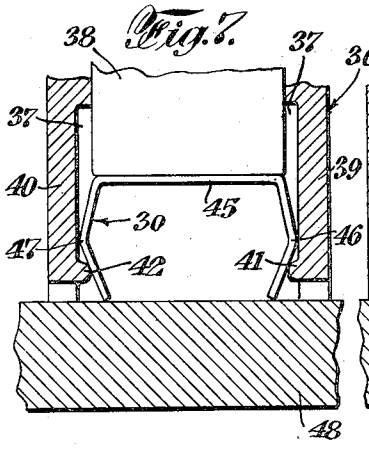


Fig. 8.

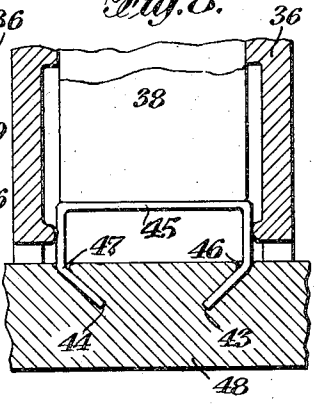


Fig. 9.

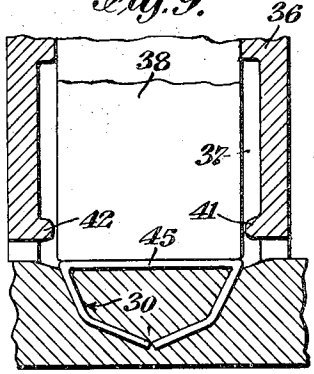


Fig. 10.

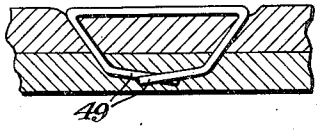


Fig. 11.

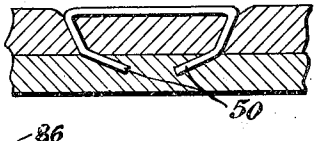


Fig. 12.

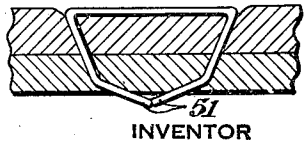
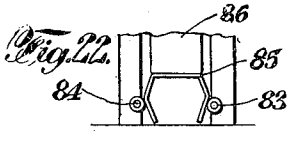


Fig. 22.



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Fig. 13.

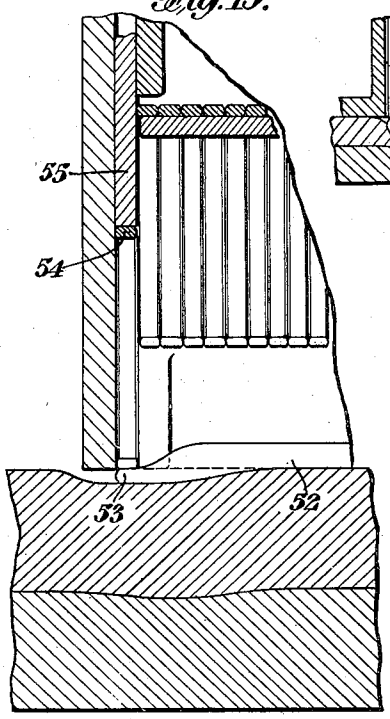


Fig. 15.

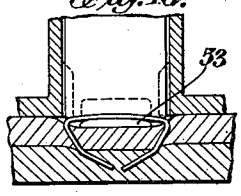


Fig. 16.

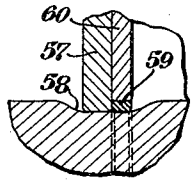


Fig. 14.

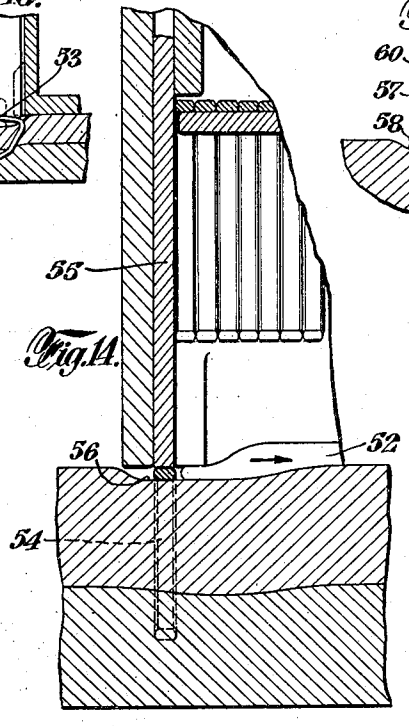


Fig. 17.

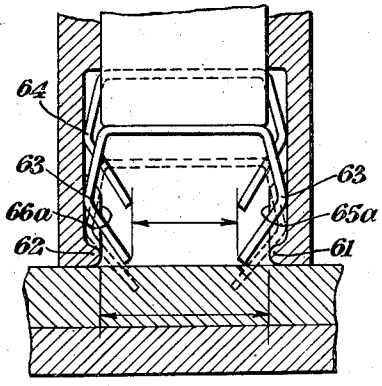


Fig. 18.

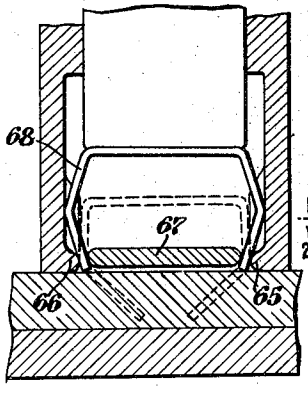
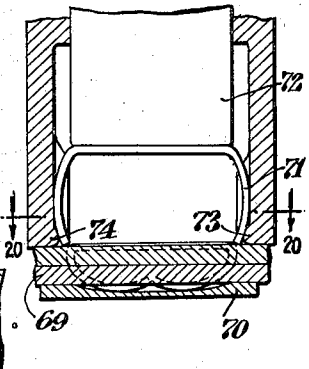


Fig. 19.



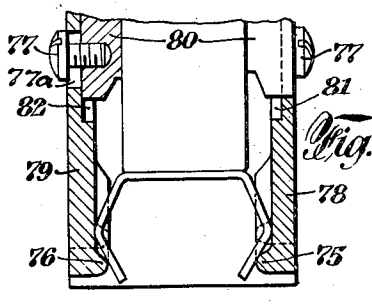


Fig. 21.

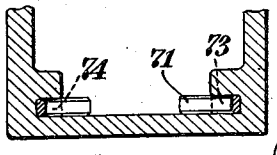


Fig. 20.

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Fig. 19A.

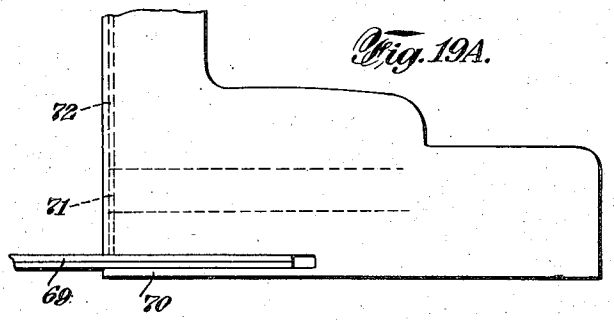


Fig. 24A.

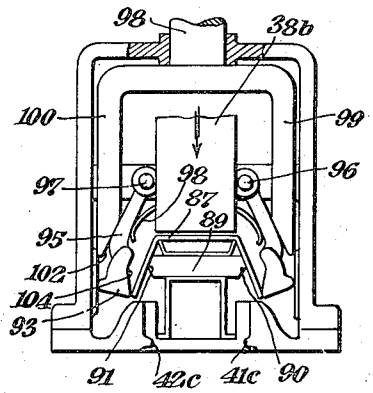


Fig. 21A.

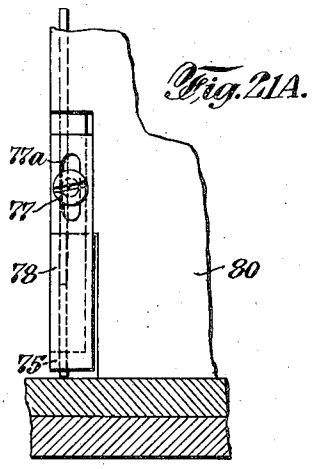
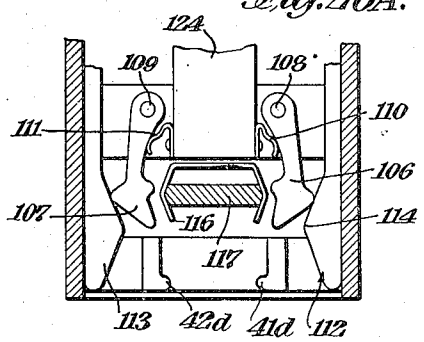


Fig. 26A.



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Fig. 23.

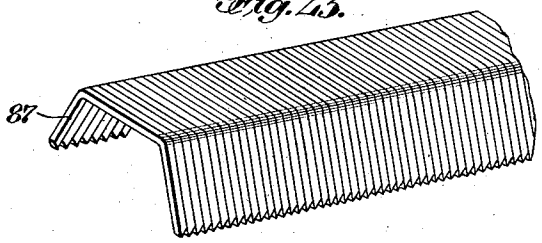


Fig. 24.

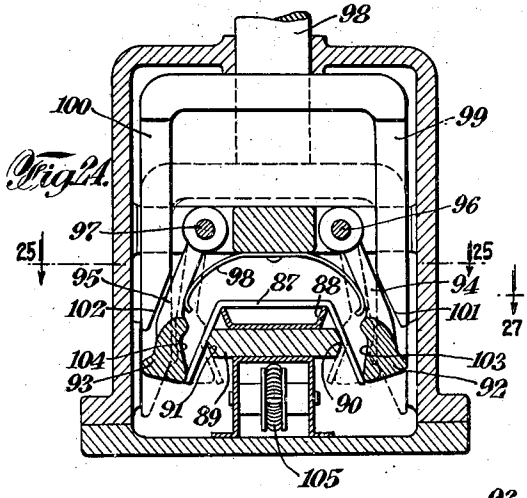


Fig. 26.

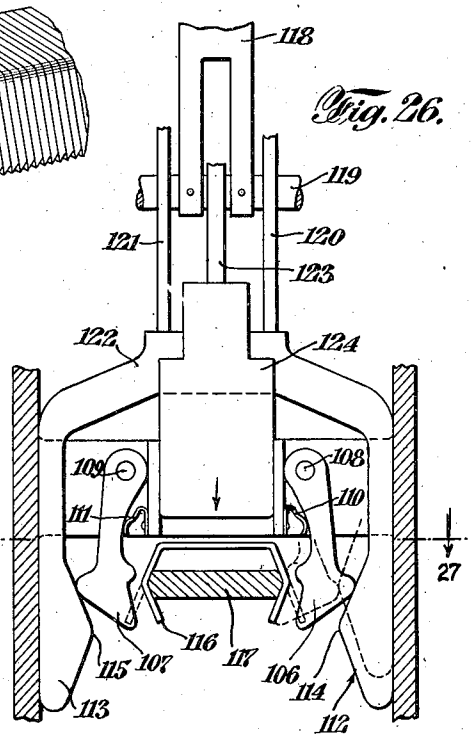
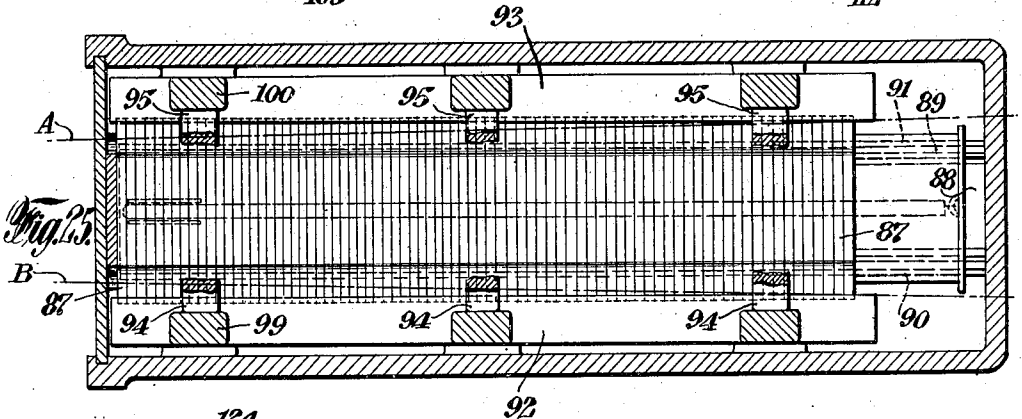


Fig. 25.



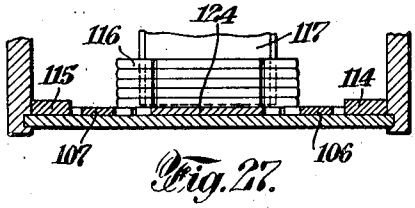


Fig. 27.

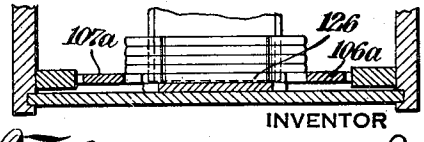


Fig. 28.

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Patented Apr. 11, 1939 2,153,874

UNITED STATES PATENT OFFICE

2,153,874

STAPLING DEVICE AND METHOD

Emanuel R. Posnack, Brooklyn, N. Y.

Application November 6, 1936, Serial No. 109,425

20 Claims. (Cl. 1—48)

This invention relates to stapling methods and machines for the sealing of containers made of corrugated board, cardboard and the like, for securing together several sheets of paper or other material, and for tacking, wire-tying and binding purposes, and is intended primarily for use in driving staples having either angulated or arcuate legs for temporary fastening purposes.

In the commercial application of stapling or stitching methods, three general classes of machines are employed, namely, (1) those that drive ordinary U-shaped staples against an anvil underlying the work, (2) those that do not employ an underlying anvil, but that effect a clenching movement of the legs of the staple by deforming the top or cross bar thereof, and (3) those driving staples with arcuate legs and with a substantially flat top, where the clenching operation is effectuated without the use of an underlying anvil but by means of a restricted outlet at the base of the machine and pivotally mounted driving members embracing the staple at the upper corners thereof and progressively actuating the legs of the staple inwardly during its downward course. Machines of the first-mentioned class are not adapted for use in such cases where an underlying anvil cannot be inserted; and furthermore, the vertical disposition of the legs of the staple results in considerable resistance to deflection upon striking the anvil. Machines of the second class above mentioned require an appreciable force to deform the top of the staple during the clenching operation aside from the force of penetration, and hence cannot be advantageously used in many instances; and furthermore, staples employed in the machines of this category are obviously difficult to produce and hence expensive, due to their rather complex configuration. And machines of the last class above mentioned are relatively intricate in nature, and must of necessity require considerable driving effort due to the multiple-point contact of the driving and clenching members with the staple. It is for the purpose of overcoming the shortcomings and disadvantages of the methods and devices heretofore employed that this invention has been conceived, one of the several objects thereof being to enable a stapling operation to be performed with a minimum of effort and a maximum of efficiency.

And it is also within the contemplation of this invention to enable staples to be driven into various kinds of work, with or without an underlying anvil, and to effect a drive with the employment of staples that are of simple design and relatively inexpensive to fabricate.

A further object of my invention is to produce a staple thoroughly embedded and countersunk in the work, and also to accomplish the desired result with the danger of buckling reduced to a minimum.

It is another object of this invention to enable straight-legged staples, particularly those with divergent legs, to be fed into the device constituting one of the several forms of this invention, and formed into staples with angulated or arcuate legs either before or simultaneously with the driving operation, thereby permitting the use of inexpensive and easily fabricated staples to be employed in a manner heretofore not possible.

And it is also within the contemplation of this invention to enable a machine to accomplish all of the above-mentioned functions at a low cost by providing inexpensive and readily fabricated elements.

Other objects, features and advantages will appear from the drawings and the description hereinafter given.

Referring to the drawings,

Figures 1, 2, 3, 4, 5 and 6 illustrate staples of various forms and shapes adapted for use with this invention, all of the staples illustrated having flat tops and bent legs of either angulated or arcuate configuration.

Figures 7, 8 and 9 are fragmentary vertical sections of the machine constituting one form of my invention, and a section of the work being stapled, illustrating the relative positions of the prime coacting elements during a complete stroke or clenching cycle.

Figure 10 illustrates a fully clenched staple driven into two layers of work by the device and method of this invention, the stitch being entirely embedded within the work, or "blind", and the legs crossing each other.

Figure 11 is a view similar to Figure 10, showing a partial clench with the terminals of the legs spaced apart.

Figure 12 is a view similar to Figures 10 and 11, showing the legs of the staple protruding through the work to form a "through" stitch.

Figure 13 is a fragmentary vertical side section of the device constituting a special form of this invention for producing countersunk stitches, showing the plunger during its downward stroke, and a retractible anvil in its operative position.

Figure 14 illustrates the device of Figure 13 with the anvil in its retracted position and the staple fully driven.

Figure 15 is a fragmentary front view of the device of Figure 13 showing the position of the

parts just before the retraction of the anvil,—the staple being shown embedded within the work.

Figure 16 is a fragmentary side section of a modified form of the device, containing no underlying anvil but having a front portion extending below the base of the machine to depress the work, the staple being shown in its driven position.

Figure 17 is a fragmentary sectional front view showing another modification of my invention, the inwardly protruding deflecting element being shown at the base of the machine, this view illustrating three different positions of the staple during the driving cycle.

Figure 18 illustrates still another form of this invention, substantially similar to that shown in Figure 17 except that a central retractible guiding element is positioned between the legs of the staple near the base of the machine,—this view showing two positions of the staple during the driving operation.

Figure 19 illustrates a structure similar to that of Figure 17, except that the machine is shown driving a staple with arcuate legs, and an anvil is shown underlying the work being stapled, this view showing two positions of the staple during the stapling operation.

Figure 19*a* is a fragmentary side view of the device shown in Figure 19.

Figure 20 is a fragmentary sectional plan view of Figure 19 taken along line **20—20**.

Figure 21 is a fragmentary front sectional view of another form of my invention showing vertically adjustable deflecting elements.

Figure 21*a* is a fragmentary side view of the device shown in Figure 21.

Figure 22 is a fragmentary vertical section of a modified form of my invention showing inwardly protruding rollers as deflecting elements.

Figure 23 represents a strip of U-shaped staples with diverging legs adapted for employment in a modified form of this invention.

Figure 24 is a fragmentary semi-diagrammatic front sectional view of a modified form of this invention adapted to deform a strip of staples similar to that shown in Figure 23 into an arrangement with angularly bent legs.

Figure 24*a* is a fragmentary semi-diagrammatic front view of the device shown in Figure 24, illustrating the position of the staple driving and deflecting means with respect to the other elements of the machine.

Figure 25 is a sectional plan view of Figure 24 taken along line **25—25**.

Figure 26 is a semi-diagrammatic fragmentary front section of another modification of this invention illustrating the mechanism for deforming a single staple in a strip such as shown in Figure 23 into one having angulated legs.

Figure 26*a* is a semi-diagrammatic fragmentary front section of the device shown in Figure 26 illustrating the position of the staple driving and deflecting elements.

Figure 27 is a partial sectional plan of Figure 26 taken along line **27—27**.

Figure 28 is a view similar to Figure 27, showing the deformation of the second staple in the strip.

In the drawings, it will be noted that the method and machine constituting this invention are adapted to employ various types of staples all having substantially flat tops, the staples **30**, **31** and **32** containing two-part angular legs of various lengths, the staple **33** showing three part angular legs, staple **34** showing arcuate legs and staple **35** showing inwardly angulated legs. Staples **30** to **34** inclusive may be employed in any of the forms of the machine shown in the drawings, Figures 7, 8 and 9 showing the employment of staple **30** in one form of my invention.

The forward portion of the frame **36** of the machine contains the usual chamber **37** for accommodating the staple being driven and the conventional driving plunger **38**. In the preferred form, the lateral walls **39** and **40** of the said chamber contain, at a predetermined distance above the base of the machine, inwardly protruding portions or deflecting elements **41** and **42**. For best operative results the distance between these elements is no less than the width of the plunger, so that there is no operative engagement of the plunger with said elements. The staple is preferably so proportioned that the distance between the extremities **43** and **44** is substantially equal to the flat top portion **45** of the staple; and the width of the plunger **38** is preferably no wider than the said top of the staple.

In the operation of this device, the staple **30** is driven downwardly by the plunger **38** from its inoperative position in any conventional manner. Inasmuch as the intermediate portions or junctures **46** and **47** of the legs of the staple are farther apart than the elements **41** and **42**, they will slidably move against these elements and be deflected inwardly during that portion of the stroke that the legs are actually in contact therewith. As the plunger continues on its downward stroke, the top **45** of the staple will pass between the deflecting elements **41** and **42**,—the innermost points of said elements being spaced sufficiently apart to permit the top of the staple to move therepast,—the legs of the staple being forced into the work **48** until the top of the staple is substantially flush with the upper surface of the work. The points of the staples may, if desired, begin entering the work before any inward deflection takes place, and as further penetration is effectuated due to the downward drive, the inward deflection continues within the material until the clench is completed.

In the position illustrated in Figure 8, the staple is shown as partly clenched, due primarily to the action of the deflecting elements **41** and **42**. If the material **48** should be of such quality as to offer very little resistance to penetration, as in the case of very soft corrugated board, the staple will remain clenched only to the extent indicated in Figure 8. Usually, however, the material does offer some resistance, and will hence cause a further bending of the legs of the staple to form a closer clench, as is illustrated in Figure 9. It thus appears that in this form of my invention, the material being stapled coacts with deflectors **41** and **42** and the plunger **38** to perform the prime operative function of the machine. In fact, the resistance of the material can obviously be so appreciable, that the legs of the staple,—converging inwardly at the extremities thereof and confined by the lateral walls of the plunger chamber against spreading outwardly,—will be bent and clenched inwardly by the action of the material alone, even if there were no deflectors present. Hence a machine of the general type above described, and without deflectors, is capable of coacting with a resisting material for operatively driving and clenching staples with flat tops and angulated or curved legs, particularly where the machine is provided with lateral abutments to prevent a spreading of the

staple; and such a combination is within the contemplation of my invention.

The depth of penetration and the ultimate position of the legs are dependent upon several factors, such as the degree of angulation or curvature of the legs, the length of the various portions of the legs, the position of the deflecting elements 41 and 42 with respect to the base of the machine, and the extent of inward protrusion of said deflecting elements. Thus it will be seen in Figure 10 that the legs 49 are overlapping, and in Figure 11 that the legs 50 are spaced apart,—both of the staples shown forming a blind stitch,—the legs being entirely embedded within the material. In Figure 12, however, a through stitch is formed, the legs 51 extending through the material.

The various mechanical embodiments of this invention can be used either with or without an anvil underlying the material being stapled. Where an underlying anvil is omitted, as in Figures 7 to 9, the clenching operation is not dependent upon any member positioned underneath the material to receive the protruding legs and bend them upwardly against the underside of the work, but is effectuated only by the action of the inwardly projecting deflecting portions against the legs of the staple as it is being driven downwardly under the action of the plunger. The inward deflection is further aided by the resistance of the material being stapled, which has the effect of increasing the inward bending movement. In the form of my invention above described, the buckling tendency is reduced to a minimum, inasmuch as there are no restricted portions positioned at the very base of the machine or extreme lowermost level of the plunger chamber, so that after the legs pass the deflecting elements, they are free to penetrate and enter the material in accordance with their own tendency,—directed by the inwardly deflecting action of the members 41 and 42.

It will thus be seen that either a blind or a through stitch can be produced without the aid of the usual underlying anvil, and without the use of any moving parts except a conventional driving plunger, the result being accomplished by stationary deflecting members coacting with the plunger, the staple and the material being stapled. This, in the opinion of the inventor, is the only device ever conceived for driving a flat-top staple without employing either an anvil underlying the material being stapled, or laterally moving deflecting elements. The structure performing the functions of this invention contains only a single moving element in contact with the staple, and can hence be of exceedingly simple design.

In order to produce a perfectly flat stitch with the top thereof absolutely flush with the surface of the work, the forms of my invention illustrated in Figures 13 to 16 can be employed, the structures shown disclosing a method of countersinking the stitch. In the structures of Figures 13, 14 and 15 a retractible anvil 52 is employed at the base of the machine, the anvil containing a front portion 53 extending below the level of the base of the machine and underlying the outlet opening through which the staple 54 is driven by the plunger 55. During the downward course of the plunger, the anvil is in its foremost or operative position where it remains until the top of the staple comes into engagement therewith. At this point, the hollow portion 56 caused by the downward pressure of the anvil, will be ready to receive the top of the staple the legs of which have penetrated into the work. The anvil is then retracted to permit the plunger to continue its drive to press the top of the staple against the work and into the depressed portion 56 to form a countersunk stitch.

In lieu of a retractible anvil above described the modification shown in Figure 16 may be employed, where the front portion 57 of the machine extends below the base thereof, so that upon an initial application of pressure before or during the drive, the hollow portion 58 is produced by the pressure of portion 57 to receive the top of the staple 59 driven by the plunger 60 and thus form a countersunk stitch.

Although in the devices shown in Figures 7, 8 and 9, the deflecting elements 41 and 42 are positioned above the base of the machine, such elements can also, within the contemplation of this invention, be positioned at the extreme base or outlet portion of the machine, as shown in Figure 17. In this form of my invention the deflecting elements 61 and 62 are adapted to begin their deflecting action only when the junctures 63 of the staple 64 reach the position at the base of the machine, the staple being shown maintained in a vertical plane by the guides or walls 65*a* and 66*a* in conventional manner. It will be noticed in this structure that the distance between the terminals of the legs is less than the top of the staple, and that the legs begin penetrating the work before the junctures 63 come into engagement with the deflecting elements 61 and 62. This arrangement is effective in producing either a relatively shallow stitch or one with a greater deflection of the legs. It is understood, however, that the proportions of the legs as shown in this figure, as well as in others illustrated, is merely a preferred arrangement, and can be modified in accordance with design requirements.

In Figure 18 is shown a structure wherein the deflecting elements 65 and 66 are also positioned at the base of the machine, the device being in this case provided with the horizontally disposed retractible guide member 67 positioned between the deflecting elements to permit the legs of the staple 68 to pass therebetween. In this form of my invention, the legs of the staple are reenforced during their downward movement against lateral buckling; and furthermore, the element 67 serves as a guide for the downwardly moving legs. In the operation of this structure, the guide 67 remains in its foremost or operative position until the top of the staple is brought near its upper surface, whereupon it is retracted to permit the staple to be projected through the base of the machine and against the work.

In the devices hereinabove described, my invention has been shown employed without the use of an anvil underlying the work. In Figure 19, however, is shown a structure where the work 69 is positioned between the machine proper and an underlying anvil 70. (See also Figure 19*a*.) The staple 71, shown as one with arcuate legs merely for the purposes of illustration, is being driven downwardly by the plunger 72, the legs of the staple entering the material and being deflected inwardly by the deflecting elements 73 and 74, until the terminal portions of the legs pass through the material and strike the anvil 70 to be clenched upwardly thereby against the undersurface of the work, as illustrated. One of the advantages of such a construction over the usual stapling device employing a conven-

tional parallel legged U-shaped staple is that it affords less resistance to clenching. In the conventional device, the legs strike the anvil practically perpendicularly, whereas in the device shown in Figure 19, the legs, during the downward drive thereof, are deflected inwardly, so that they strike the anvil **70** obliquely so as to reduce the frictional engagement against the anvil and thereby cause a reduction in stapling effort. This form of the invention is particularly adaptable for office stapling purposes where the application of relatively little pressure to effect the stapling operation is obviously a decided advantage. Furthermore, with the use of an underlying anvil, a greater upward deflection is obtainable and a firmer stitch procurable than is possible where there is not such an anvil equivalent to that identified by the numeral **70**.

In the device of Figure 21, the deflecting elements **75** and **76** are vertically adjustable by manipulating the screws **77** and sliding the side members **78** and **79** upwardly or downwardly to vary their position with respect to framework **80** of the machine, the recesses **81** and **82** and the slots **77***a* permitting such slidable movement and adjustment. Inasmuch as the position of the deflectors **75** and **76** are factors determining the ultimate shape and depth of the stitch, this arrangement enables a predetermined adjustable setting for accomplishing these purposes, all within the contemplation of this invention.

In order to reduce the frictional resistance to the downward movement of the staples by virtue of their engagement with the deflecting elements, inwardly extending rollers **83** and **84** can be employed as deflectors as shown in Figure 22. As the staple **85** is downwardly moved under the action of the plunger **86**, the legs of the staple, in encountering the said rollers, will cause them to rotate, without in any way reducing the deflecting action thereof. With such a construction the frictional resistance is obviously reduced, resulting in less stapling effort.

In the various forms above described, it will thus be seen that a deflection of the legs is effectuated by elements which are operatively stationary with respect to the machine, the only moving element being a conventional plunger, as aforesaid. As the staple progressively enters the work, the staples are being bent inwardly towards each other to form either a fully or partially closed clench, in accordance with the specific design of the device. If, during the downward and lateral movement of the legs, there is a plowing through of the material being stitched, the entire top of the staple will cover any hole caused thereby inasmuch as the width of the top is substantially equal to the outlet opening at the base of the machine, within the intent of this invention.

By employing this invention, or the forms thereof herein described, not only can several sheets be stapled together, and containers made of cardboard or other material be efficiently sealed, but various types of tacking operations can also be performed. A staple can be driven into solid material, such as wood for example, to form a fully or partially clenched "blind" stitch, useful for attaching tags, securing window shades to their rollers, attaching insulation or waterproofing sheets to wall boards or the like, and for other building purposes. And still another use is for binding together a group of wires passed through the machine, or clamping a wire to a flat surface for producing window displays and the like.

In the practical application of this invention the staple can be inserted preformed as illustrated in the drawings above referred to. However, it is within the further contemplation of this invention to employ straight-legged staples, particularly those having divergent legs as shown in Figure 23, a strip of such staples **87** being inserted into the machine and the legs bent into the required shape during or before the driving operation.

By referring to Figures 24 and 25, the strip of staples **87** is mounted on the staple rail **88**, a central die or bar **89** with angulated (or curved) lateral sides **90** and **91** underlying said rail and extending longitudinally of the machine and positioned intermediate the legs of the staples. The lateral forming dies **92** and **93**, also extending longitudinally of the machine, are carried by a plurality of arms **94** and **95** pivotally mounted at **96** and **97** respectively, the springs **98** being positioned between the said arms **94** and **95** and normally actuating them outwardly. The slidably movable plunger or rod **98** is suitably attached to the vertically disposed actuators **99** and **100** the lower terminals **101** and **102** of which are adjacent the said arms **94** and **95** respectively and adapted for operative engagement therewith.

When the plunger **98** and consequently the actuators **99** and **100** are forced downwardly, the said extremities **101** and **102** of the actuators will engage the arms **94** and **95** to cause an inward pivotal movement thereof, resulting in a corresponding movement of the dies **92** and **93** to produce an inward bending of the lower portions of the legs of the staple about the lateral sides **90** and **91** of the bar **89**, thereby producing angulated legs as shown by dotted lines in Figure 24. The shape of the dies **92** and **93**, particularly the forming faces **103** and **104** thereof, are angulated in accordance with the desired angle and shape of the legs. The strip of staples **87** is constantly being urged forwardly by any conventional spring feed mechanism such as the rotatably mounted spring **105** suitably associated with the strip in a manner not shown, but in accordance with conventional structures.

The structure of Figure 24 may also contain at the forward portion thereof driving and clenching means similar to those hereinbefore described, these means being separately and independently operated after the staple forming operation has been completed. By referring to Figure 24*a*, it will be seen that the independent plunger **38***b*, suitably operated manually or by any other independent means, is adapted to move downwardly past the deflecting elements **41***c* and **42***c* near the base of the device. When the staples of the form similar to those shown in Figures 1 to 5 are operatively inserted in the machine, the said plunger **38***b* and the deflecting elements **41***c* and **42***c* will coact to drive and clench the staple in the manner hereinbefore described.

The lateral forming dies, such as **92** and **93**, can, within the contemplation of this invention, be normally at a slight inclination to the longitudinal axis of the machine, as indicated by the dot-dash lines A and B. If then these dies were actuated inwardly to bring them into parallel relation to said axis and into operative engagement with the staple strip, the staples would be progressively reshaped, from one end of the ma-

chine to the other. With this arrangement, less effort would be required to reshape the staples into the required form than would be necessary where all the staples were reshaped simultaneously.

It is thus apparent that the relatively inexpensive staples such as 87 can be employed in this device whereby such staples are readily transformed into those having flat tops and bent or angulated legs, whereafter they are driven by a suitable driving plunger in the manner hereinbefore described.

In Figure 26 is shown a mechanism similar to that of Figures 24 and 25, except that a single staple of the strip is deformed, and simultaneously with the driving operation. The dies 106 and 107 are pivotally mounted at 108 and 109 respectively, the arms of these dies being normally urged outwardly by the springs 110 and 111. The die actuators 112 and 113 contain the cams 114 and 115 which, upon the downward movement of the said actuators, engage the said dies to move them inwardly and bend the legs of the staple 116 about the lateral sides of the central die or bar 117, in a manner similar to that described with reference to the structure of Figure 24.

The manually or power operated lever 118, affixed to the shaft 119 suitably mounted on the machine, causes a rotation of the shaft during its operative movement, thereby actuating the two lateral cams 120 and 121 engageable with the yoke 122, and the central cam 123 engageable with the driving plunger 124. The cams are so designed that upon an operative movement of the lever 118, the yoke 122 and consequently the actuators 112 and 113 are moved downwardly, against the action of springs 132 and 133, to cause an operative inward movement of the forming dies 106 and 107 to reshape the legs of the adjacent staple; and after the cams 114 and 115 of the said actuators have completed their operative engagement with the said dies, the cam 123, during the continued operative rotation of shaft 119, actuates the plunger 124 downwardly to effect its driving operation in a manner similar to that hereinabove described, the staples 116 being deflected inwardly by the members 41*d* and 42*d*.

The position of the forming dies 106 and 107 may, if preferred, be in the plane of the plunger at the front of the machine to engage the foremost staple, as shown in Figure 27. After the staple is deformed the springs 110 and 111 force the dies 106 and 107 outwardly out of the path of the plunger, the bar 117 is slightly retracted, in a manner to be hereinafter described, and the plunger, during its downward drive as above described, continues its operative engagement with the staple 131. Thereafter the parts are retracted to their normal inoperative positions by the springs 132 and 133 mounted on the shaft 119 and affixed to the yoke 122.

If desired, the dies 106*a* and 107*a*, similar to those identified by the numerals 106 and 107, can be positioned adjacent and in the plane of the second staple 126 as shown in Figure 28, so that there will be no interference with the plunger 124 during its downward drive, thereby obviating the necessity of retracting the said dies and bar before the completion of the stroke.

In either of the last two forms above described it will thus be seen that straight-legged staples can be inserted in a machine embodying my invention, and one of the staples simultaneously deformed into a staple with bent legs to enable it to be driven by the method and mechanism constituting my invention.

It is of course understood that other additional forms and modifications of the apparatus and adaptations of the method constituting this invention can be employed beyond and in addition to those hereinbefore described, all within the scope of the appended claims.

It should be noted that in the claims hereinafter set forth, the term "bent" legs is employed to denote legs of both angular and arcuate configuration containing an intermediate portion out of the vertical plane through the upper corners at the extremities of the top of the staple.

What I claim is:

1. In a stapling machine for driving a staple having a substantially flat top and bent legs, a plunger adapted for operative engagement with the top of the staple, and two oppositely positioned deflecting elements positioned above and in spaced relation to the work to be stapled and interposed in the path of the legs of the staple for engagement therewith to operatively deflect the legs during the downward movement of the staple.

2. In a stapling machine for driving a staple having a substantially flat top and bent legs, a plunger adapted for operative engagement with the top of the staple, and two deflecting elements positioned above the work to be stapled and interposed in the path of predetermined intermediate portions of the legs of the staple for engaging said portions to operatively deflect the legs during the downward movement of the staple, the plunger being free throughout its stroke from operative engagement with the deflecting elements.

3. In a stapling machine for driving a staple having a substantially flat top and bent legs, a plunger adapted for operative engagement with the top of the staple, and two deflecting elements positioned above and in spaced relation to the work to be stapled and interposed in the path of predetermined intermediate portions of the legs of the staple for engaging said portions to operatively deflect the legs during the downward movement of the staple, said deflecting elements being out of the path of the terminals of the legs.

4. In a stapling machine for driving a staple having a substantially flat top and bent legs with outwardly extending intermediate portions, a plunger of a width no greater than said top of the staple and adapted for operative engagement therewith, and two fixed deflecting elements positioned above and in spaced relation to the work to be stapled and interposed in the path of said intermediate portions of the staple for engagement with the outer surfaces thereof to operatively deflect the legs inwardly during the downward movement of the staple.

5. In a stapling machine for driving a staple having a substantially flat top and bent legs with outwardly extending intermediate portions, a plunger adapted for operative engagement with the top of the staple, and two deflecting elements positioned above and in spaced relation to the work to be stapled and interposed in the path of said intermediate portions of the staple for engagement with the outer surfaces thereof to operatively deflect the legs inwardly during the downward movement of the staple, the plunger being free throughout its stroke from operative engagement with the deflecting elements.

6. In a stapling machine for driving a staple

having a substantially flat top and bent legs with outwardly extending intermediate portions, a plunger adapted for operative engagement with the top of the staple, a chamber for accommodating the plunger, and two deflecting elements extending inwardly from the lateral walls of the chamber and in spaced relation to the plane of the base of the machine, said elements being interposed in the path of said intermediate portions of the staple for engagement with the outer surfaces thereof to operatively deflect the legs inwardly during the downward movement of the staple, the distance between said elements being no less than the width of the plunger.

7. In a stapling machine for driving a staple having a substantially flat top and bent legs with outwardly extending intermediate portions, a plunger with a flat driving surface adapted for operative engagement with the top of the staple, a chamber for accommodating the plunger, and two laterally immovable oppositely disposed deflecting elements extending inwardly from the lateral walls of the chamber and interposed in the path of said intermediate portions of the staple for engagement with the outer surfaces thereof to operatively deflect the legs inwardly during the downward movement of the staple, said deflecting elements being out of the path of the terminals of the legs and in spaced relation to the work to be stapled.

8. In a stapling machine for driving a staple having a substantially flat top and bent legs with outwardly extending intermediate portions, a plunger with a flat driving surface adapted for operative engagement with the top of the staple, and two stationary deflecting elements in spaced relation to the plane of the base of the machine and interposed in the path of said intermediate portions of the staple for engagement with the outer surfaces thereof to operatively deflect the legs inwardly during the downward movement of the staple.

9. In a stapling machine for driving a staple having a substantially flat top and bent legs with outwardly extending intermediate portions, a plunger adapted for operative engagement with the top of the staple, a chamber for accommodating the plunger, and two stationary deflecting elements in spaced relation to the plane of the base of the machine and extending inwardly from the lateral walls of the chamber and interposed in the path of said intermediate portions of the staple for engagement with the outer surfaces thereof to operatively deflect the legs inwardly during the downward movement of the staple, the path of the plunger being free throughout its stroke from the deflecting elements.

10. In a stapling machine for driving a staple having a substantially flat top and bent legs with outwardly extending intermediate portions, a plunger adapted for operative engagement with the top of the staple, and two stationary deflecting elements positioned substantially at the level of the base of the machine and interposed in the path of said intermediate portions of the staple for engagement with the outer surfaces thereof to operatively deflect the legs inwardly during the downward movement of the staple, said deflecting elements being out of the path of the terminals of the legs.

11. In a stapling machine for driving a staple having a substantially flat top and bent legs with outwardly extending intermediate portions, a plunger adapted for operative engagement with the top of the staple, two vertically adjustable and laterally immovable deflecting elements positioned above the work being stapled, and means to lock said elements in predetermined positions with respect to the base of the machine, the said elements being interposed in the path of the legs of the staple for engagement therewith to deflect them inwardly during the driving stroke.

12. In a stapling machine for driving a staple having a substantially flat top and bent legs with outwardly extending intermediate portions, a plunger adapted for operative engagement with the top of the staple, a chamber for accommodating the plunger, two vertically movable side members slidably engageable with the lateral walls of the chamber, means to hold said members locked in predetermined position, and a deflecting element extending inwardly from each of said members a distance sufficient for their engagement with the legs of the staple during the driving stroke to operatively deflect said legs inwardly.

13. In a stapling machine for driving a staple having a substantially flat top and bent legs with outwardly extending intermediate portions, a plunger adapted for operative engagement with the top of the staple, and two revolvable deflecting elements positioned above the work to be stapled and interposed in the path of said intermediate portions of the staple for engagement with the outer surfaces thereof to operatively deflect the legs inwardly during the downward movement of the staple.

14. In a stapling machine for driving a staple having a substantially flat top and bent legs with outwardly extending intermediate portions, a plunger adapted for operative engagement with the top of the staple, a chamber for accommodating the plunger, and two rollers extending inwardly from the lateral walls of the chamber and interposed in the path of said intermediate portions of the staple for engagement with the outer surfaces thereof to operatively deflect the legs inwardly during the downward movement of the staple.

15. In a stapling machine for driving a staple having bent legs with outwardly extending intermediate portions, means for reshaping divergent straight-legged staples fed into the machine into those with legs of the required bent configuration, including a staple rail for operatively supporting a strip of said straight-legged staples, coacting bending dies operatively engageable with the inner and outer surfaces of the staple legs, and means for actuating the dies into operative engagement with said legs.

16. In a stapling machine for driving a staple having bent legs, means for reshaping straight-legged staples fed into the machine into those with legs of the required bent configuration, including a staple rail for operatively supporting a strip of straight-legged staples, a central die positioned between the legs of the staples and engageable with intermediate portions thereof, two lateral dies positioned outside of the staples and having portions engageable with the lower portions of adjacent staple legs, and means for actuating the lateral dies towards the central die whereby the staple legs therebetween are bent inwardly.

17. In a stapling machine for driving a staple having bent legs with outwardly extending intermediate portions, means for reshaping divergent straight-legged staples fed into the machine into those with legs of the required bent configuration,

including coacting bending dies operatively engageable with the inner and outer surfaces of adjacent staple legs, a plunger for operative engagement with the top of an underlying staple and actuating means coactively connected with said dies and said plunger, the said dies being brought into operative engagement with said legs to produce a bent configuration thereof, and the plunger driving the said underlying staple downwardly; and two deflecting elements positioned above the work being stapled and interposed in the path of the legs of the foremost staple for engagement therewith to deflect them inwardly during the driving stroke.

18. In a stapling machine for driving a staple having bent legs with outwardly extending intermediate portions, means for reshaping divergent straight-legged staples fed into the machine into those with legs of the required bent configuration, including a central die positioned between the legs of the staples and engageable with intermediate portions thereof, two lateral dies positioned outside of the staples and having portions engageable with the lower portions of adjacent staple legs, a plunger for operative engagement with the top of the foremost staple, actuators engageable with the lateral dies for moving them towards the central die whereby the staple legs therebetween are bent inwardly, and means coactingly connected with said actuators and said plunger the said dies being adapted to be brought into operative engagement with said legs to produce a bent configuration thereof, and the plunger being adapted to drive the said foremost staple downwardly; and two deflecting elements positioned above the work being stapled and interposed in the path of the legs of the reshaped foremost staple for engagement therewith to deflect them inwardly during the driving stroke.

19. In a method of stapling, providing a strip of staples with straight legs, bending the legs of a series of staples to form outwardly extending intermediate portions while applying driving force to the top of the foremost reshaped staple of said strip, and forcing the legs of the staple being driven towards each other by engaging said intermediate portions thereof during the downward movement of the latter staple.

20. In a stapling machine for driving a staple having a substantially flat top and bent legs with outwardly extending intermediate portions, a plunger adapted for operative engagement with the top of the staple, and two revolvable deflecting elements positioned above the work to be stapled and interposed in the path of the legs of the staple for engagement therewith to deflect them inwardly during the downward movement of the staple.

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