United States Patent

[11] 3,633,810

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[54] **COMBINED STAPLER AND CLIPPER FOR FURNITURE SPRING CLIPS**
10 Claims, 19 Drawing Figs.

[52] **U.S. Cl.** **227/20,** 227/64, 227/120
[51] **Int. Cl.** **B25c 5/06**
[50] **Field of Search** 227/15, 16, 17, 18, 19, 20, 64, 66, 77, 120, 147, 156

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ABSTRACT: Compactly nested, generally V-shaped clips, each intended to hold the end of a sinuous spring, are stacked in a chute. U-shaped staples or nails are separately stacked in a magazine. In each clip there are two angularly related flanges, both perforated for fasteners. The clip to be fastened is machine fed to a fastening station where the clip is secured by a first fastener and the upper flange of the clip is bent into position to hold the spring securely. The end of the sinuous spring is then inserted between the flanges and a second fastener may then, if desired, be driven through both flanges. When and if the second fastener is driven, no clip can be advanced from the clip stack, the clip transfer mechanism being manually rendered inoperative.

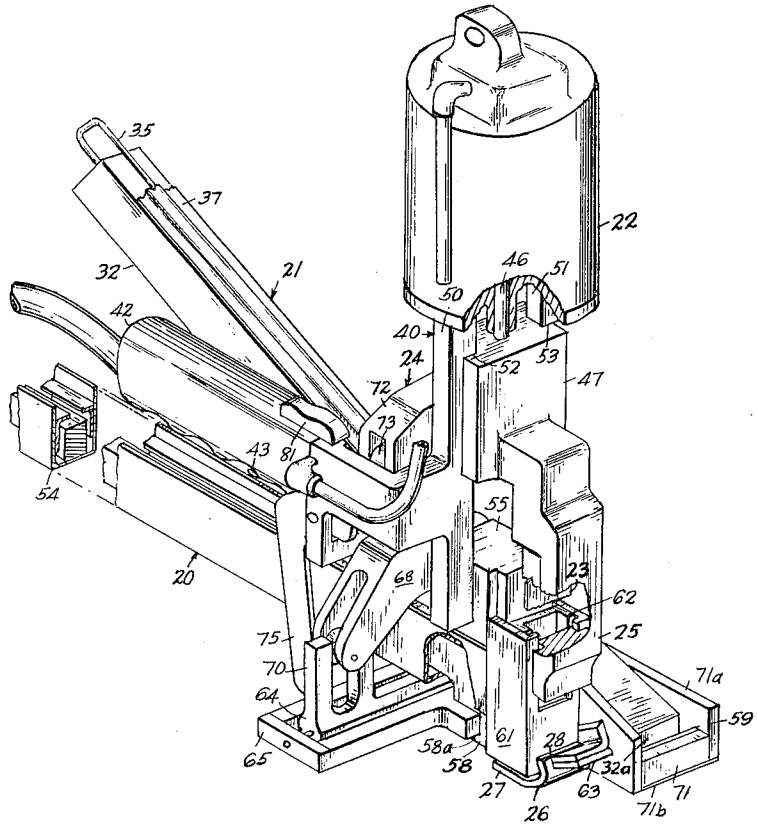


Fig. 1

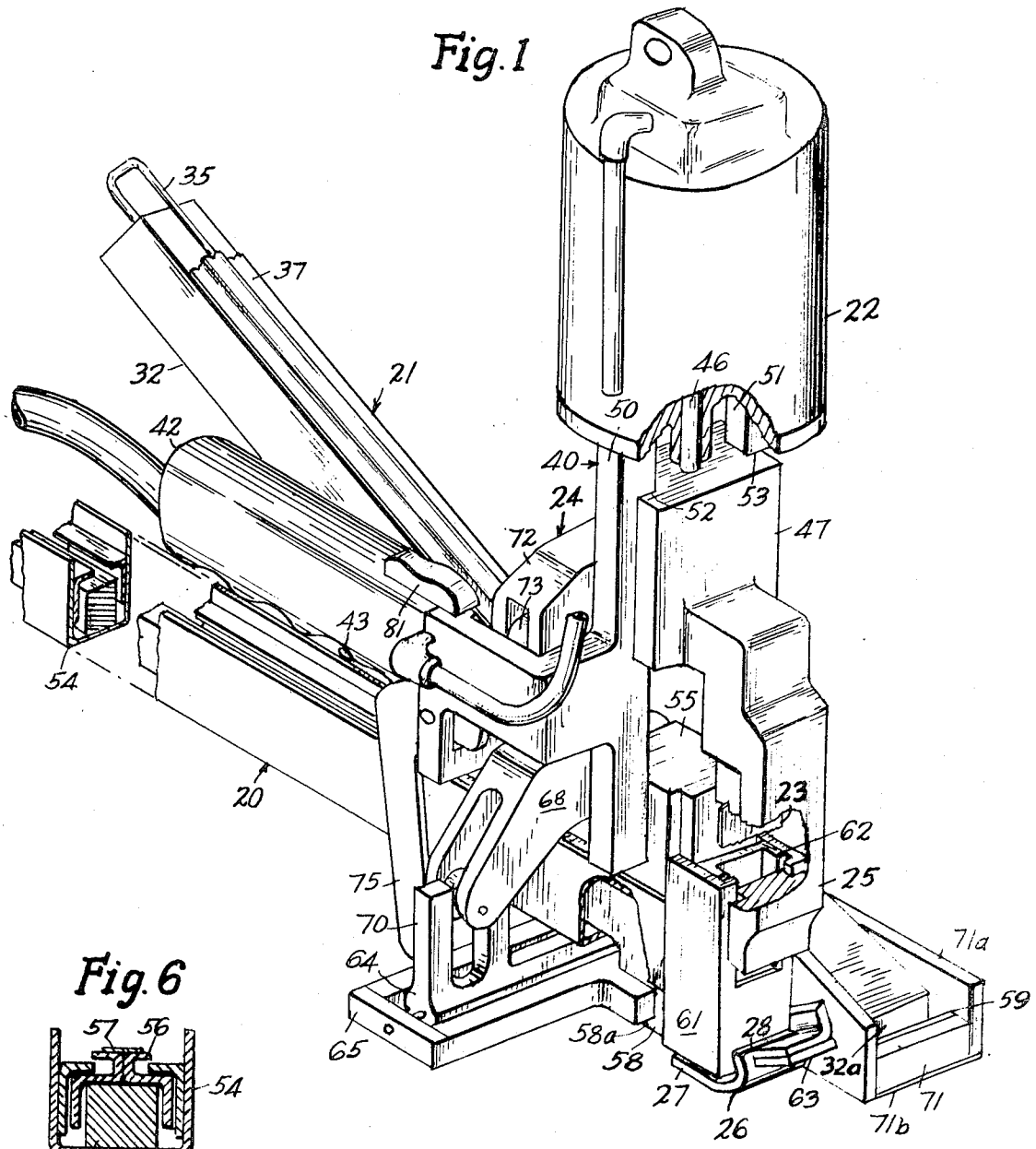
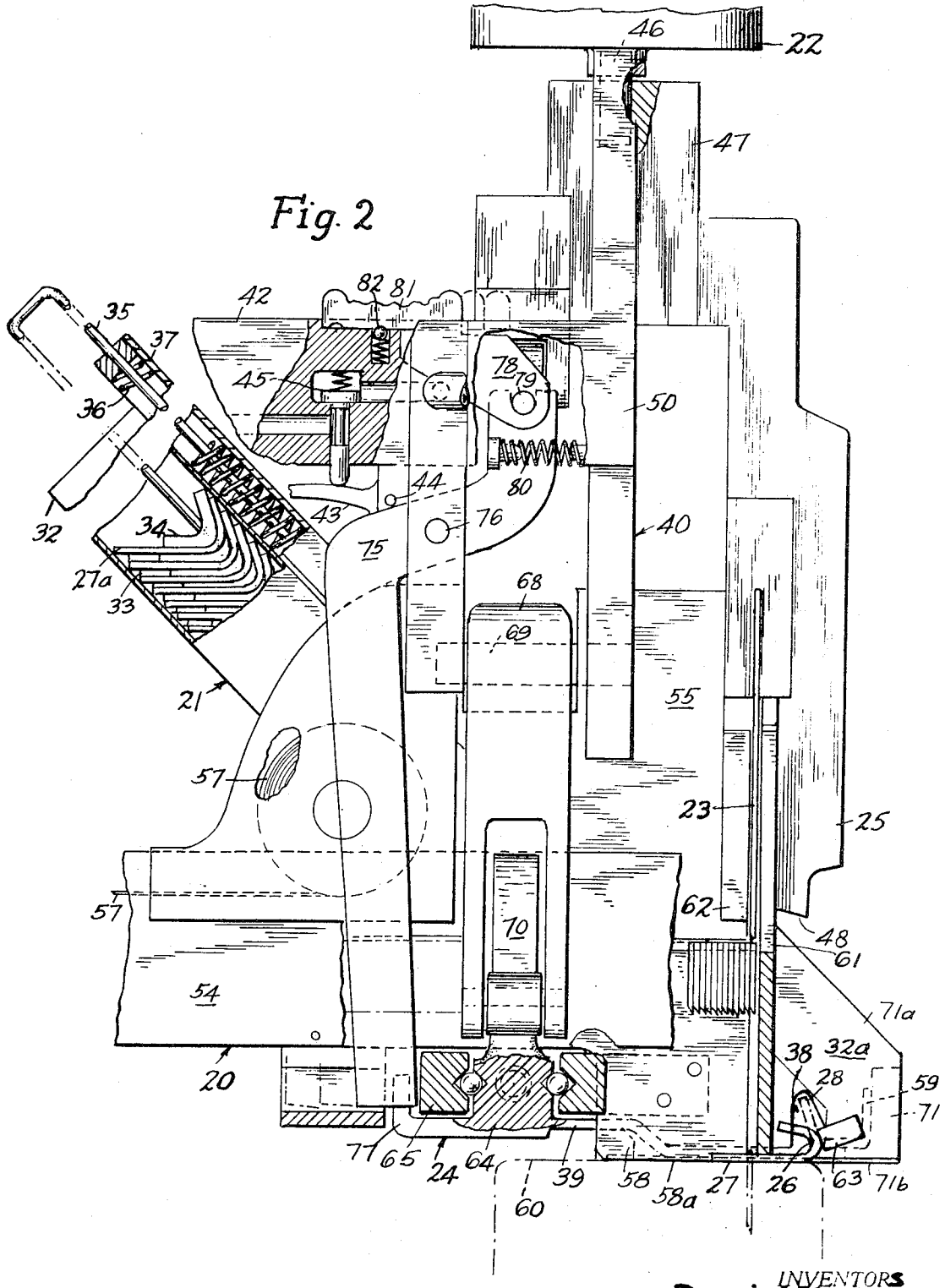


Fig. 6

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Fig. 2



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Fig. 7

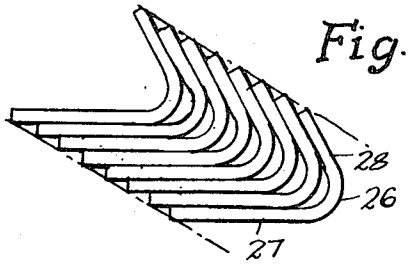


Fig. 8

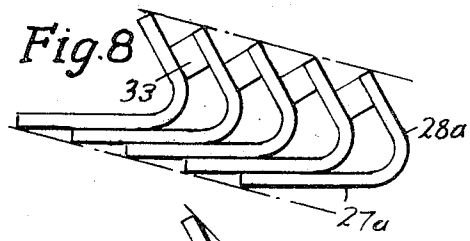


Fig. 9

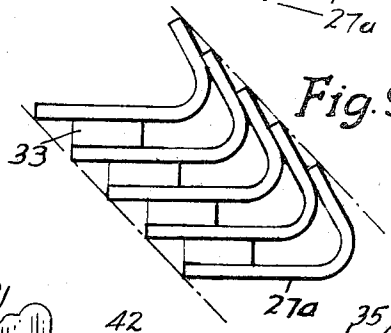


Fig. 3

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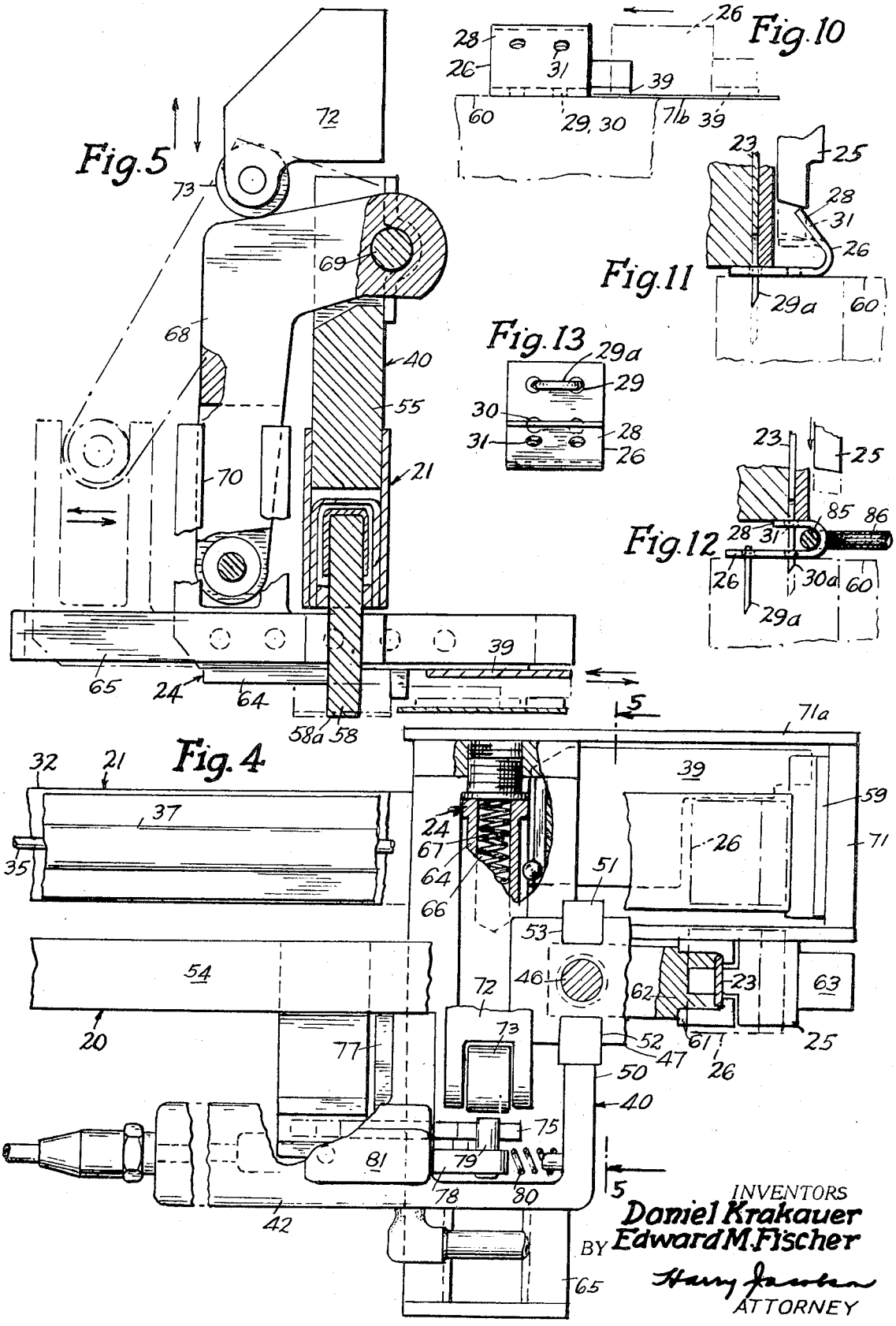

Fig. 5
Fig. 4
Fig. 10
Fig. 11
Fig. 13
Fig. 12
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58a
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71a
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78
80
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29, 30
71b
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29a
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85
86
30a
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Fig. 18

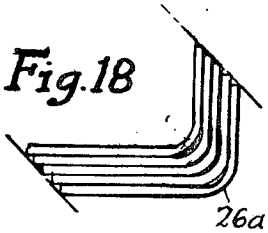


Fig. 19

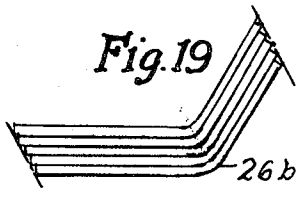
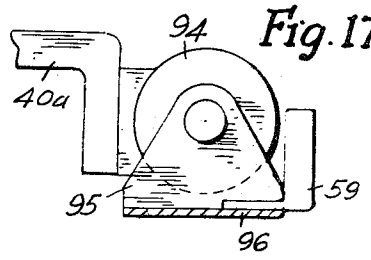


Fig. 17



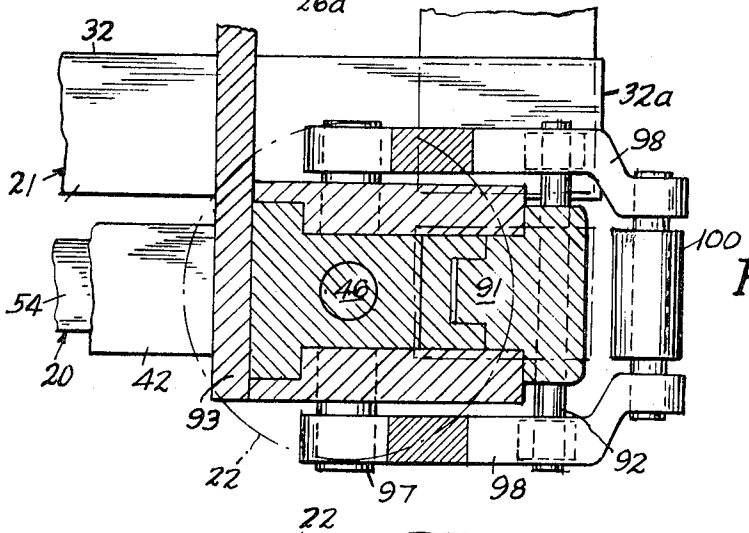


Fig. 15

Fig. 14

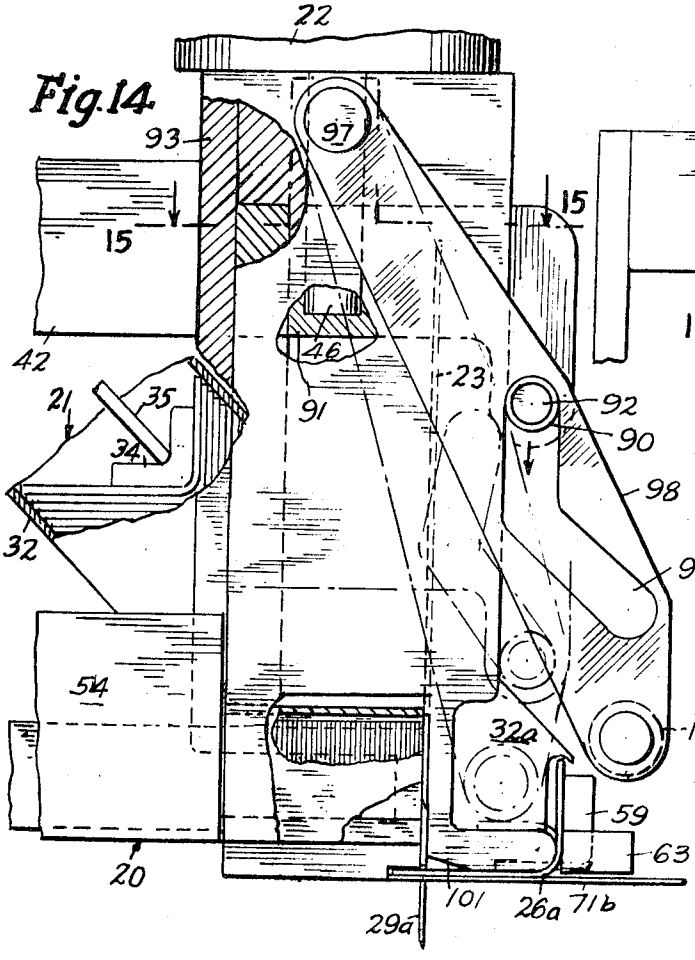
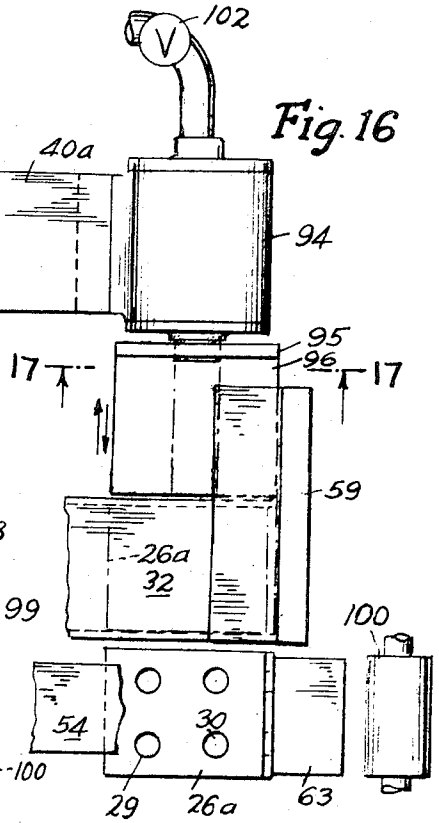


Fig. 16



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COMBINED STAPLER AND CLIPPER FOR FURNITURE SPRING CLIPS

It will be understood that wherever staples are mentioned herein, it is intended that nailers be included, since fastener machines such as staplers and nailers are conventional and are used interchangeably to drive staples or nails as conditions require.

Furniture clips of generally J-shaped form such as are shown for example in U.S. Pat. No. 2,853,123 each having a pair of spaced-apart substantially parallel flanges, have largely been used to hold the ends of sinuous springs to furniture frames and the like. Such clips are usually stapled or nailed as by known staplers or nailers after the clip is manually placed thereinto and held in fastener driving position. Manual handling of the clips is a slow and expensive operation. The arrangement of the clips in a magazine adapted to advance them into stapling position is unsatisfactory and no combined staplers and clippers have heretofore been available insofar as can be ascertained. The excessive space required for the bulky clips necessitates frequent replenishment of the clips. Furthermore, a separate stapler, nailer or other fastening machine is now necessary, nevertheless, to drive the second or more staples or fasteners usually required to hold the spring end within the clip.

The present invention is therefore directed to the means for and method of greatly reducing the space required for properly stacking and feeding clips automatically, as well as for stapling the clips, the invention involving closely compacted nested clips and of means for optionally rendering the clip-feeding means inoperative when desired, so that stapling alone may be performed by the same combined stapler and clipper.

A further object of the invention is to so feed the clips that the longer flanges thereof are fed in a position parallel to the surface of the work to which the clip is to be stapled, which will be termed "horizontal" hereinafter.

A further object of the invention is the provision of means and a method for stapling the longer flange of an automatically fed generally J-shaped clip and bending the other flange into position securely to hold the inserted spring end.

Various other objects of the invention will become clear as the description progresses, and from the drawings, in which

FIG. 1 is a perspective view of the combined stapler and clipper, some parts being foreshortened and others broken away to expose interior structure.

FIG. 2 is a side elevational view of the same.

FIG. 3 is a similar view of the side of the machine opposite to that shown in FIG. 2.

FIG. 4 is a fragmentary top plan view of FIG. 2 with some parts in section, broken away or omitted.

FIG. 5 is a fragmentary vertical sectional view of the clip transfer means taken approximately on the line 5—5 of FIG. 4.

FIG. 6 (sheet 1) is a vertical sectional view of one form of the staple holder showing the staple follower and the actuating spring therefor.

FIG. 7 is an elevational view of part of a clip stack showing both flanges of the clips compactly nested and indicating in dash-dot lines, the inclination of the chute to the horizontal and to the flanges.

FIG. 8 is a similar view of a clip stack and indicating the chute inclination, but showing only the longer clip flanges compacted.

FIG. 9 is a similar view showing the shorter clip flanges compacted.

FIG. 10 is a side elevational view of the unstapled clip at the stapling station, showing in dash-dot lines, the position of the clip as it leaves the chute and before the transfer thereof.

FIG. 11 is a combined elevational and sectional view of the clip at the stapling station showing the first staple being driven and the bending of the shorter flange begun.

FIG. 12 is a similar view showing the machine shifted and driving the second staple after the spring end has been placed between the flanges.

FIG. 13 is a top plan view of the clip at the stapling station showing the first staple driven through the longer flange.

FIG. 14 is a fragmentary combined side elevational and sectional view of a modified form of the machine showing L-shaped clips and pneumatically operated clip transfer mechanism.

FIG. 15 is a horizontal sectional and plan view taken approximately on the line 15—15 of FIG. 14.

FIG. 16 is a fragmentary top plan view constituting a continuation of FIG. 15 and showing the clip transfer mechanism.

FIG. 17 is a fragmentary vertical sectional view taken on the line 17—17 of FIG. 16.

FIG. 18 is a view similar to FIG. 7 of a stack of fully nested L-shaped clips.

FIG. 19 is a similar view of another form of fully nested clips.

While as has been indicated, the machine and method of the present invention may take various forms, that form shown in FIGS. 1–13 will now be described. Briefly, the apparatus or machine comprises a stapler 20 and a clipper 21 having a common air cylinder 22, the stapler having a staple-driving blade 23 and the clipper having a clip transfer mechanism 24 and a clip-bending hammer 25. The method of carrying out the invention includes the provision of a stack of more or less tightly nested two-flanged clips of U-shape, J-shape, L-shape, V-shape generally, or the like and the usual stack of staples, feeding the clips with the longer flanges thereof preferably horizontal, transferring the end clip to the stapling station and holding the clip there while affixing it to the work by driving a first staple through one flange and bending the other flange. The remaining steps of the method include inserting the spring end in the bent clip and driving the second staple through both flanges to complete the bending of said other flange, thereby to close the clip and to retain the spring end in position.

In more detail, the invention utilizes a suitable clip as 26 shown at the stapling station in FIGS. 1, 2 and 10–12 as generally initially V-shaped, the longer flange 27 making an acute angle with the shorter flange 28. It will be understood that for purposes of clarity, the thicknesses of the clips shown have been greatly exaggerated. Both flanges are preferably perforated (FIGS. 12 and 13) with transversely spaced-apart staple-receiving holes, the longer flange having two pairs of such holes, one pair 29 receiving the first staple 29*a* and the other pair 30 receiving the second staple 30*a* which passes also through the holes 31 in the shorter flange as shown in FIG. 12. The chute 32 for holding and feeding the clips is inclined to the horizontal and is intended, for easy transfer purposes, to maintain the long flanges horizontal despite the inclination of the chute. The angle of such inclination is determined, among other things, by the angular relation of the clip flanges and the spacing apart of said flanges, if any. Preferably the clips adhere together in the stack in much the same manner as conventional staples and with the corresponding flanges closely nested in two sets as shown in FIGS. 7, 18 and 19 to minimize the space occupied by the stack.

In FIG. 18 both sets of flanges of the clips 26*a* are compacted and the angle between flanges is 90°. In FIG. 19, both sets of flanges of the clips 26*b* are also compacted and the angle between flanges is greater than 90°. In both cases, bending of the shorter flange is difficult if done by hammering, but such bending can readily be performed by the roller form of the machine shown in FIGS. 14–17 as will later be explained.

The chute angle may be considerably varied to meet different conditions, by spacing apart either the shorter flanges 28*a* of the clips shown in FIG. 8 or the longer flanges 27*a* of FIG. 9 without materially separating the other flanges. In that case, suitable discardable spacers 33 of inexpensive material such as paper or plastic are interposed between and removably adhered to corresponding adjacent flanges, the thickness of said spacers being greatly exaggerated in the drawings. For ease in bending the shorter flange, an acute angle between the flanges of the clip is preferred.

Means are provided for urging the stack of clips toward the discharge end 32*a* of the clip chute 32. As best seen in FIGS. 2 and 3, said means takes the form of the V-shaped clip follower 34 secured to the elongated rod 35 and urged by the spring 36 toward the discharge end of the chute. Said rod is bent back on itself outside of the chute and enters the spring casing 37 secured to the top of the chute and against the end walls of which the spring abuts. At the discharge end 34, the sidewalls of the chute are cut away as at 38 on one sidewall to permit the removal of the end clip and at the lower part of the other sidewall to permit the movement of the clip transfer plate into and through the bottom of the chute thereby to remove the end clip from the stack.

The chute is suitably supported by the frame 40 of the machine as by means of the bracket 41 (FIG. 3), the frame in turn being secured to and supported by the machine handle 42. All of the moving parts of the machine are suitably supported by the frame 40 or by extensions of said frame in a manner which need not be described nor illustrated in detail. The machine is carried about by the handle 42 and controlled or set into operation when desired, by pressing the trigger 43 which is pivoted to the frame at 44. Pressure on the trigger opens the control valve 45 communicating with a source of compressed air to actuate the double-action air cylinder 22.

The piston rod 46 of the air cylinder is secured to the ram 47 which it reciprocates during the cycle of the machine to perform both the stapling and clip-bending operations until prevented from doing so as will later be explained. For bending the shorter flange of the clip after the clip reaches the stapling station, the hammer 25 is secured to the ram and terminates in a suitably inclined edge 48 adapted to engage and depress the shorter flange on the descent of the hammer and during the driving of the first staple 29*a* through the clip holes 29. The ram is guided in its reciprocation by the fixed frame parts 50, 51 secured to the handle 42 and entering the vertical grooves 52, 53 of the ram.

For delivering a staple to the stapling station and driving the staple, a substantially conventional stapler 20 may be employed. As shown, the staple magazine 54 is supported by the frame 40 and suitable extensions as 55 (FIGS. 1, 2, 3 and 5). The staple follower 56 (FIG. 6) engages the outer end of the stack of staples and under the urge of the clock spring 57 (FIG. 2) moves the stack resting on the fixed bar 58 until the end staple overhangs the end of the bar and is directly underneath the staple-driving blade 23. The end part of said bar is extended downwardly to terminate in a flat base 58*a* adapted to rest on the working surface 60 of an article while the first staple is being thereinto driven.

To guide the blade 23 as well as the clip hammer 25 during the reciprocation thereof together with the ram 47 as a unit, fixed guide members as 61 and 62 are provided. The free end of the staple blade is located sufficiently below the hammer 25 to insure the beginning of the staple-driving operation before the hammer reaches the shorter upper flange 28 of the clip, whereby the clip remains fixed in position during the driving of the first staple. Before the staple driving is begun, the clip is held in position at the stapling station by means of the magnet 63 fixed to a part of the frame.

The means for transferring the end clip of the clip stack to the stapling station comprises certain fixed parts secured to the frame and movable parts guided and supported by the fixed parts and operative on ascent of the ram 47. As shown in FIGS. 2, 3, 4, 5 and 10, the transfer plate 39 is suitably shaped and dimensioned to engage the side edge of the long flange (FIG. 3) of the end clip in the stack for removing said clip and advancing it in the direction shown by the arrow of FIG. 10 in a horizontal plane through the opening 38 in the side of the chute. Said plate 39 is fixedly connected to the bottom of, and is substantially perpendicular to, the antifriction slide 64 and moves therewith as a unit. Suitable ball bearings (FIG. 4) permit easy reciprocation of the slide in the fixed frame extensions 65. A longitudinal hole 66 in one end part of the slide receives the spring 67 which urges the slide away from its normal position behind the end of the stack of clips, toward the stapling station thereby to transfer the clip when the slide is released from its operating mechanism.

Said mechanism comprises the crank 68 best shown in FIG. 5, pivoted at one end 69 to the frame extension 55 and at the other end connected to the upstanding fork 70 of the slide 64. In the uppermost position of the ram 47, the crank has been moved by the slide under the influence of the spring 67 to the position shown by the dash-dot lines of FIG. 5, and a clip has been transferred to the stapling station. However, when the trigger 43 is pressed by the operator, valve 45 opens to admit air to the cylinder 22 to force the ram 47 down, carrying down the arm 72 which is secured to the ram and which carries the roller 73. Said roller engages the crank 68 and rotates it in a counterclockwise direction as viewed in FIG. 5, causing retraction of the slide 64 and transfer plate 39 to the normal positions thereof ready to repeat the cycle, while the first staple is being driven and the flange 28 is being bent into its spring-holding position.

After the staple is driven and the machine is lifted off the work, the crank 68 is released by the ascent of the ram and the spring 67 again transfers a clip to the clipping station. During the transfer, the clip is guided by the guide member which is fixed to extensions 71, 71*a* of the frame (FIGS. 2, 3 and 4), the clip and the transfer plate sliding on the fixed soleplate 71*b*.

Should the machine be used solely as a stapler for a time, as for example after all the needed clips have been fixed to the work by first staples, means are provided for rendering the slide 64 inoperative to transfer a clip as the last clip of a group is fixed by its first staple. Said means comprises the stop lever 75 (FIGS. 2 and 3) pivoted at 76 to the frame and swingable into the path of the extension 77 of the slide 64. At its upper end, the lever is connected to the lug 78 (FIG. 2) through the pin 79, the lever being pressed by the spring 80 to its stop position in front of the slide extension 77 unless prevented from doing so by the position of the manually adjustable lug 78. Said lug is adjusted by means of the thumbpiece 81 slidable in the handle and held in its adjusted position by the spring-pressed ball detent 82. Thumbpiece 81 may assume any one of three positions, two extreme and one intermediate. Corresponding positions of the lower end of the lower end of the lever 75 are indicated by dash-dot and full lines in FIG. 2. When at the extreme left, the thumbpiece prevents advancing movement of the slide 64 and clip owing to the obstruction of the extension 77 by said lever 75 which has been rotated in a counterclockwise direction.

In the right-hand position of the thumbpiece, a clip is automatically fed, bent and fastened by a first staple, said lever having been rotated clockwise to remove it from the path of the extension 77. No further adjustment is required to continue the feeding, bending and fastening of successive clips.

When only one clip at a time is to be fed, bent and completely fastened at two or more points before succeeding clips are processed, the thumbpiece is first moved from automatic feed position at the right to its temporary intermediate position wherein the detent 82 is not in either notch and thereby permits the spring 80 to swing the lever 75 into its stop position when the extension 77 is out of its way. It being understood that a clip has been fed and is arranged at the stapling station on the previous ascent of the ram 47, movement of the thumbpiece to its intermediate position merely causes the spring 80 to press the bottom of the lever against the extension 77. However, on the next descent of the ram and the consequent retraction of the extension out of the path of the lever, the spring 80 moves the lever into its stop position in front of said extension and additional stapling may proceed until completed without clip feeding. To feed, bend and staple the next clip, the thumbpiece is moved back to the right to its intermediate position, whereupon the extension and slide 64 are released, permitting the spring 67 of the slide to feed a clip to the stapling station. By thus reciprocating the thumbpiece between its left and intermediate positions, the complete processing of each clip is possible. To drive the second staple

30*a* (FIG. 12), the machine is set with its soleplate 71*b* on top of the upper flange 28 of the clip while the thumbpiece is at the left.

It will be understood that before the second staple is driven, one spring end 85 of the sinuous spring 86 is inserted into the clip through the entrance opening between the flanges and the other spring end is inserted into a similar clip secured to the opposite rail of the work in the usual manner. The shorter flange is insufficiently bent to close the clip or to unduly restrict the entrance space thereinto.

In that form of the invention shown in FIGS. 14–17, the clip chute 32 and the staple magazine remain substantially the same as previously described, as do the air cylinder 22, clip guide 59, soleplate 71*b* and other parts not necessary to mention. However, the hammer 25 is replaced by the roller 90 for bending the shorter clip flange into stapling position, and the transfer of the clip to the stapling station has been modified for pneumatic operation.

The piston rod 46 of the air cylinder 22 is fixed to vertically reciprocating member 91 which carries the staple-driving blade 23 as well as the roller-operating pin 92. Side extensions 93 of the frame 40 are provided with guide grooves which receive cooperating tongues projecting from the member 91 (FIG. 15). Said member is relatively short but the frame parts 93 are long enough to permit said member to reciprocate through a relatively long stroke sufficient to complete transfer of the clip and to deposit it at the stapling station before a first staple has been started into the work by the blade. For this purpose, the compressed air supply to the cylinders 22 and 94 is controlled by the same trigger 43. The cylinder 94 operates the clip transfer mechanism best shown in FIGS. 16 and 17. FIG. 16 is a plan view constituting a continuation of the upper part of FIG. 15 and shows the cylinder 94 supported by an extension 40*a* of the frame 40. The upstanding flange 95 of the clip transfer plate 96 is secured to the piston rod of the cylinder 94 and reciprocated thereby when the operator opens the valve 45 by pressing the trigger. Air is consequently supplied simultaneously to the cylinders 22 and 94, but the stapling and bending operations by the roller are delayed until after the clip has been transferred to the stapling station owing to the time required to move the blade before it can reach the staple to be driven, during the initial part of the descent of the member 91.

Suitably pivoted to a fixed part of the machine, as for example, to opposite sides of the air cylinder 22 at 97, are the pair of similar levers 98 each having a suitable cam slot 99 therein in which moves the cam roller 90. The upper part of the slot is vertical to avoid movement of the lever during the initial part of the descent of the member 91. During the last part of such descent, the roller 90 moves in the inclined part of the cam slot and swings the levers to the position shown in dash-dot lines in FIG. 14, to force the clip-bending roller 100 at the lower end of the levers, to bend the upstanding flange of the clip just after driving of the first staple has begun. The bending roller cooperates with the fixed anvil 101 illustrated as extending from the frame parts 93, the lower portions of which also serve as guides for the blade 23.

When the second staple is to be driven without any transfer of the clip and after withdrawal of the machine from the clip, the valve 102 in the air line to the cylinder 94 is manually closed, whereby the clip transfer becomes inoperative even though the trigger is pressed. The machine can then be used merely as a stapler until first staples again have to be driven, at which time the valve 102 is manually opened.

It will be understood that various changes may be made in the illustrated and described embodiments of the invention, which embodiments are intended to be illustrative but not limitative, without departing from the spirit of the invention defined by the appended claims.

We claim:

1. In a combined stapler and clipper, a chute for a stack of overlappingly nested and compacted generally J-shaped clips each having a pair of flanges angularly related to each other and of unequal lengths, a staple magazine, means for denesting the leading clip of said stack, means including a staple driver for stapling the longer flange only of the denested clip to an article of work at a given stapling station and means associated with said staple driver and operatively connected thereto for bending the shorter flange toward said longer flange at said given station and insufficiently to close said clip.

2. The stapler and clipper of claim 1, and means for rendering inoperative the clip-transferring means while maintaining the staple-driving means operative.

3. The stapler and clipper of claim 1, the flange-bending means comprising a reciprocating hammer.

4. The stapler and clipper of claim 1, the flange-bending means comprising a roller and means for moving the roller against the shorter flange.

5. The stapler and clipper of claim 1, at least one set of the corresponding flanges of the clips in the stack being closely compacted to each other in the nested position thereof, said chute being inclined to both flanges of the stack of clips therein.

6. In a combined stapler and clipper, a chute for a stack of nested generally J-shaped clips each having a pair of flanges angularly related to each other and of unequal length, a staple magazine, means for denesting and transferring a clip from said stack to a stapling station, means for stapling the longer flange to an article of work and means for bending the shorter flange toward the longer flange an amount insufficient to close the clip, the stapling means being pneumatically operated, and an operative connection between the stapling means and the means for bending the shorter flange, the bending means being operated by said connection on the driving of a staple by said stapling means.

7. The stapler and clipper of claim 1, the means for transferring the clip being pneumatically operated and the means for bending the flange of the clip being operatively connected to the staple-driving means and manually controlled means for rendering inoperative the clip-transferring means while the staple-driving means remains operative.

8. The stapler and clipper of claim 6, the chute being inclined to the horizontal and maintaining the longer flanges of the clip in the clip stack substantially horizontal during the movement thereof through the chute.

9. The combined stapler and clipper of claim 1, and means associated with the chute for positioning said leading clip at said given stapling station during the bending of said shorter flange.

10. The combined stapler and clipper of claim 1, the means for denesting said leading clip also advancing said clip to said given stapling station.

* * * * *