March 11, 1941. E. R. POSNACK 2,234,448

METHOD OF FASTENING AND APPARATUS THEREFOR

Filed Nov. 4, 1938 2 Sheets-Sheet 1

Fig. 1.

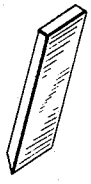


Fig. 2.

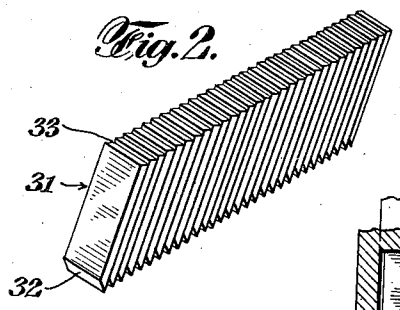


Fig. 3.

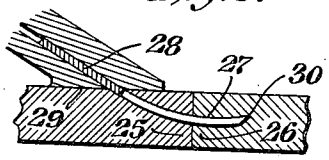


Fig. 9.

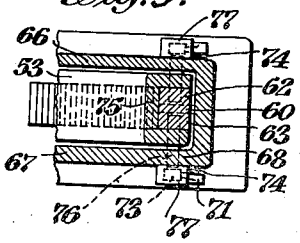


Fig. 5.

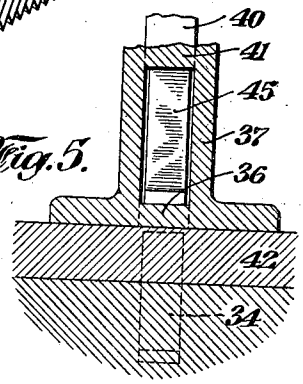


Fig. 4.

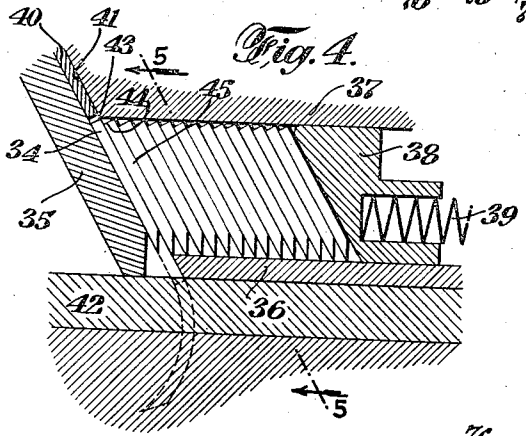


Fig. 7.

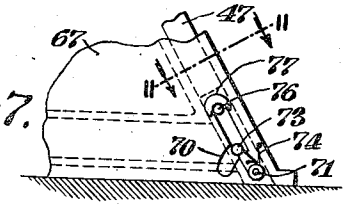


Fig. 8.

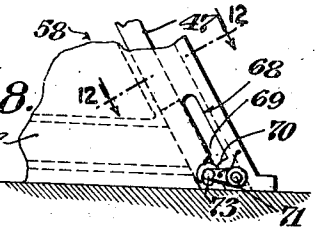


Fig. 6.

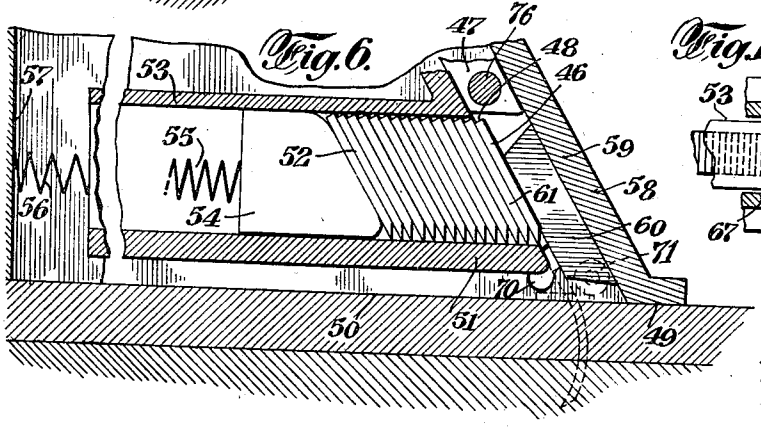
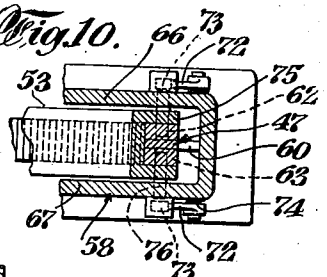


Fig. 10.



INVENTOR

Emanuel R. Posnack

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METHOD OF FASTENING AND APPARATUS THEREFOR

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Fig. 11.

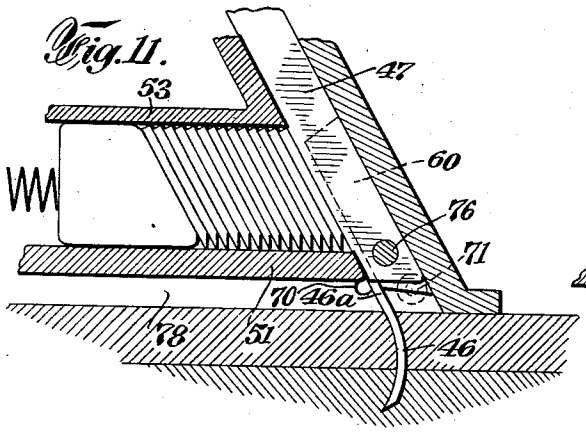


Fig. 12.

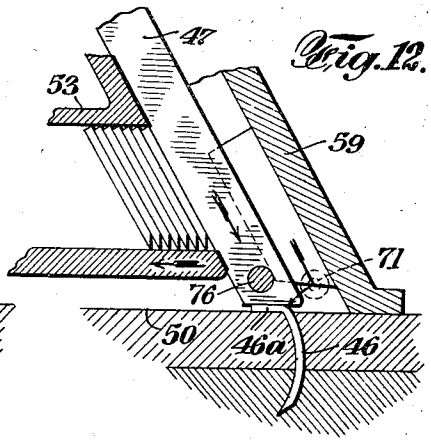


Fig. 13.

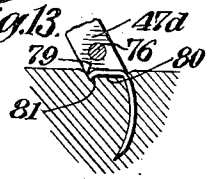


Fig. 14.

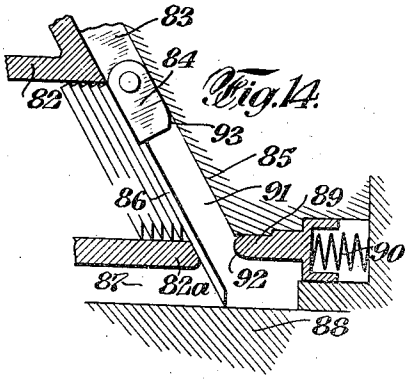


Fig. 15.

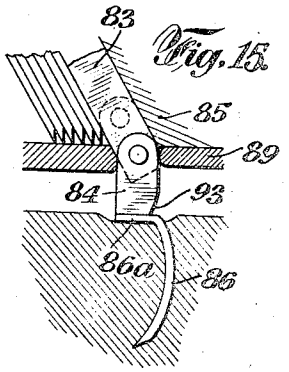


Fig. 16.

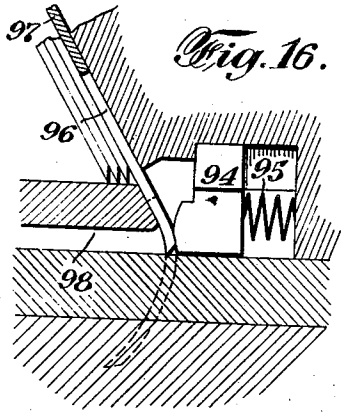


Fig. 17.

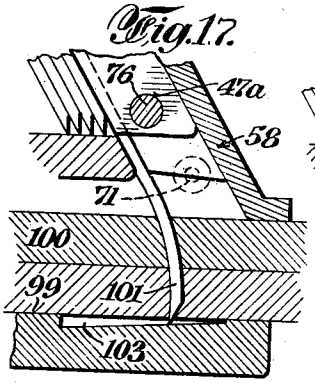


Fig. 18.

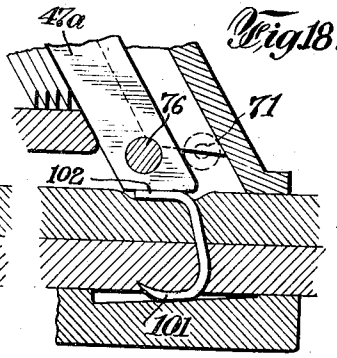


Fig. 19.

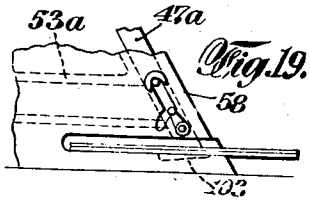
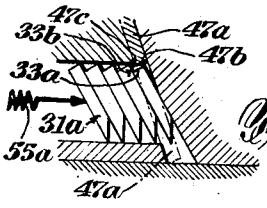


Fig. 20.



INVENTOR

Emanuel R. Posnack

Patented Mar. 11, 1941

2,234,448

UNITED STATES PATENT OFFICE

2,234,448

METHOD OF FASTENING AND APPARATUS THEREFOR

Emanuel R. Posnack, New York, N. Y.

Application November 4, 1938, Serial No. 238,820

14 Claims. (Cl. 1—47)

This invention relates to fastening methods and devices for securing together several sheets or layers of paper or other material, as well as for effecting temporary or permanent closures for containers made of corrugated board and the like, for top and bottom sealing, and for tacking, tagging or similar operations, this being a continuation in part of my application filed on March 3, 1937, Serial No. 128,832, and which matured into Patent No. 2,172,259.

In the several conventional methods of stapling, the most commonly employed staple is that having two prongs or legs, either straight or substantially arcuate, driven into the work by a plunger traveling normal to the plane of the work. Another form of fastener, only occasionally employed, is the single-legged or flat wire type the top and bottom of which are clenched by positive deflecting means such as by a top and bottom anvil—this type of fastener also being driven by a plunger moving perpendicularly to the surface of the work. Both of these fasteners involve the use of relatively intricate clenching or deflecting mechanisms, and the fasteners themselves, particularly of the two-legged type, are usually quite expensive due to the length of the wire stock and the forming operations required to produce them. It is within the contemplation of my invention to overcome these short-comings by simplifying fastening operations and reducing the cost thereof—an objective which I attain by employing an inclined drive with single-legged fasteners also inclined with respect to the surface of the work. By means of such method, a relatively simple and inexpensive fastener can readily be driven into the work whereby the material being fastened will, in certain forms of my invention where the fastener is formed with a head, be held between the head and the inclined leg of the fastener to resist a vertical upward pull.

A further object of my invention is to enable single-legged fasteners arranged in stack formation to be readily and positively detached from the stack one at a time upon the operative stroke of the plunger.

It is also within the contemplation of this invention to employ a preferably straight single-legged fastener to be driven into the work simultaneously with the formation of a head thereon whereby the device serves both as a fastener forming and driving mechanism. Due to the employment of an inclined drive, a collapse of the upper portion of the partially driven inclined fastener against the work can be effected when the support for the fastener is either eliminated or retracted, thereby obviating the necessity of employing special dies or anvils for forming the top head of the fastener.

Another object of this invention is to provide a fastener whereby a secure operative grip upon the work will be effected by employing the method above referred to, and whereby a plurality of fasteners adapted to be driven thereby can be economically housed in the driving mechanism.

It is also within the contemplation of this invention to enable a fastener to be clenched or bent within the work without the use of an underlying anvil, an objective which is attained by causing the prong or leg of the fastener being driven to be curled into the work due to the engagement thereof with a relatively rigid member positioned upon the work, preferably aided by the resistance afforded by the material being fastened.

Another object of this invention is to enable the method above-referred-to to be used in conjunction with an underlying anvil whereby it can be employed particularly for bottom sealing of cartons, and for the fastening together of several sheets of paper substantially in the manner of other conventional desk stapling devices.

And it is also within the contemplation of my invention to enable the above method to be effectively performed by employing fasteners of the aforesaid type conveniently contained in novel stack formation.

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

In the drawings,

Figure 1 is a perspective view of a preferred form of fastener employed in connection with this invention.

Figure 2 is a perspective view of a stack of inclined fasteners substantially similar to the form of Figure 1.

Figure 3 is a fragmentary vertical section of a device employing one method of my invention, the drawing showing the fastener driven into the work by an inclined plunger.

Figure 4 is a fragmentary vertical section of another machine embodying my invention and adapted to house a stack of fasteners, showing by broken lines a fastener driven completely into the work.

Figure 5 is a section of Figure 4 taken along line 5—5.

Figure 6 is a fragmentary vertical section of another form of my invention illustrating a retractable mechanism for causing a collapse of the fasteners during the driving operation to form a head thereon, as indicated by broken lines.

Figure 7 is a fragmentary side elevation illustrating the front portion of the machine of Figure 6 with the plunger in a raised position and the retractable mechanism in its forward position.

Figure 8 is a view similar to Figure 7 showing the plunger at the completion of its stroke and in its retracted position.

Figure 9 is a fragmentary sectional plan of Figure 7 taken along line 9—9.

Figure 10 is a fragmentary sectional plan of Figure 10 taken along line 10—10.

Figure 11 is a vertical section substantially similar to that of Figure 6, showing a position of the plunger during its operative stroke with the upwardly extending inclined column of the driven fastener just before the retraction of the plunger and fastener holding mechanism.

Figure 12 is a view similar to Figure 11 showing the plunger in its final operative position after having caused the collapse of the fastener to form a head thereon, the plunger and fastener holding mechanism being in their retracted positions.

Figure 13 is a fragmentary vertical section of a structure similar to that of Figure 12 but with the plunger containing a downwardly protruding portion to cause an additional bending of the head of the fastener into the work.

Figure 14 is a vertical section of a modified form of my invention, the driving plunger containing a pivotally supported tip for forming a head on the fastener, the plunger being shown in a partly raised position.

Figure 15 shows the position of certain of the parts of the device of Figure 14 after a completion of the driving stroke.

Figure 16 is a fragmentary vertical section of another modification of my invention, containing a deflecting element at the base of the machine, the broken lines showing the approximate driven position of the fastener after encountering the deflecting element.

Figure 17 is a fragmentary vertical section of a device similar to that shown in Figures 11 and 12 but with an underlying anvil to cause a positive deflection of the lowermost portion of the fastener.

Figure 18 represents the parts of Figure 17 in their final operative positions after the retraction of the fastener and plunger supporting structure, showing the formation of the complete clench.

Figure 19 is a fragmentary side elevation of the structure of Figure 17, and

Figure 20 is a semi-diagrammatic representation of a form of my invention illustrating the manner in which a positive severence of a fastener can be effectuated by a slightly inclined plunger.

In the forms of my invention as described in my said Patent No. 2,172,259, one or more staples, each containing a head portion substantially parallel to the work and a leg portion inclined with respect thereto, is driven downwardly by one or more inclined plungers whereby, upon the completion of the stroke, the head portion of each staple will engage the surface of the work and the penetrating portion thereof will be inclined at an angle thereto. Hence in this position the head and penetrating portions of the staple will hold therebetween the portion of the material being stapled, which will obviously present a resistance to a straight upward vertical pull exerted upon the staple. A detailed description of the gripping action of a staple thus driven has been adequately set forth in the said Patent No. 2,172,259, and hence will not be repeated here. However, it is intended by my present invention to obviate the use of a preformed staple containing a head thereon, and to obtain a substantially similar effect by employing only a simple straight strip of flat wire which, during the driving operation in accordance with certain forms of this invention, will be deformed to provide a driven fastener presenting a head and an inclined leg similar to the performed staple described in my said Patent No. 2,172,259. And in this aspect of my invention, it is a further objective to effectuate a drive of an inclined fastener for obtaining an operative grip upon the work without the necessity of forming a head thereon, as will more specifically hereinafter appear.

In all the forms of my invention illustrated in my said Patent No. 2,172,259, the penetrating leg of the staple is shown as extending straight into the material. This will obviously occur when the toughness or density of the material being stapled is not sufficient to cause a bending of the leg of the staple. However, in certain types of corrugated board with a tough upper layer, or in dense cardboard or fibre board, the material may afford a partial resistance to penetration. Thus, in Figure 3, as well as in certain other figures of the drawings herein, the ultimate shape of the fastener may be slightly curved, particularly if the terminal point of the fastener is bevelled as indicated. In each of these cases, the fastener illustrated is not sufficiently rigid to completely withstand the bending effect produced by the drive of the plunger and the resistance afforded by the material being fastened, thereby causing a slight curvature of the fastener as it is being driven. This tendency to produce curved driven fasteners is enhanced particularly in those structures where the driven fastener is in effect an inclined column supported during its driving movement only at two points—the wall of the penetrated portion of the work, and the lower portion of the fastener supporting member which is spaced above the work—as exemplified by the structures of Figures 6 and 11 to 18. Where it is, however, desired to obtain a more positive clench, the structure of Figures 17, 18 and 19 can be used wherein an underlying anvil is employed, all in a manner to be more fully hereinafter set forth.

Where a drive of considerable inclination is employed, the fastener deflecting tendency of the material being fastened can be advantageously utilized for various purposes, including that of effecting temporary closures. Thus in Figure 3, the two abutting portions 25 and 26 are held together by the straight wire fastener 27 driven into the work by the plunger 28. It will be noted that the base 29 of the machine rests flatly upon the surface of the work and contains an inclined channel therein for plunger 28, said plunger being adapted to penetrate the surface of the work to practically hide the fastener from view. The terminal point 30, being bevelled as indicated, will cooperate with the material to cause an upward deflection of the fastener, although a satisfactory temporary closure can obviously be effected with a straight substantially unbent fastener driven into the work at a considerable inclination.

Where it is desired to economically house a relatively large number of fasteners in a suitable driving machine, to be driven in accordance with the methods of my invention, I prefer the employment of a stack of straight fasteners secured together by any conventional adhesive means, the fasteners being disposed at an inclination to the longitudinal direction of the stack, similar in arrangement to the stack 31 shown in Figure 2, or the stacks of fasteners illustrated in Figures 4, 6 and 11 of the drawings. Each individual fastener is preferably bevelled at the bottom edge

32 thereof (see Figure 2), the uppermost edge 33 of each fastener being preferably normal to the front and rear sides thereof. Hence a stack of fasteners of my invention contains a stepped formation at the upper edge thereof so that the division between the individual fasteners is well defined, as distinguished from certain conventional stacks of fasteners that are adapted to be driven in a direction normal to the plane of the work thereby presenting an upper edge of the stack of such smoothness as to render the lines of demarcation between adjacent fasteners hardly discernible. With this stepped formation of the inclined stack of fasteners, a driving plunger can be made to separate a fastener from its stack more readily than with the aforesaid conventional arrangement where there always is some danger that the slightest play in the driving plunger may cause it to engage the next adjacent fastener and inadvertently detach it from the stack.

To more clearly understand this action, reference will be made to Figures 4, 6 and 20 in which stacks of fasteners similar to that of Figure 2 are employed. In Figure 4, the foremost staple 34 is in abutment with the front fastener 35, the stack of fasteners being operatively supported upon the fastener rack or base 36 within the framework 37 of the machine. The stack of fasteners is urged forwardly by the push member 38 under the influence of spring 39 in the conventional manner well known in the art. The plunger 40 is movable within the channel 41 in the direction of the inclination of the fasteners, and is positioned to drive the foremost fastener into the work 42. In this form of my invention, it is preferred that the thickness of plunger 40 be no greater, and preferably less than the thickness of the underlying fasteners such as 34.

It will be noted that the uppermost edge 43 of fastener 34 projects above the most proximate portion 44 of the next adjacent fastener 45, so that the plunger 40 definitely encounters only the fastener 34 at the beginning of its downward drive. As the drive continues, the detached foremost fastener 34 will be driven into the work as indicated by the broken lines; and if, as in the structure illustrated, the plunger 41 is designed to extend at the completion of its operative drive slightly below the base 39, it will cause a countersinking of the driven fastener. It will also be observed that the fastener may be slightly bent due to the bevelled point thereof and the resistance of the material 42, for the reasons hereinabove set forth.

In Figure 6, a detailed description of which will be hereinafter set forth, the plunger 47 is positioned at that end of the stack opposite from the plunger's position in Figure 4, so that fastener 46 is in the foremost position ready to receive the operative drive of said plunger 47. It will be noted that, in the structure illustrated, the uppermost edge 48 of fastener 46 will receive the first impact of the plunger, being closest thereto—and hence will cause said foremost fastener 46 to be detached from the stack the instant after the plunger reaches the level of point 48.

In Figure 20, the driving edge 47*b* of the plunger 47*a* is operatively engageable with the upper edges 33*a* of the fasteners 31*a*. The plunger is in this form of my invention, directed downwardly at a lesser inclination than that of the fasteners. Upon a downward operative movement of the plunger, the driving edge 47*b* will engage the top edge 33*a* of the underlying fastener to detach it from the stack and drive it downwardly. It is apparent that the wall 33*b* of the second fastener, exposed to the plunger because of the stepped formation of the top edge of the stack, will receive the lowermost point 47*c* of the plunger and prevent it from sliding rearwardly (because of excessive play or looseness for any other reason) and inadvertently engaging the top of the second staple. During the continued driving movement of the plunger the stack of fasteners will be urged rearwardly against the action of spring 55*a*, leaving room for the plunger in its lowermost driving position, as indicated by dot-dash lines in the figure.

The positive detaching and driving action above described is primarily due to the inclined formation of fasteners, which effect is obviously not as readily attainable with a stack of fasteners adapted for a drive in a direction normal to the surface of the work.

In the forms of my invention shown in Figures 3 and 4, no provision has been made for the formation of a head on the top of the fastener during the driving operation. In the forms of my invention illustrated in Figures 6 to 19 inclusive, however, structures are provided whereby a straight inclined drive in the aforementioned manner is effected for the major portion of the stroke, leaving a portion of the fastener protruding upwardly at an inclination in the form of what may be considered an inclined column. Thereafter the fastener supporting means is retracted and the plunger permitted to continue in a general downward direction, thereby forcing the said upward projecting inclined column to be collapsed against the surface of the work. In this manner a straight single-legged fastener consisting only of a single strip of wire is operatively driven into the work and shaped into a form having a head and leg portion embracing therebetween a portion of the work, as illustrated in Figure 12 and other figures in the drawings.

One method by which this operation is effectuated within the scope of my invention is shown in Figures 6 to 12 inclusive. The base 49 of the machine is adapted to rest upon the surface 50 of the work; and in spaced relation to the base is the fastener supporting floor 51 upon which the stack 52 of inclined fasteners is supported. The entire stack is operatively housed within the casing 53 which, together with supporting floor 51, constitutes a fastener magazine. Slidably supported within the magazine is the push member 54 urged forwardly by the spring 55 in conventional manner, the specific anchorage of the spring not being shown inasmuch as it may be of conventional structure well known in the art. The entire casing or housing 53 is also urged forwardly by the spring 56 which is in abutting engagement with the wall 57 constituting part of the framework 58 of the machine. It is not deemed necessary to show the details of the entire structure inasmuch as that is not essential for a complete understanding of this invention. The relative position of the parts during the various operating conditions have been clearly shown in Figures 6 to 12 inclusive.

The front plate 59 contains an inwardly extending guide member 60 in constant abutment with the foremost fastener 46, the width of said guide member being such as to permit said foremost fastener 46 to project forwardly a sufficient amount under the influence of spring 55 to enable

it to be operatively driven by plunger 47, and particularly to permit said driven fastener to slidably move between the said guide member 60 and the second fastener 61. In one arrangement of my invention, the said guide member 60 contains a single wall intermediate the lateral edges of the foremost fastener, the plunger 47 having bifurcated terminals 62 and 63 to straddle said guiding member 60, as clearly indicated in Figure 9.

Referring particularly to Figures 7 to 10 inclusive, it will be noted that the lateral walls 66 and 67 contain slotted portions 68 of substantially L-shaped formation, the upper portion 69 extending in a direction parallel to the inclination of the driver, and the lower portion 70 extending rearwardly and downwardly. Pivotally attached at point 71 at the base of the machine are the actuators 72 each consisting of an arm and upper terminal portion 73 positioned adjacent the said lower portion 70 of the slot 68. The arms 72 are each so positioned and so mounted that upon a pivotal or rotatable movement thereof, the terminals 73 will move along the path of said lower slot 70. The said actuators 72 are each normally maintained by springs 74 in an elevated position so that said terminals 73 are positioned substantially at the bottom of upper slot 69. And it should further be observed that the said lower slot 70 is inclined rearwardly in a direction intersecting the foremost portion 75 of the casing 53, said foremost portion being of U-shaped cross-section and adapted to slidably embrace the plunger 47. In other words, portion 75 constitutes a three-sided housing for slidably supporting the plunger 47 during its operative stroke.

The plunger carries, in the region of the lower portion thereof, the two outwardly extending pins 76 slidably movable within the said slot 68; and suitably attached upon the extremities of these pins are the contactors 77 extending beyond the lateral walls 66 and 67 of the framework of the device, the undersides of these contacting elements being recessed to enable them to operatively receive the upper terminals 73 of actuators 72 in a manner to be hereinafter set forth.

Upon an operative driving stroke of the plunger 47, the said pins 76 slidably move within the upper inclined portions 69 of slots 68 until the contacting elements 77 engage the terminals 73 of the actuators 72. Such an engagement will cause a counter-clockwise pivotal rotation of said actuators, carrying with it the contacting elements 77 and the pins 76 along the path of the lower portion 70 of slot 68. Inasmuch as the said pins are fixedly attached to the plunger 47, the entire plunger will be rearwardly actuated thereby exerting a rearward pressure upon the entire housing 53 against the action of spring 56, to cause retraction of the housing and the fasteners carried thereby. This retraction occurs before the termination of the driving stroke of plunger 47, inasmuch as the rearward movement of the pins 76 occurs substantially at the juncture of slotted portions 69 and 70. Hence just before retraction starts, there is an upwardly inclined portion of the driven fastener protruding from the work; and as the plunger continues downwardly and rearwardly during its operative stroke it will cause a bending and subsequent collapse of the said protruding portion of the fastener against the surface of the work, all as will be more clearly hereinafter set forth.

By referring particularly to Figures 11 and 12 the above-described action will be clearly understood. In Figure 11 the fastener 46 has been partly driven into the work under the influence of the plunger 47, the housing 53 and the plunger being in their respective positions just prior to the beginning of the retracting operation above referred to. At this point, the upwardly extending portion 46a of the fastener is in effect an inclined column underlying the relatively thicker plunger 47—said plunger being actuated by a downwardly directed drive in the general direction of the inclination of the fasteners. It should be noted here that the base 51 of housing 53 is elevated above the surface of the work being fastened, forming a space 78 thereabove. Preferably at this point retraction of housing 53 occurs, in the direction of the arrow shown in Figure 14, all in the manner above described. Obviously the plunger in moving with the housing 53 towards the left will continue its operative engagement with the unsupported inclined top portion 46a of the fastener to cause a collapse thereof against the surface 50 of the work. Hence a head will be formed on the fastener upon the completion of the driving action of the plunger, which, together with the penetrating portion of the fastener, embraces therebetween a portion of the adjacent material being fastened. In this manner the driven fastener can effectively serve, among other purposes, that of a tacker or temporary sealing device.

When the base of the plunger 47d (see Figure 13) contains a downwardly extending projection 79, the portion of the head 80 underlying the projection will be bent downwardly to produce the burr 81, thereby effectuating a still stronger clench.

Instead of employing a retractable guide for the plunger, such as the housing 53 of the forms above described, a stationary magazine and guide 82 (see Figures 14 and 15) can be used, the plunger 83 containing at the lower portion thereof a pivotally mounted tip 84. Upon a downward movement of the plunger between guide 82 and front wall 85, the fastener 86 will be driven downwardly into the work in the manner hereinabove described. But when the said tip 84 of the plunger reaches the spaces 87 between the base 82a and the work 88, it will tend to straighten itself out in a direction substantially normal to the surface of the work, inasmuch as it is no longer being confined within its oblique path when the wall guide 85 is no longer in engagement therewith. In the preferred form, the abutment 89, yieldably urged by spring 90 towards the channel 91 so that the extreme terminal 92 of the abutment extends slightly into said channel, will intercept the bevelled lower portion 93 of the tip 84 of the plunger and positively deflect it downwardly as indicated in Figure 15. The yieldable arrangement above described permits a slight retraction of the abutment at the moment of impact. It is thus apparent that upon a completion of the operative stroke, the upper portion of the fastener, comprising an unsupported inclined column, will be collapsed downwardly against the work under the influence of plunger 83 to form a head 86a thereon. The stack of fasteners, being adhesively secured together, as aforesaid, can be operatively moved forwardly or maintained in place within magazine 82 as a unit. It may be held in place and moved forwardly manually so that the foremost fastener underlies the plunger, or the stack may be moved forwardly by any other means within the contemplation of this invention; and if spring means like 55 (Figure 6) are

used to urge the stack of fasteners forwardly a guide member like 60 can be employed to hold the fasteners against being forwardly expelled when the plunger is fully raised.

In most of the forms hereinabove described, the fastener is shown to curl inwardly, due primarily to the resistance afforded by the work being fastened and the bevelled penetrating point of the staple. In Figure 16, the curling effect is more positively obtained by providing an abutment 94 positioned at the base of the machine and being urged by spring 95 to its foremost position as indicated in said figure. It will be noted that said abutment is positioned in the path of the fastener 96 moving under the driving force of plunger 97. During the operative movement of the fastener, it will obviously engage the wall of the abutment 94 and be deflected thereby in such manner as to cause it to curl into the work as shown in the drawings, the space 98 permitting such an action. In this manner the entire fastener or any predetermined portion thereof can be made in a positive manner to assume a substantially arcuate shape within the material. The spring 95 is employed to provide against any possible undesirable shock which the plunger 97 may impart to the abutment when it comes into engagement therewith. It is of course apparent that the fastener 96, being made of relatively thin wire, will not be able to cause an appreciable retraction of the abutment if the spring 95 is made sufficiently strong, whereas the plunger 97 being generally made of heavy steel or some other sturdy material, will be able to cause such a retraction.

To obtain even a greater bending of the penetrating fastener and a more positive deflection thereof, the form of my invention illustrated in Figures 17, 18, and 19 may be effectively employed. The general construction of the fastener housing 53*a*, plunger 47*a*, and framework 58 and associated parts, are substantially similar to that shown in Figures 6 to 14 inclusive. However, employed in conjunction with plunger 47*a* is the anvil 99 adapted to underly the work 100 being stapled. In this case, the lower portion 101 of the fastener will be clenched upwardly by the anvil before the top head 102 is completely formed by a collapse thereof under the influence of plunger 47*a*. The anvil also serves to support the fastener during the formation of head 102. It is preferable that the underlying anvil be provided with a downwardly tapering receiving recess 103 to facilitate the formation of the bottom clench. With this construction, a stack of inclined straight wire fasteners of the type above described can hence be operatively driven to obtain a top and bottom clench effective for use not only in sealing containers, but also adapted for office stapling and tagging operations.

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 hereinabove described, all within the scope of the appended claims.

What I claim is:

1. In a machine for driving a single-pronged fastener, a plunger operatively engageable with the fastener, and an inclined support for supporting the plunger and fastener and directing them at an inclination with respect to the surface of the work being fastened, said support being wholly removed and in spaced relation to the work whereby a partially driven fastener that has passed beyond said support will contain a laterally unsupported inclined column extending out of the work and in the path of the plunger, the plunger during its operative movement being at all times substantially parallel to the fastener and being engagable with said column to cause a collapse thereof against the work.

2. In a machine for driving a single-pronged fastener, a plunger operatively engagable with the fastener, an inclined retractible support for suppotring the plunger and fastener and directing them during a predetermined portion of the stroke at an inclination with respect to the surface of the work being fastened, said support being wholly removed from and in spaced relation to the work, and means for retracting said support before the compeltion of the driving stroke whereby the partially driven fastener will contain a laterally unsupported inclined column extending out of the work and in the path of the plunger, the plunger being movable with its said support during the retraction thereof and being engageable during its continued operative movement with said column to cause a collapse thereof against the work, the plunger being at all times substantially parallel to the fastener.

3. In a machine for driving a single pronged fastener from a stack of fasteners inclined with respect to the surface of the work being fastened, a magazine for operatively supporting said stack, an inclined plunger operatively engageable with the top of the foremost fastener, and guiding means having an inclined surface adjacent the front surface of the plunger and adapted to cooperate with the second fastener in the stack for directing the plunger and fastener at an inclination with respect to the surface of the work, said plunger and said guiding means' surface being disposed substantially parallel to the fasteners, the said magazine being slidably engageable with the plunger and in spaced relation to the work whereby a partially driven fastener that had passed out of engagement with the magazine will contain a laterally unsupported inclined column extending out of the work and in the path of the plunger, the plunger during its operative movement being engagable with said column to cause a collapse thereof against the work.

4. In a machine of the class described, the combination according to claim 2, the said retractible support comprising a housing for the fasteners and containing an open forward end the peripheral edge of which is in the plane of the front surface of the second fastener of said stack whereby the plunger during its operative movement will slidably engage and be supported by said peripheral edge of the support and the said second fastener.

5. In a machine for driving a single pronged fastener from a stack of inclined fasteners, a framework, an inclined plunger channel, a magazine for operatively supporting said stack and containing an open forward end through which the fasteners are operatively fed, inclined guiding means extending rearwardly from the front portion of said framework and engageable with the foremost fastener of said stack, yieldable means for urging said stack of fasteners towards the channel and into engagement with said guiding means, and inclined plunger operatively engageable with the top of the foremost fastener and movable within said channel during its operative stroke, the forward portion of said magazine being in supporting engagement with said plunger, said magazine being in spaced relation

with the work being fastened whereby a partially driven fastener that had passed out of engagement with the magazine will contain a laterally unsupported inclined column extending out of the work and in the path of the plunger, the plunger during its operative movement being engageable with said column to cause a collapse thereof against the work.

6. In a machine of the class described, the combination according to claim 5, the said magazine being retractible rearwardly, and means for retracting said support before the completion of the driving stroke whereby a partially driven fastener will contain a laterally unsupported inclined column extending out of the work and in the path of the plunger, the plunger being movable with said magazine during the retraction thereof and being engageable during its continued operative movement with said column to cause a collapse thereof against the work.

7. In a machine of the class described, the combination according to claim 1 wherein the plunger is provided with a tip for operative engagement with the top edge of the fastener during the driving stroke, said tip being substantially parallel to the work and thicker than the fastener and extending forwardly beyond the top edge thereof whereby it will engage the underlying upwardly extending inclined portion of the fastener upon the completion of the stroke to cause a collapse thereof against the work.

8. In a machine of the class described, the combination according to claim 1 wherein the plunger is provided with a tip for operative engagement with the top edge of the fastener during the driving stroke, said tip being substantially parallel to the work and extending forwardly beyond the top edge thereof a distance no less than the height of the support above the work whereby it will engage substantially the entire underlying upwardly extending inclined portion of the fastener upon the completion of the stroke to cause a collapse thereof against the work.

9. In a machine for driving a straight single-pronged fastener, a plunger having a pivotally mounted tip operatively engageable with the top of the fastener and extending therebeyond, and an inclined support for slidably supporting the plunger and fastener and directing them at an inclination to the surface of the work being fastened, said support being in spaced relation to the work whereby a partially driven fastener that had passed beyond said support will contain a laterally unsupported inclined column extending out of the work and in the path of the plunger, the said tip being pivotally movable during the operative movement of the plunger to a path substantially normal to the work and engageable with said column to cause a collapse thereof against the work, the plunger being movable in the direction of the inclination of the support.

10. In a machine for driving a straight single-pronged fastened, a plunger having a pivotally mounted tip operatively engageable with the top of the fastener and extending therebeyond, an inclined support for supporting the plunger fastener and directing them at an inclination to the surface of the work being fastened, said support being in spaced relation to the work whereby a partially driven fastener that had passed beyond said support will contain a laterally unsupported inclined column extending out of the work and in the path of the plunger, and an abutment spaced from said support for engaging the said tip and diverting it to a path substantially normal to the work whereby it will engage said column during the operative movement of the plunger to cause a collapse of the column against the work.

11. In a machine for driving a single-pronged fastener, an inclined plunger operatively engageable with the top of the fastener, an abutment at the base of the machine, yieldable means holding said abutment in predetermined normal position and inclined guiding means in spaced relation to the work being fastened for directing the plunger and fastener at an inclination with respect to the surface of the work and towards said abutment when in its normal position whereby the fastener will be diverted from its path as it encounters the abutment and curled into the work.

12. In a machine for driving a single-pronged fastener, a plunger operatively engageable with the fastened, and an inclined support for supporting the plunger and fastener and directing them at an inclination to the surface of the work being fastened, said support being in spaced relation to the work whereby a partially driven fastener that had passed beyond said support will contain a laterally unsupported inclined column extending out of the work and in the path of the plunger, the base of the plunger containing a projection and being engageable with said column to cause a collapse thereof against the work and a bending into the work of the part of the fastener engaged by said projection.

13. In a machine for driving a straight single-pronged fastened, a plunger having a tip operatively engageable with the top of the fastener and extending therebeyond, an inclined support for supporting the plunger and fastener and directing them at an inclination to the surface of the work being fastened during a portion of the operative stroke of the plunger, and an anvil underlying the work to receive the penetrating portion of the driven fastener and deflect said portion against the undersurface of the work, the said support being in spaced relation to the work whereby a partially driven fastener out of engagement with said support will contain a laterally unsupported inclined column extending out of the work and in the path of the plunger, the plunger during its operative movement being engageable with said column to cause a collapse thereof against the work, the said anvil being adapted to cooperate with the work in supporting the fastener as the said column is being collapsed against the work.

14. In a method of driving a straight single-pronged fastener, the steps of applying driving pressure upon the top of the fastener along an inclined path in the direction of the work being fastened until a predetermined portion of the fastener penetrates the work whereby an inclined column is left extending out of the work, supporting the fastener on one side thereof during a predetermined portion of its operative movement under the influence of said driving pressure, releasing the fastener from support thereafter, and applying pressure to said column along an inclined path but in a direction more towards normal with respect to the work than the original inclined path of the fastener to cause a bending of the column and a collapse thereof against the work.

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