Dec. 19, 1961 W. D. CHILTON 3,013,270

HOG RING CLINCHING TOOL WITH ANGLE HEAD

Filed Feb. 24, 1958 5 Sheets-Sheet 1

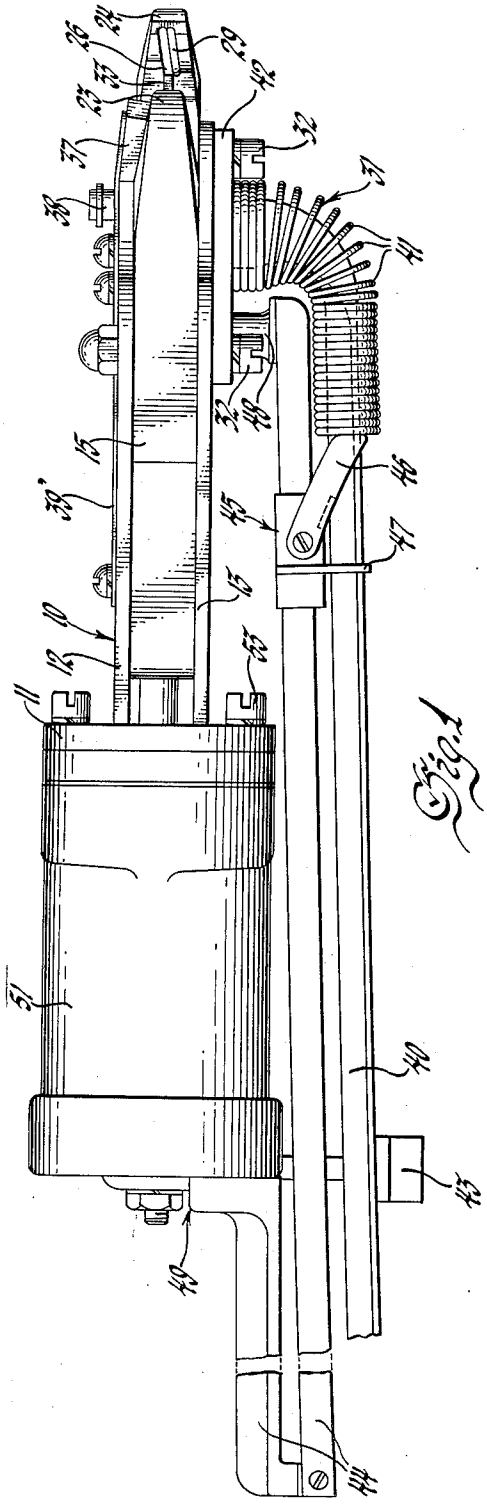


Fig. 1

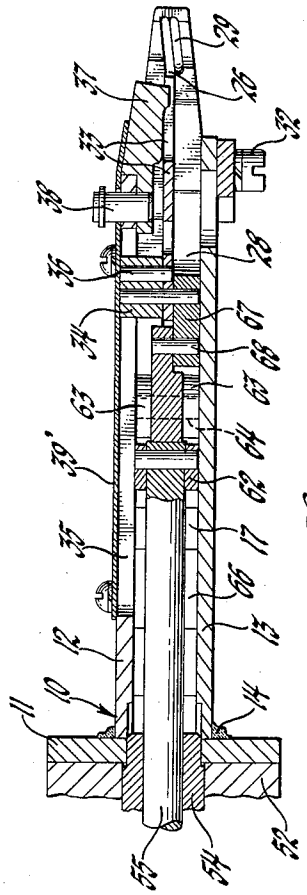


Fig. 2

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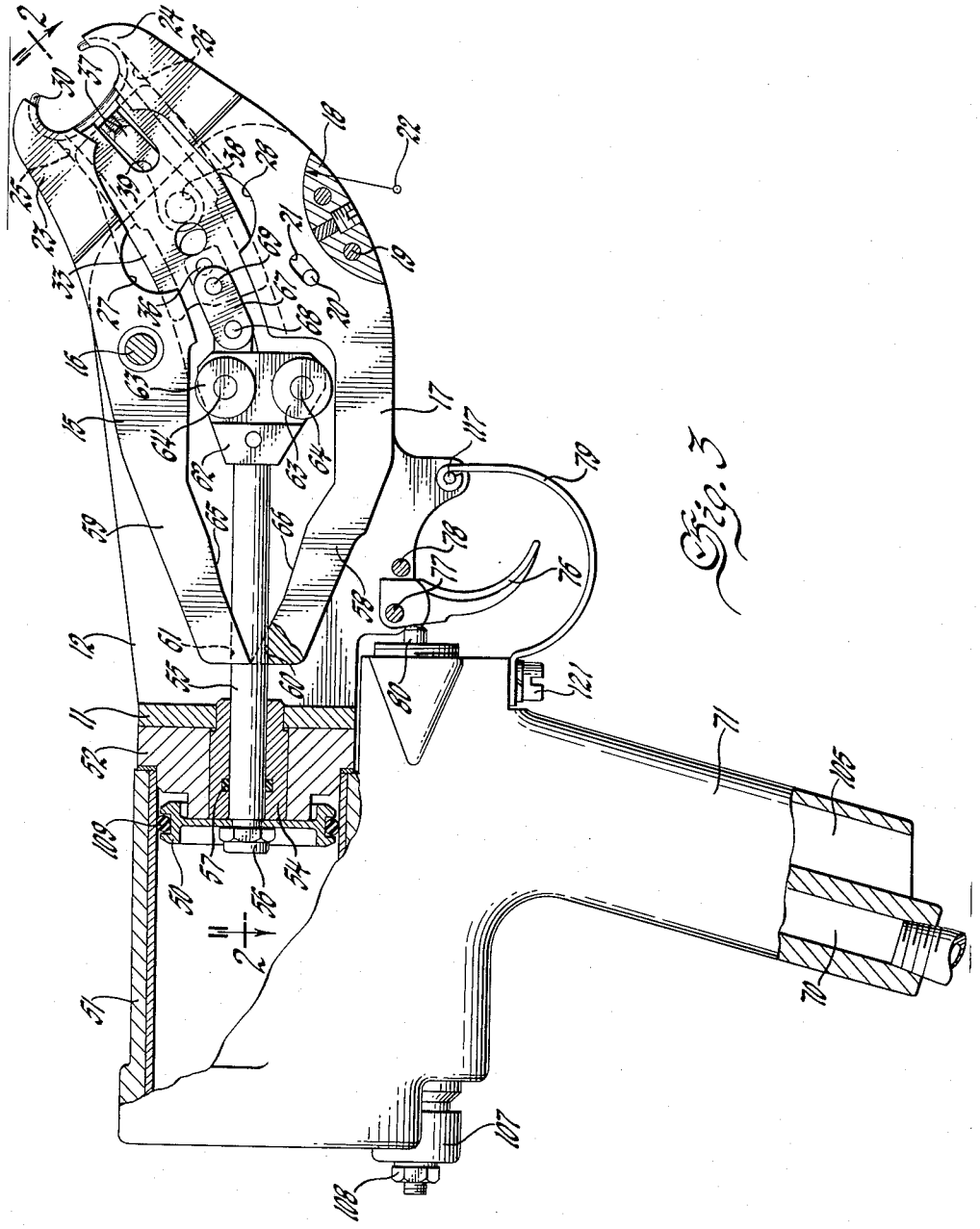


Fig. 3

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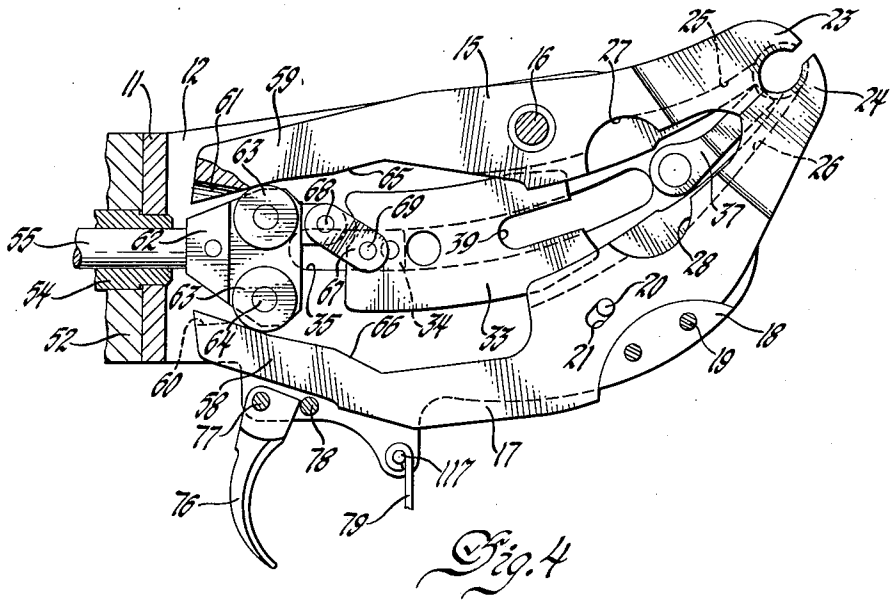


Fig. 4

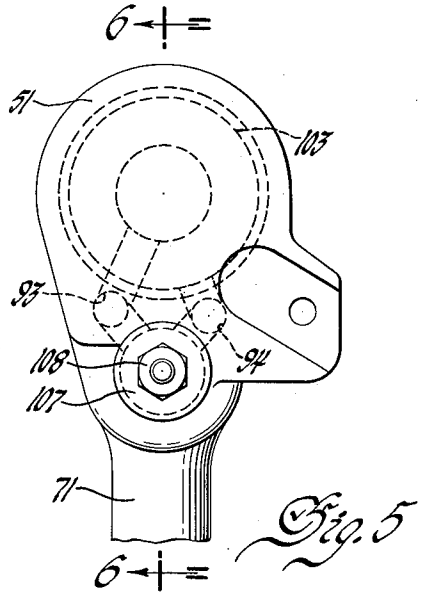


Fig. 5

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HOG RING CLINCHING TOOL WITH ANGLE HEAD

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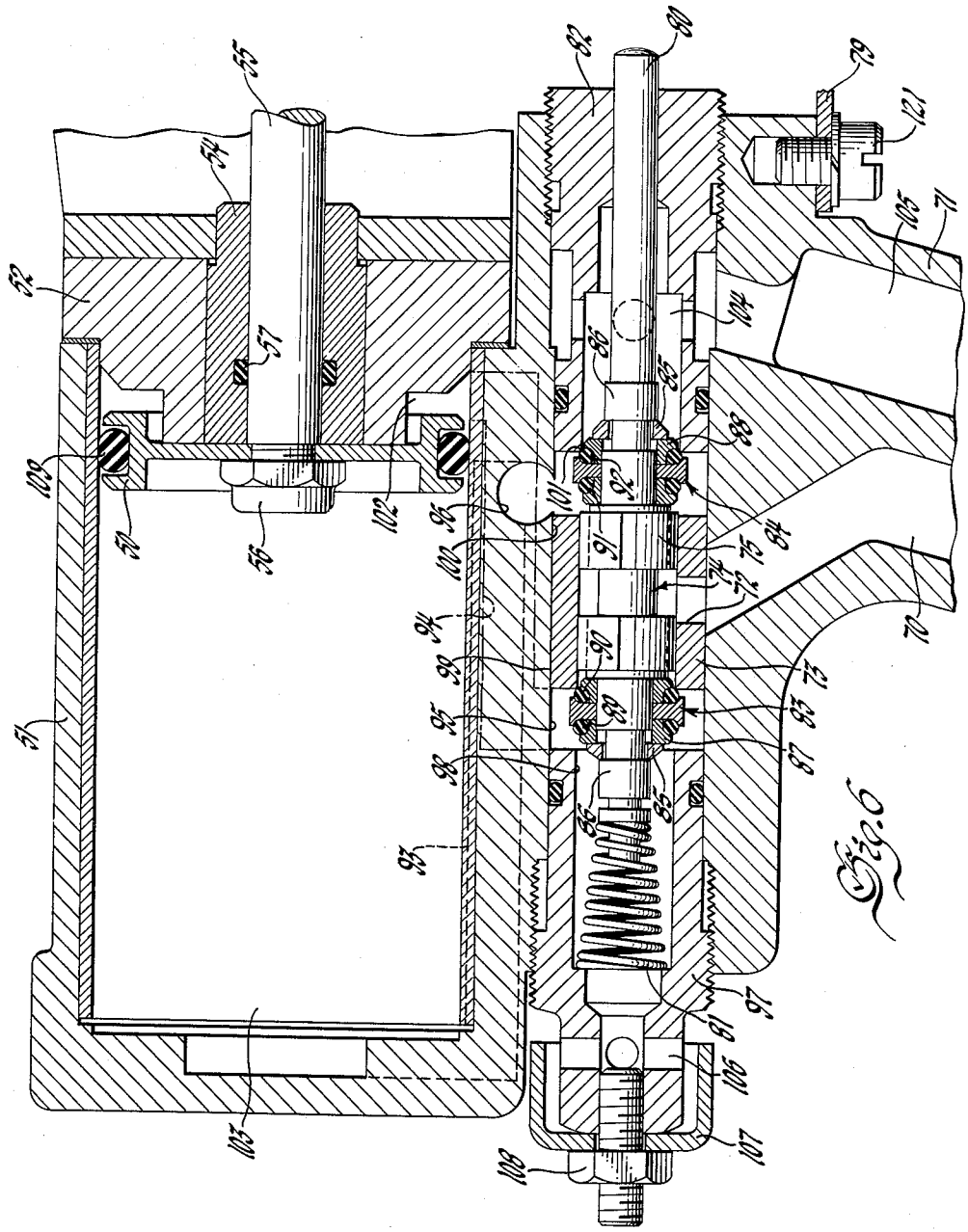


Fig. 6

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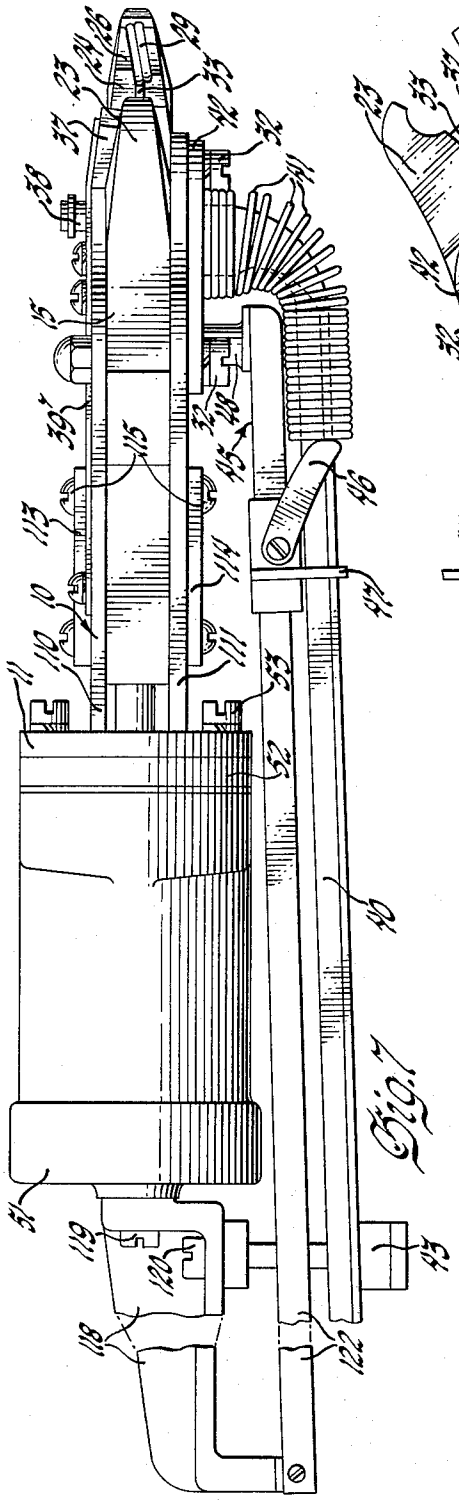


Fig. 7

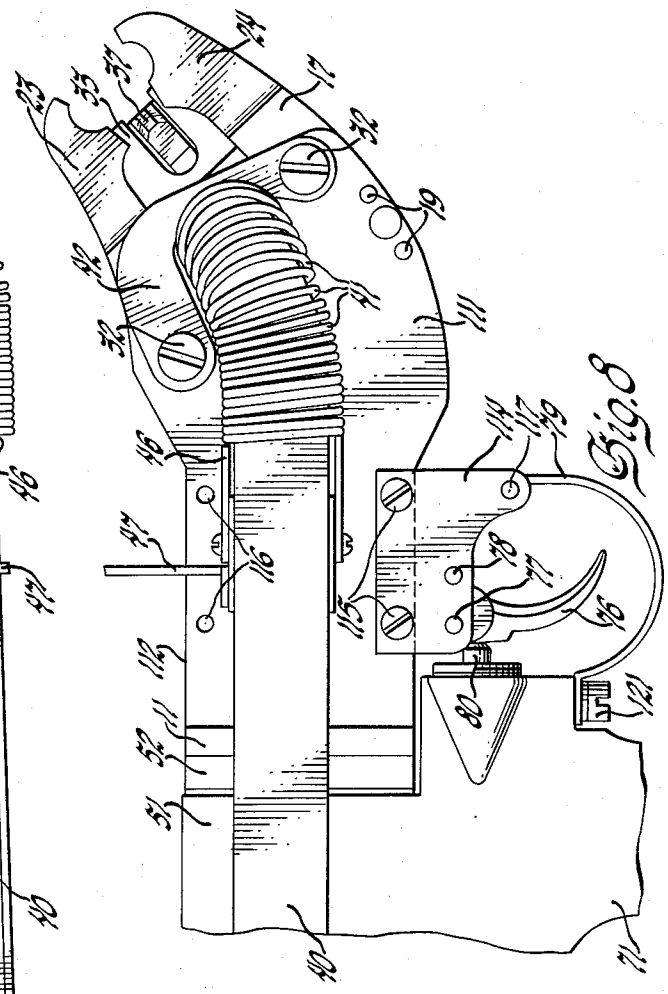


Fig. 8

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3,013,270

HOG RING CLINCHING TOOL WITH ANGLE HEAD

William D. Chilton, Royal Oak, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Filed Feb. 24, 1958, Ser. No. 716,950
1 Claim. (Cl. 1—187)

This invention relates to hog ring clinching tools, and more particularly, to an improvement over my hog ring clinching tool shown and described in the U.S. Patent 2,656,539.

Hog rings are used extensively in connection with clinching wires and springs together in cushioned seat constructions, and particularly for clinching trimming material to the cushioned seat. Due to this extensive use, it is desirable to have a tool with power operated clinching jaws to close the hog rings around the parts to be connected. In the past, tools have been provided having clinching jaws extending forward along the axis of the tool, providing limited operation of the tool because of space restrictions, corners, and the like, encountered in structures requiring hog ring type connections.

The device in which this invention is embodied provides clinching jaws adapted to extend at an angle with respect to the axis of the jaw of the tool either upwardly or downwardly, giving a much greater range of applicability for hog ring connections. The angularly extending jaws readily adapt the tool to a greater number of operations, with less operator effort, giving greater efficiency, savings in time and effort on the part of the operator, and reduced cost in seat and cushioned constructions.

In the drawings:

FIGURE 1 shows a top of plan view of the tool;

FIGURE 2 is a cross sectional view of the clinching end of the tool substantially along the line 2—2 in FIGURE 3 and looking in the direction of the arrows;

FIGURE 3 is a fragmentary elevational view of the tool showing the jaws in opened position and the linkage between the actuating means and the jaws;

FIGURE 4 is a sectional elevation view of the clinching end of the tool showing the jaws in the closed position;

FIGURE 5 is a partial rear end view of the tool; and

FIGURE 6 is a partial cross sectional view of the actuating end of the tool, showing the power operating means and valve arrangement, taken substantially along the line 6—6 of FIGURE 5 and looking in the direction of the arrows.

FIGURE 7 is a top view of a modification of the tool shown in FIGURES 1–6, having the jaws thereof adapted to extend upwardly or downwardly.

FIGURE 8 is a partial elevational view of the modification shown in FIGURE 7 showing the mounting of the trigger mechanism.

Referring more particularly to the drawings, FIGURES 1 through 4 best show the clinching end of the tool and the parts therein. A frame indicated generally at 10 includes a transverse section 11 and a pair of forwardly extending portions 12 and 13. The frame may be of one piece construction or made of several pieces, the forwardly extending portions being welded to the transverse section as indicated at 14. An upper lever 15 is pivotally mounted on the forwardly extending portions of the frame on the pivot 16. A lower lever 17 is mounted between the forwardly extending portions of the frame and is allowed pivotal movement by the stationary cam 18 secured to the frame by pins 19. The locating pin 20, passing through the slot 21 in the lower lever, prevents the lower lever from disengaging from

the cam. The lower lever will thus pivot about the point 22, the center of the cam. The forward ends of the levers 23 and 24 extend forwardly and upwardly from the frame portions 12 and 13, terminating in clinching jaws. Grooves 25 and 26 formed in the clinching jaws provide a passage between the jaws to allow hog rings, received in the openings 27 and 28, to be advanced to the clinching ends of the levers. Groove 29, in the lower jaw, is adjacent the feed groove 25. The upper jaw has a corresponding groove, in mis-alignment with groove 29, to allow the C-shaped ends of the hog ring 30 to overlap each other when the ring is clinched. The hog rings are received in the openings 27 and 28 from a magazine 31 mounted on the outside of the frame as by bolts 32. A pusher 33 is slidably engaged in the grooves 25 and 26 in the jaws and is properly directed in its movement by the block 34 sliding in an arcuate slot 35 in the frame portion 12. A pin 36 secures the sliding block to the pusher. A ring retaining block 37, laterally pivots between the jaws 23 and 24 and is secured to the frame portion 12 by the pin 38. A leaf spring 39' biases the ring retaining block in the proper position to prevent the ring from backing out of the grooves and allows a ring, as it is pushed forward by the pusher, to move the retaining block outwardly to allow passage of the ring past the retainer block. A slot 39 in the pusher 33 provides an opening for the ring retaining block behind the hog ring.

The hog ring supply assembly, similar to the ring supply assembly of my previous device, consists of a bar 40 on which is received a supply of hog rings 41. The bar is attached to the plate 42 which is in turn attached to the tool by the bolts 32. The attachment is such that the bar is in communication with the openings 27 and 28 in the clinching jaws, to allow rings to move freely from the bar to a position between the jaws. The bar 40 is further supported on the bracket 43 in any suitable manner. A U shaped slide 44, located between the bar 40 and the tool, has a loading block and finger assembly 45 slidably engaged thereon, the fingers 46 adapted to bear on the last hog ring in the stack. The block and finger assembly is biased by a spring of any suitable type, not shown, to bias the assembly into ring engaging position, forcing the rings into the openings in the jaws. A flange 47 provides for moving the assembly toward the rear of the tool when a new supply of hog rings is loaded on the bar 40. The slide is attached to the frame by the post 48, supported on the bracket 43, and secured to the rear end of the tool as at 49.

Power actuation is provided for the clinching jaws by the piston assembly 50 acting within the cylinder 51. The cylinder block 52 is secured to the frame by the bolts 53 and has a bushing 54 therethrough to allow passage for the piston rod 55. A nut 56 secures the piston assembly to the piston rod and an O ring 57 prevents the passage of air along the piston rod. The piston rod extends between the rearward or actuating portions 58 and 59 of the levers 15 and 17 which have cylindrical grooves 60 and 61 provided therein to receive the piston rod. A roller block 62 is attached to the end of the piston rod 55 and has a plurality of rollers 63 pivotally mounted thereon by the pins 64. The rollers contact the cam surfaces 65 and 66, on the actuating ends of the levers 58 and 59 respectively, when the piston is moved to the rear, to open those ends of the levers and closing the clinching jaws 23 and 24 to clinch the hog ring. A link 67 is secured to the roller block 62 by the pin 68 and is secured to the pusher plate 33 and gudie block 34, by the pin 69, to reciprocate the pusher plate with the piston and the roller block.

Air is supplied to the cylinder through the inlet 70

in the handle 71. As shown in FIGURE 6, air inlet 70 leads into a passage 72 in the valve block 73. The cylindrical valve stem, indicated generally by 74, is provided with a plurality of lands 75 allowing passage of air therebetween to the cylinder. The valve stem is operated by a trigger 76 pivotally secured to the frame by the pin 77 and having a stop pin 78 located adjacent thereof. A trigger guard 79 protects the trigger from inadvertent actuation. The trigger gears against a rod 80, biased in the forward position by a spring 81, which passes through a fitting 82 threaded into the handle end of the tool, and has a pair of valve assemblies 83 and 84 mounted thereon. The valves are comprised of spacer washers 85 acting against lands 86 on the rod 80 and conical valve members 87 and 88. O rings 89, 90, 91 and 92 provide the proper seal against the passage of air. Air inlet passages 93 and 94 communicate with the cylinder on opposite sides of the piston assembly and with the openings 95 and 96 between the fittings 82 and 97 and the valve block. Valve seats 98 and 101 are provided in the fittings 82 and 97, and valve seats 99 and 100 are provided at the ends of the valve block 73, for the conical valves 83 and 84.

Operation of the hog ring tool is as follows: In the normal or standing position the front clinching jaws are generally in an open position with hog ring in the grooves therebetween. The operator, when he desires to clinch the hog ring, pulls the trigger 76, pushing the rod 80 rearwardly and opening the valve seat 99 to allow passage of air from the inlet 70 through the openings in the valve stem and into the passage 94 in the cylinder block. Air then enters the forward chamber 102 to force the piston to the rear, the O ring 109 preventing the passage of air around the piston. Air is expelled from the chamber 103, behind the piston, through the passage 93 and through the now opened valve passage 101 to the chamber 104 communicating with the air outlet 105 in the handle. As the piston moves to the rear carrying the roller block 62 and rollers 63, the rollers bear against the cam surfaces 65 and 66, on the rear lever extensions 58 and 59, spreading those lever extensions. The levers pivot on the pivot pin 16 and the stationary cam 18 to close the clinching jaws 23 and 24 and the hog ring 30. The pusher plate 33, linked to the roller block 62, moves rearwardly in the slots 25 and 26 in the clinching jaws, properly guided by the guide block 34 traveling in the arcuate slot 35. The ring retainer pin 37, in position behind the hog ring 30, prevents the hog ring from moving back in the jaws as the jaws are closed. When the hog ring is clinched, the operator releases the trigger 76 and the spring 81 pushes the rod 80 forward, to its normally closed position. The conical valve members 83 and 84 are moved to their forward positions closing valve seats 99 and 101 and air is passed from the inlet 70 in the handle through the passage 93 in the cylinder block to force the piston forward. Air is expelled from chamber 102 in front of the piston through the passage 94 and the now open valve seat 98 into the chamber 106 containing the spring 81 and out to the atmosphere through ports 106. A cap 107 secured to the body by a nut 108 prevents air from blowing back directly on the operator. The piston moves to the forward position pushing the roller block, link and pusher plate into the normal position between the jaws, the pusher plate picking up a ring from the magazine 31 as it passes the openings 27 and 28 in the clinching jaws. The piston and linkage forces the ring over the ring retaining block and into the grooves for the next clinching operation.

A modification of the hog ring tool above described is shown in FIGURES 7 and 8, having greater versatility and is adaptable to more uses than the previously described tool. The forwardly extending jaws are adapted to be mounted angularly upwardly or angularly downwardly. Referring to the drawings, parts corresponding to the previously described modification are similarly numbered. The frame 10 has the transverse section 11 and forwardly extending portions 110 and 111, the top and bottom rear edges of which are axially disposed with respect to the axis of the tool, as at 112. The loading and pushing linkage and mechanism is the same as previously described. In adapting the tool to extend in either direction a pair of trigger plates 113 and 114 are secured to the forwardly extending frame portions 110 and 111 respectively, by the bolts 115. Tapped holes 116 are provided in the upper and lower portions of the forwardly extending members to receive the screws 115. The trigger guard 79 is secured to the handle 71 by a bolt 121 and retained by a pin 117 extending between the trigger plates. Pin 77, on which the trigger 76 is pivoted, and stop pin 78 also extend between the trigger plates. In the rearward portion of the cylinder 51 the finger assembly guide 117 has a bracket 118 secured thereto, the bracket being attached to the end of the cylinder 51 at the center by the bolt 119. Bracket member 43 which retains the supply bar 40 is supported on the bracket 118 and retained thereon by the bolt 120. The dimensions between the parts are such that the entire supply assembly may be positioned on the opposite side of the hog ring tool with adequate clearance.

To change the position of the forwardly and angularly disposed clinching jaws it is necessary only to remove the trigger plate bolts 115, remove the frame bolts 53, remove the trigger retaining bolt 121 and loosen the feed assembly bracket bolt 119 in the cylinder member 51. Thus the trigger and trigger plate assembly will drop out of the way and the entire forward end of the hog ring tool may be rotated through 180° passing the supply assembly over the top of the tool, to position the clinching jaws angularly downwardly. The hog ring supply assembly will then be located on the opposite side of the hog ring tool and the removed and loosened bolts may be returned to reassemble the tool. The operation of the tool will be as has been described.

It is evident therefore from the foregoing description that a hog ring tool having jaws angularly disposed with respect to the jaw of the tool will provide great versatility and wide diversity of operations in cushioned seat constructions and the like. The usual limited operation of a tool because of space restrictions, corners, and so forth, are overcome by having a tool with angularly extending jaws.

What is claimed is:

A hog ring clinching tool comprising a frame, a pair of levers pivotally mounted on said frame having angularly disposed clinching ends and rearwardly extending actuating ends, piston and cylinder means attached to said frame and including a piston rod extending between the actuating ends of said levers, a roller block secured to the end of said piston rod and disposed between said levers, roller means on said roller block engageable with said lever actuating ends to operate said ends when said piston is moved rearwardly, pusher means slidably mounted on said frame for advancing a hog ring into the clinching ends of said levers, and link means between said roller block and said pusher for actuation of said pusher by said piston.

No references cited.