May 11, 1965 M. ABRAMS 3,182,878

TACKERS AND THE LIKE STAPLING MACHINES

Filed July 1, 1963 2 Sheets-Sheet 1

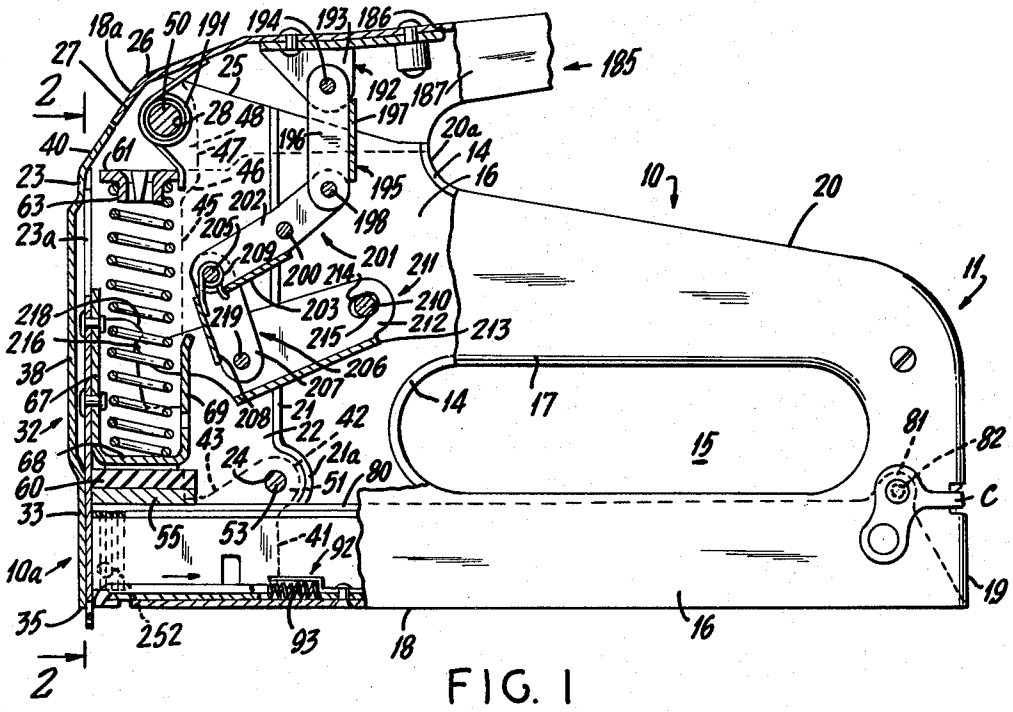


FIG. 1

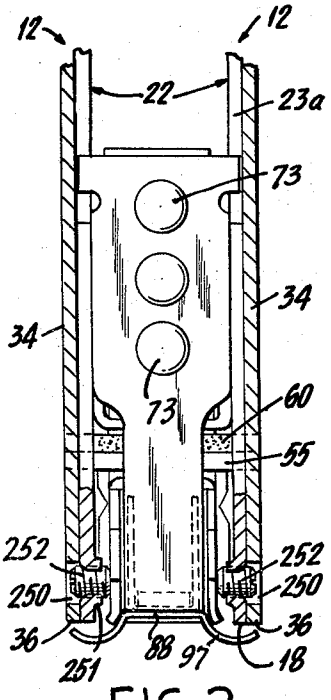


FIG. 2

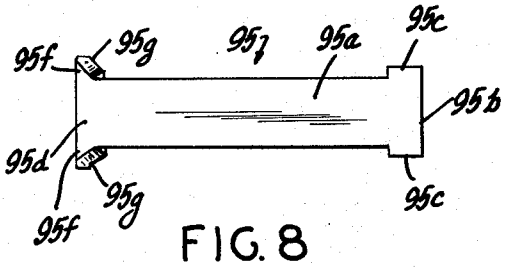


FIG. 8

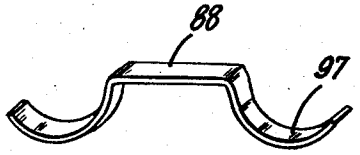


FIG. 9

INVENTOR.
MORRIS ABRAMS

BY Fetherston and Rosen

ATTORNEYS.

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TACKERS AND THE LIKE STAPLING MACHINES

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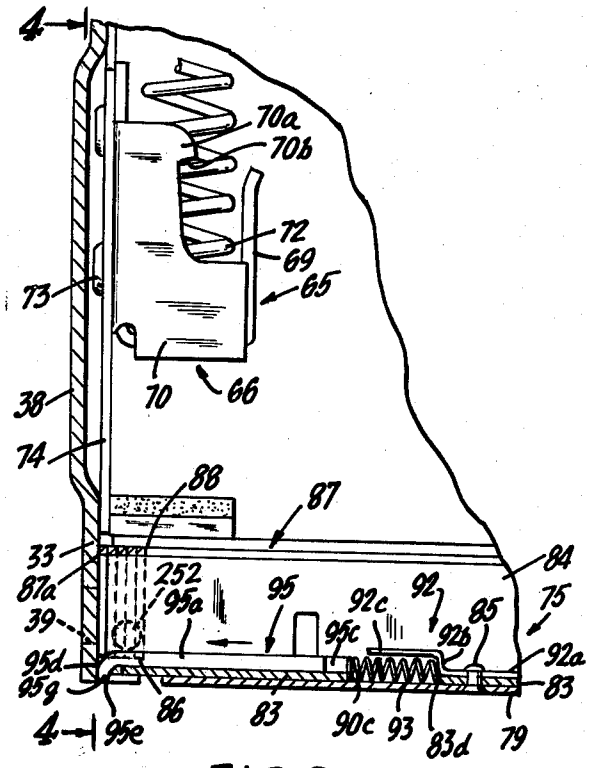


FIG. 3

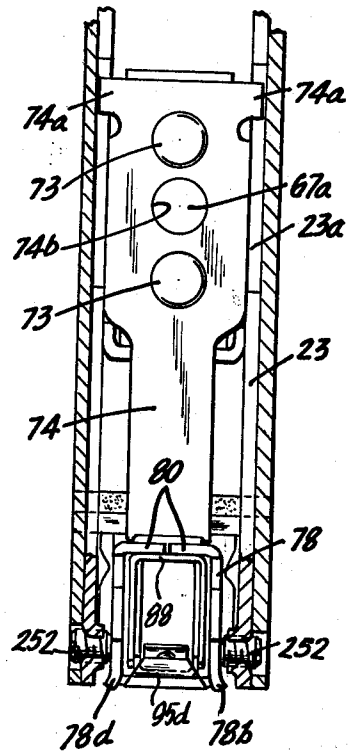


FIG. 4

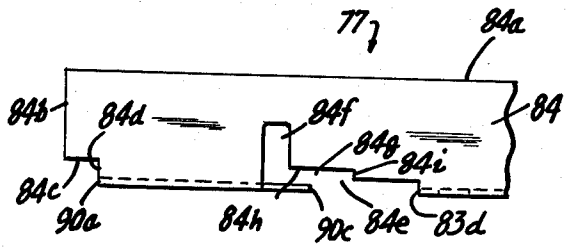


FIG. 5

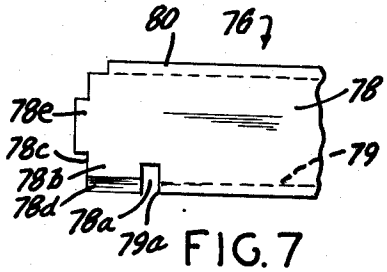


FIG. 7

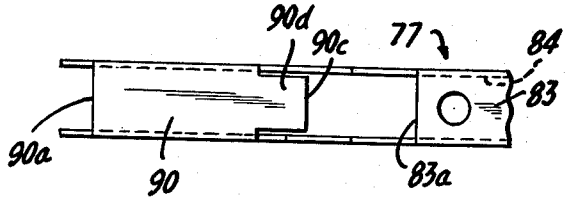


FIG. 6

INVENTOR.
MORRIS ABRAMS

BY
Felshin and Rosen
ATTORNEYS.

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3,182,878

TACKERS AND THE LIKE STAPLING MACHINES

Morris Abrams, Great Neck, N.Y., assignor to Arrow Fastener Co., Inc., Brooklyn, N.Y., a corporation of New York

Filed July 1, 1963, Ser. No. 291,952
3 Claims. (Cl. 227—83)

This invention relates to tackers and the like stapling machines.

An object of this invention is to provide a machine of the character described having highly improved means to turn the legs of a staple outwardly as the staple is driven for a clinching operation.

Another object of this invention is to provide a machine of the character described, having means to turn the legs of the staple outwardly as the staple is being driven, said means being arranged to allow the staple to by-pass the anvil means as it is fully ejected, and to allow the anvil means to be automatically returned to operative position after the driving blade is retracted.

Another object of this invention is to provide a machine of the character described comprising a staple magazine having side walls curved outwardly at their lower ends thereby forming with curved surfaces of the anvil, curved passages for legs of a staple as the legs are turned outwardly for a clinching operation, and means to adjustably vary the positions of said side walls, to vary the passages, for controlling the curvature of the staple legs during the clinching operation.

A further object of this invention is to provide a strong, rugged and durable machine of the character described which shall be relatively inexpensive to manufacture, which shall be smooth and positive in operation, easy to manipulate and which shall yet be practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts, which will be exemplified in the construction hereinafter described, and of which the scope of invention will be indicated in the following claims.

In the accompanying drawings in which is shown an illustrative embodiment of this invention,

FIG. 1 is a side elevational view of a clinching or stapling machine of the tacker type, embodying the invention, with parts broken away and in cross section, and showing the driving blade in full ejecting position;

FIG. 2 is a cross-sectional view taken on line 2—2 of FIG. 1;

FIG. 3 is a partial view similar to FIG. 1 and showing the driving blade fully retracted above the staple strip;

FIG. 4 is a cross-sectional view taken on line 4—4 of FIG. 3;

FIG. 5 is a side elevational view of the front end of the staple guide or channel;

FIG. 6 is a bottom plan view thereof;

FIG. 7 is a side elevational view of the front end of the staple magazine frame or body;

FIG. 8 is a top plan view of the sliding anvil; and

FIG. 9 is a perspective view of a clinched staple.

Referring now in detail to the drawing, **10** designates a staple or clinching machine of the tacker type, embodying the invention.

Said machine **10** comprises a housing **10***a*. Said housing **10***a* comprises a body **11**, which may be substantially similar to the housing body described in U.S. Patent No. 2,671,215. Said body **11** comprises a pair of similar, symmetrically disposed body parts **12** having meeting edges **14** along a longitudinal vertical plane through the middle of the body. The body is formed with a hand

hole **15**. It is open at the bottom and at its front end. Each of the body parts **12** has a side wall **16** from which extends inwardly, curved portions **17** forming said hand hole. At the lower end of each of said side walls **16** is a longitudinal bottom edge **18**. The side walls have rear ends **19**. The upper portions of the rear ends of said side walls **16** and the top portions thereof are curved, as at **20**, meeting along the meeting plane **14**. Rearwardly of their forward ends, side walls **16** are formed with vertical, outwardly offset shoulders **21**, from which extend forwardly, side walls **22** spaced further apart than said side walls **16**.

The side walls **22** have forward edges **23**. The shoulder **21** has an intermediate semi-circular shoulder portion **21***a*. At the axis of shoulder portions **21***a*, side walls **22** are formed with aligned through-openings **24**. The wall portions **20** are upwardly curved as at **20***a* at their forward ends. Extending from the upper ends of walls **20***a* are forwardly and upwardly inclined edges **25** merging with a downwardly curved edge **26** from which extend downwardly and forwardly, inclined edges **27**. The edges **27** extend down to the forward edges **23**. Forward edges **23** are formed with longitudinal grooves **23***a* for the purpose hereinafter appearing. The side wall portions **22** are formed adjacent the curved edges **26** with aligned through-openings **28**.

Fitted over the front of the body is a front nose piece **32**. Nose piece **32** may be made of hardened steel. It comprises a front wall **33** from which extend rearwardly parallel side walls or flanges **34**.

The front wall **33** has a bottom edge **35** at the level of the bottom edge **18** of the body parts **12**.

The front wall **33** has a forwardly pressed substantially rectangular portion **38** for the purpose hereinafter appearing. Furthermore, said wall **33** is formed below the forwardly spaced portion **38** with a pair of parallel horizontally aligned vertical slots **39**.

At the upper end of the front wall **33** is an upwardly, and rearwardly inclined wall **40** contacting the inclined edges **27** and extending about half way up said edges. Said side walls or flanges **34** contact the outer surfaces of the side walls **22** of the body. Side walls **34** are formed at their rear ends with rear edges **41** extending upwardly from the lower edges **36**. The rear edges **41** extend substantially from the lower ends of the semi-circular shoulder portion **21***a*. Extending from edges **41** are edges **42** following the semi-circular shoulder portions **21***a*. Extending downwardly and forwardly of the semi-circular edges **42** are inclined edges **43**. Extending upwardly from the front ends of edges **43** are vertical edges **45**. Extending from the upper ends of edges **45** are rearwardly inclined edges **46** from which extend edges **47** located around and spaced from the openings **28**. Edges **47** extend down to the upper ends of the front wall **33**. The upper ends of the side walls **34** thus comprise ears **48** and they are formed with openings registering with the openings **28** in the side wall portion **22**.

Extending through the registering openings **28**, is a shaft **50** riveted at its ends. The portion of the side walls **34** bounded by edges **42**, **43** comprises ears **51** formed with through openings registering with the openings **24** in the side wall portions **22**. Extending through registering openings **24**, is a bolt **53**. It will now be understood that shaft **50** and bolt **53** serve to attach nose piece **32** to the front of the body.

Mounted on the body **11** is a bottom stop member **55**. Said bottom stop member **55** is a metal plate and may be hardened. It is in horizontal position as shown in FIGS. 1 and 2.

Attached onto the top surface of the bottom stop **55** is a shock absorber **60** of the same shape as member **55**

and overlying the same and made of either rubber, plastic or any other suitable material to absorb shocks.

Mounted on and between wall portions 22 is a top stop 61. Top stop 61 is formed with a plurality of downwardly pressed lips 63 arranged in a circle, for the purpose hereinafter appearing. Top stop 61 is disposed above the bottom stop 55 and its shock absorber 60.

Slidably mounted within the front of the body and between side walls 22 and adjacent the front wall of the nose piece 32, is a plunger member 65. The same comprises a plunger cup 66 made of a single sheet of metal, die cut and pressed to the shape shown in the drawing. The cup 66 has a front wall 67 from which extends rearwardly a bottom wall 68. Extending upwardly from the rear of wall 68 is a rear wall 69. Extending rearwardly from the front wall 67 are side walls 70. The side walls 70 are formed with rearwardly extending hooks 70*a* having upwardly and rearwardly inclined under edges 70*b* located substantially midway between the front and rear ends of said side walls.

It will be noted that the cup is open at its upper end. Inserted within the cup and contacting the bottom wall 68 is the lower end of a coil compression spring 72, the upper end of which contacts the underside of the top stop 61. The downwardly pressed lips 63 are received within the upper end of spring 72. Riveted to the front wall 67 as by rivets 73 is a driver blade 74 passing through registering slots in the bottom stop 55 and the shock absorber 60, respectively. The head of the rivet 73 may be moved through the recess formed by the forwardly pressed wall 38.

The drive blade has, at its upper ends, side extending wings 74*a* received within groove 23*a*. Said blade 74 also has a circular hole 74*b* receiving a forwardly pressed lug 67*a* on front wall 67 of cup 66. The compression spring 72 presses the plunger downwardly.

Within the bottom of body 11 is a staple magazine comprising a staple magazine body 76 to which is fixed a staple guide or channel 77. The magazine body 76 comprises parallel side walls 78 interconnected by a bottom wall 79. Extending inwardly from the upper ends of side walls 78 are coplanar flanges 80. Bottom wall 79 terminates at its front end in an edge 79*a* spaced rearwardly of the front ends of said side walls. Said side walls 78 are notched upwardly as at 78*a* in front of edge 79*a*, forming wings 78*b* between the front edges 78*c* of said side walls and said notches. The lower ends 78*d* of said wings 78*b* are curved downwardly and outwardly. At the front ends of walls 78 are a pair of parallel, vertical tongues 78*e* adapted to be received in the slots 39 in wall 33, with the front edges 78*c* contacting the inner surface of said wall, and thereby positioning the lower surface of bottom wall 79 in the plane of the lower edges 18 of side walls 16, 22 and lower edges 36 of side walls 34.

Said side walls 78 have at their rear ends, upwardly extending ears 81 through which extends a cross shaft 82 passing through suitable openings in side walls 16.

The staple guide 77 has a rear bottom wall 83 from which extend upwardly, side flanges 84. The bottom wall 83 is fixed to bottom wall 79 of the magazine body by rivets 85 passing through registering front and rear openings on said body and guide (only the front openings being shown). The side flanges 84 are spaced inwardly from side walls 78 sufficiently to allow legs 86 of a staple strip 87 to move therebetween. The upper edges 84*a* of the staple guide are spaced below the flanges 80 sufficiently to allow passage of the crowns 88 of the staple strip 87. Side walls 84 have front edges 84*b* which are spaced rearwardly of the front edges 78*c* by somewhat more than the thickness of a staple 87*a* of the staple strip 87.

Side walls 84 are also interconnected by a front bottom wall 90 disposed forwardly of and spaced from the rear bottom wall 83. Front bottom wall 90 has a forward edge 90*a* disposed rearwardly of front edges 84*b*. The front lower corners of side walls 84 are notched or cut away, as at 84*c*, forming vertical edges 84*d* in the plane of edge 90*a*.

The front bottom wall 90 has a rear edge 90*c* spaced forwardly from the front edge 83*a* of rear bottom wall 83. Side walls 84 have cut away portions 84*c* at their lower ends, forming a rearwardly extending tongue 90*d* rearwardly of said rear edge 90*c*, and also vertical upwardly extending notches 84*f* at the front end of said tongue. At the lower ends of vertical notches 84*f* are rearwardly extending slots 84*g* having lower edges 84*h*. Edges 84*h* terminate short of edge 83*d* in downwardly extending shoulders 84*i*, for the purpose hereinafter described.

Attached to the rear bottom wall 83 and bottom wall 79 by one of the front rivets 85, is a hold down member 92. Said member 92 comprises a rearwardly extending flat portion 92*a* overlying the front end of said rear bottom wall, an upwardly extending short intermediate shoulder portion 92*b* aligned with edge 83*a* and from the upper end of which extends forwardly a flat horizontal hold down tongue 92*c* parallel to and spaced above said wall 83 and overlying the space between edges 83*d* and 90*c*. Said member 92 is disposed between side walls or flanges 84 and tongue 92*c* is located somewhat above edges 84*h*.

Disposed within the staple guide or channel 77 and below tongue 92*c* and resting on the upper surface of bottom wall 79 and between edges 83*d* and 90*c*, are a pair of coil compression springs 93 in side by side, coextensive relation.

Slidably mounted on the front bottom wall 90 of the staple guide for longitudinal, guided, limited sliding movement thereon, is a sliding anvil 95. Said anvil comprises a flat, elongated shank 95*a* provided at its rear end with a rear edge 95*b* and a pair of outwardly extending guide wings 95*c*. The wings 95*c* engage below edges 84*h*. The rear edge 95*b* contacts the front ends of coil springs 93. At its front end, anvil 95 has a downwardly and forwardly curved portion 95*d* extending down below the underside of shank portion 95*a*, in a transverse edge 95*e*. Said curved portion 95*d* has outwardly extending wings 95*f* having downwardly, forwardly and outwardly curved end edges 95*g*. The lower edge 95*e* is in the plane of the underside of bottom wall 79 of the magazine body 76. The lower end of said portion 95*d* contacts the inner surface of wall 33 at its lower end when the drive blade is raised. The outwardly curved edges 95*g* are disposed in the plane of the foremost staple 87*a* of the staple strip 87, and below the lower ends of the legs of said staple and are spaced inwardly of the front ends of the lower outwardly curved wings 78*d* of the magazine. Hence, said curved edges 95*g* form, with said wings 78*d*, a pair of downwardly and outwardly extending passages for the purpose hereinafter appearing.

Any suitable, releasable means may be provided to raise the cup 65 and drive blade 74 to compress the actuating spring 72, whereby upon release of the cup, the blade will descend under pressure of the compressed spring, to force the foremost staple downwardly to cause the legs thereof to pass through the passages between edges 95*g* and wings 78*d*, to cause said legs to be curved or bent outwardly as shhown at 97 in FIG. 9, to clinch material. One such means is illustrated in the drawing and is also shown and described in said Patent No. 2,671,215.

To this end, there is pivoted on the shaft 50, a handle 185. Handle 185 has a top wall 86 from which extend side flanges 187. Said flanges 187 are formed with through openings through which the shaft 50 passes. The said side flanges 187 fit over the side walls 34 of the front nose piece. The top wall 186 has a forwardly and downwardly inclined extension 189 contacting the inclined edges 27. The lower end of flange 189 substantially meets the upper end of flange 40. On shaft 50 and within the

body is a torsion spring 191, one arm of which contacts the underside of the top wall of the handle and the other arm of which engages the back of top stop 61. Thus the torsion spring 191 tends to raise the handle.

Attached to the underside of the handle, rearwardly of the shaft 50, is a saddle 192 formed with a pair of downwardly extending apertured flanges 193 carrying a transverse pivot pin 194. Pivoted to the pivot pin 194 and disposed within the flanges 193 is a link 195. Link 195 has a pair of side walls 196 interconnected by a rear web 197. The lower ends of side walls 196 carry a transverse pivot pin 198. Side walls 16 of the body members 11 are formed with aligned openings carrying a transverse pivot pin 200 disposed below and forwardly of the pivot pin 198.

Pivoted to the pivot pin 200 is a lever 201. Lever 201 comprises side flanges 202 interconnected by a bottom web 203. Side walls 202 have upwardly and rearwardly extending arms formed with openings through which the pivot pin 198 passes. Said side walls 202 also have downwardly and forwardly inclined arms carrying a transverse pivot pin 205. Pivoted to the pivot pin 205 is the upper end of link 206. Link 206 has side walls 207 interconnected by front web 208. On the pivot pin 205 is a torsion spring 209 having one arm engaging the front edge of the web 203 and a second arm contacting the back of the web 208. Thus torsion spring 209 tends to swing the link 206 forwardly.

The side walls 16 of the body members 11 are formed with aligned through-openings through which pass a transverse pivot pin 210. Pivoted on the pivot pin 210 is a trigger member 211. Trigger member 211 has side walls 212 interconnected by a bottom web 213. Side walls 212 are formed adjacent their rear ends with kidney shaped openings 214 through which pivot pin 210 passes. These kidney shaped openings 214 are somewhat elongated but have a notch 215 at their rear lower ends, for the purpose hereinafter appearing. The side walls 212 are in alignment with the side walls 70 of the cup 66. Said side walls 212 have at their forward ends upwardly projecting pointed portions 216 engaging under edges 70*b* of the hook 70*a*. Said side walls 212 are formed with aligned through openings rearwardly of the pointed portions 216 carrying a transverse pivot pin 219. The lower ends of the side walls 207 of the links 206 are formed with apertures through which the pivot pin passes.

It will be noted that the torsion spring 209 normally tends to press the trigger 211 forwardly so that the pivot pin 210 is located at the rear end of the slots 214 and is engaged within the offset portions 215 of said slots.

When the handle 185 is in its normal "up" position and the plunger 65 rests on the shock absorber 60, the parts are in the position shown in FIG. 1 of the drawing. When it is desired to operate the device, the handle 185 is depressed causing the handle to swing downwardly about the shaft 50. Link 195 is then pushed downwardly to rotate the lever 201 in a clockwise direction about the pivot pin 200 to raise the link 206 and thus swing the trigger 211 in a clockwise direction about the pivot pin 210 to raise the plunger 65. As the plunger is raised, the pointed ends of the trigger slide upwardly and rearwardly along the under edges 70*b* of the hooks 70*a*. At a predetermined point in the vertical movement of the plunger, the pointed ends 216 move beyond the hooks and permit the compressed spring 72 to cause the plunger to descend and at the same time the driver blade will push out the foremost staple in the staple magazine. As the plunger descends the hook 70*a* will move down below the pointed ends 216. When the handle is released the trigger 211 will swing in a counterclockwise direction down with the upward movement of the handle.

The forward edges of the flanges 212 adjacent the pointed ends 216 are curved or cammed downwardly and rearwardly as at 217. As the cammed edges 217 contact the downwardly and forwardly curved or cammed edges 218 of the hooks 70*b*, the trigger 211 is pushed rearwardly against the tension of the torsion spring 209 so that the trigger will by-pass the hooks 70*a*. During such movement the shaft of the pivot pin 210 will move out of the offset portion 215 of the kidney shaped slot 214.

Elongation of the slot 214 permits the trigger to move back. However, as soon as the pointed end 216 passes below the hook 70*a*, torsion spring 209 will again snap the trigger forwardly and the pivot pin 210 will again snap into the offset portions 115 of the slots 114 and then the tacker will again be in the position shown in FIG. 1.

It will now be noted that as the legs of the foremost staple are being bent outwardly, as shown in FIG. 9, the front end of the sliding anvil will remain in contact with the inner surface of front wall 33 of the nose piece. However, as the crown 88 of the staple is moved down against the curved portion 95*d* of the anvil, said anvil will be cammed or pushed backwards, to compress springs 93. As the lower end of the drive blade 74 passes into contact with the front lower end of curved wall 95*d* of the blade, said anvil will continue to hold the anvil in retracted or rearwardly pushed position, as shown in FIG. 1 of the drawing.

The anvil will remain in retracted poistion as long as the spring 72 is keeping the cup 65 depressed. However, as soon as the handle 185 is depressed for again raising the plunger 65; and the lower end of drive blade 74 raises above the anvil, springs 93 will again project the anvil forwardly to contact wall 33, allowing the staple strip to advance to place the forward staple in the plane of curved edges 95*g*, so that when the plunger is released, it will descend and the blade will drive the staple.

Means is provided to adjust the curvature of the outwardly bent legs 97 of the driven staple. To this end, side walls 34 of the front nose piece are formed with through holes 250 at the lower front corners thereof, in locations opposed to wings 78*b* of the side walls 78 of the staple magazine body 76.

Side wall 22 of the body parts 12, are formed with inwardly extending internally threaded short tubes 251 coaxial with openings 250 and of smaller diameter. Screwed in said tubes 251 are set screws 252 which may be of the socket type, to permit a wrench to be inserted through openings 250 for engagement in the sockets of said set screws for tightening or loosening said screws. The screws 252 pressing wings 78*b*, will change or vary the passages through which the legs of the staple pass during the clinching operation, to thereby vary the curvature of the clinched legs.

A usual staple strip pusher (not shown) may be slidably mounted on the staple magazine. Such pusher may have a usual rear spring catch C, to releasably hold the pusher on the magazine.

It will thus be seen that there is provided on apparatus in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings, is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A staple machine for staples having a crown from which legs extend, said machine comprising a housing, a staple magazine in said housing, a front wall at the front end of said housing and magazine, and anvil movably mounted in said magazine, said anvil having at its front end, outwardly and downwardly beveled camming surfaces, and said magazine having at its front end, outwardly beveled portions spaced from and forming passages with said camming surfaces, to cause the legs of a driven staple to be bent outwardly during the driving operation as said legs pass through said passages, and said anvil having at

its front end, a camming surface to be engaged by the crown of the driven staple, at the end of the driving operation, to move back said anvil, to allow said crown to by-pass said anvil, and spring means mounted in said magazine in position to be loaded upon movement of said anvil by the crown of the driven staple, for urging said anvil to move back to the position from which it was moved, and adjustable means on the housing to press said portions of the magazine to vary said passages.

2. A staple machine for staples having a crown from which legs extend, said machine comprising a housing, a staple magazine fixed in said housing for carrying a strip of said staples, a fixed front wall at the front end of said housing and magazine, a driving means for driving the foremost staple in said strip, an anvil movably mounted in said magazine, spring means biasing said anvil toward said fixed front wall and said anvil having at its front end outwardly, forwardly and downwardly beveled camming surfaces, and said magazine having at its front end, outwardly beveled portions extending down to and terminating at the level of the lower ends of said camming surfaces and being spaced from and in opposed relation thereto at the same level, and forming passages with said camming surfaces, to cause the legs of a driven staple to be bent outwardly during the driving operation as said legs pass through said passages, said outwardly, forwardly and downwardly beveled camming surfaces of said anvil being engaged by the crown of the driven staple during the driving operation, to move back said anvil against the action of said spring means to allow said crown to by-pass said anvil, said magazine having an underside contacting the work, said anvil comprising a rear shank portion, the underside of which is in a plane disposed above the underside of said magazine in spaced parallel relation thereto, and said front end of said anvil extending down below said shank substantially down to the level of said underside of said magazine.

3. In combination, a staple magazine for staples having a crown from which legs extend, means to press down

on the crown of the staple to drive the staple, a staple guide forming a passage for said driver and staple, an anvil slidably mounted in the magazine and having at its front end a pair of oppositely beveled forwardly and downwardly directed camming side edges, spring means to bias the front end of said anvil forwardly to said passage, and means located at the front end of the magazine providing a pair of oppositely beveled camming surfaces outwardly spaced from and forming therewith a pair of oppositely inclined passages through which the legs of said staple pass and are clinched as said staple is being driven by said drive means, and said front end of said anvil having a top forwardly and downwardly beveled surface to be engaged by the crown to retract said anvil against the action of said spring means, as the driver presses the crown of said staple down against said anvil, until said crown is below said anvil, and whereby when said drive means is retracted upwardly above said anvil, said spring means will move said anvil forwardly, said beveled side edges extending downwardly and forwardly, to retain engagement with the legs of said driven staple as said anvil is being retracted until the crown of said driven staple passes beyond said top forwardly and downwardly beveled surface, said magazine comprising a bottom wall, said anvil comprising a rear shank portion above said bottom wall, and said front end of said anvil extending down below said shank, substantially down to the level of the underside of said bottom wall.

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GRANVILLE Y. CUSTER, JR., *Primary Examiner.*