

June 9, 1953

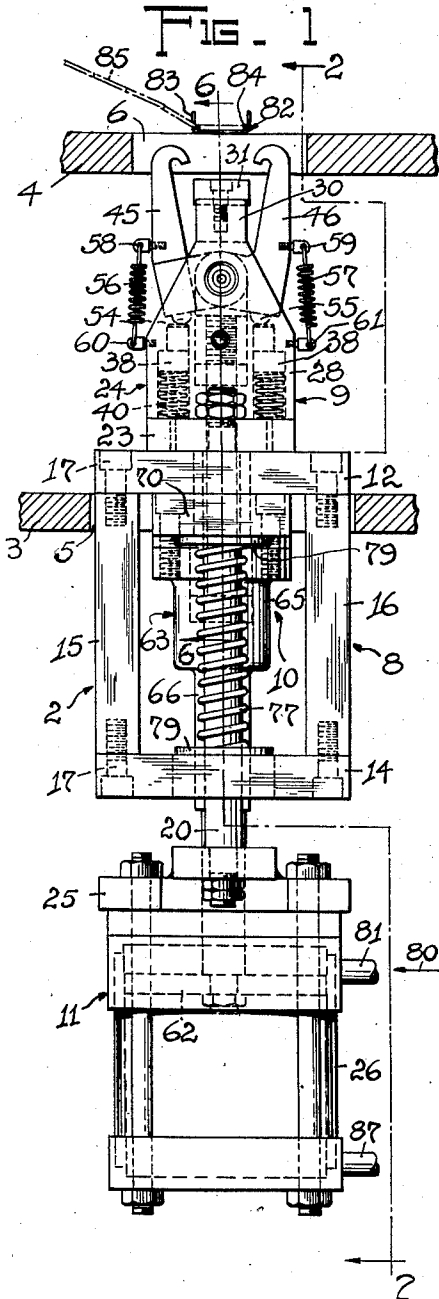
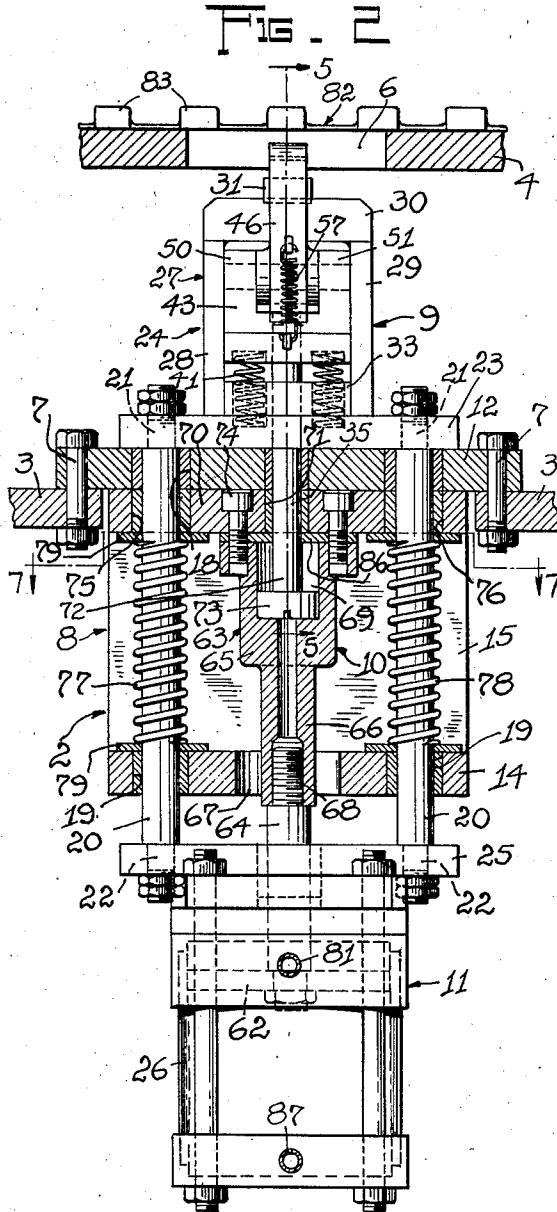
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2,640,986

CLINCHING APPARATUS

Filed May 26, 1950

3 Sheets-Sheet 1



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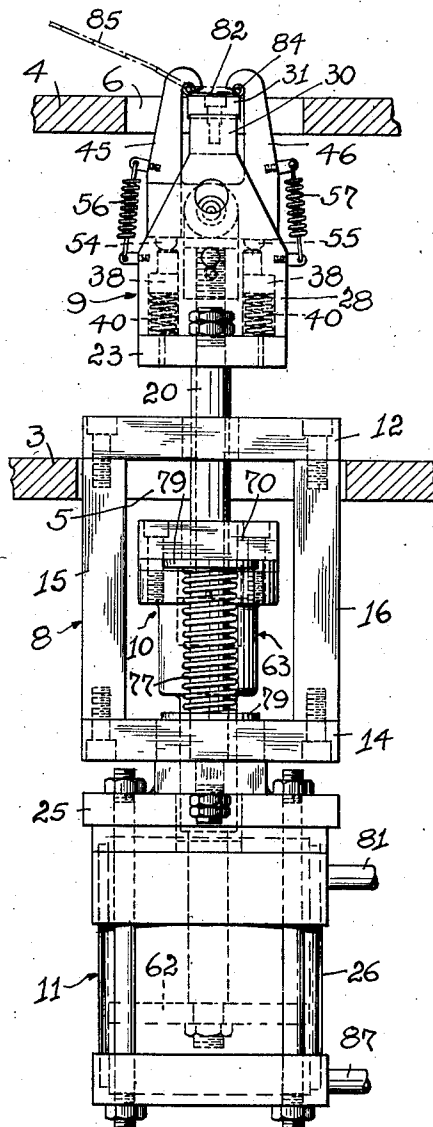
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FIG. 4



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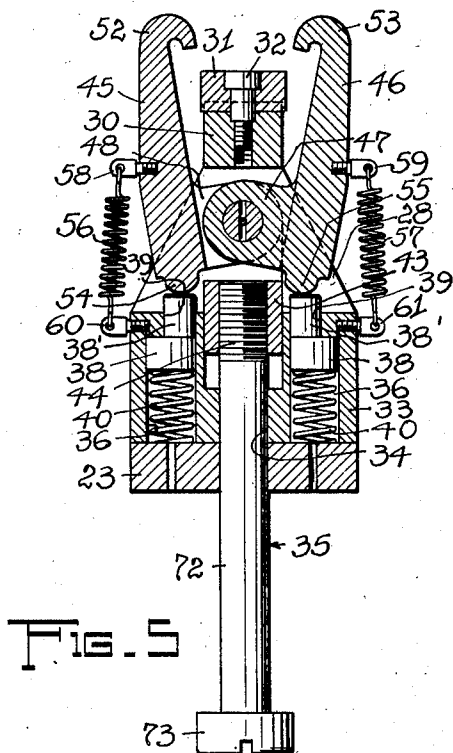


FIG. 5

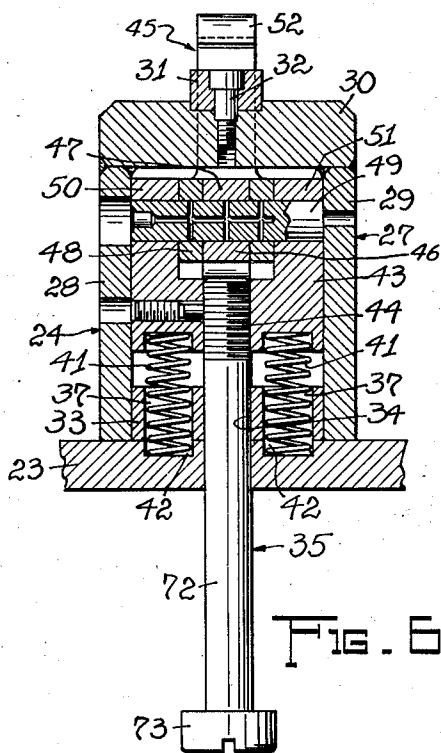


FIG. 6

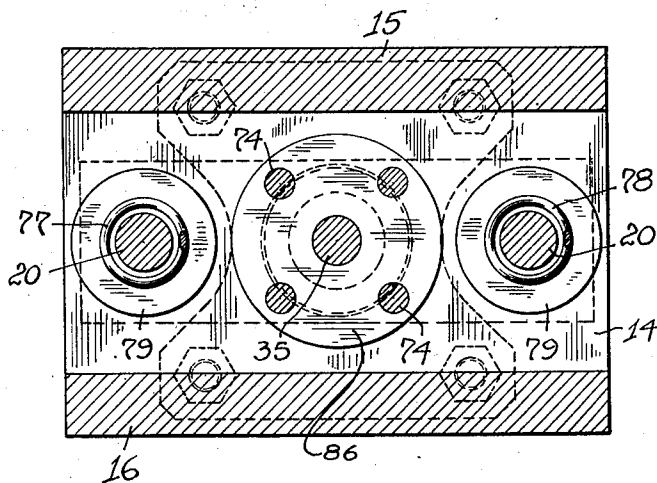


FIG. 7

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UNITED STATES PATENT OFFICE

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CLINCHING APPARATUS

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6 Claims. (Cl. 1—224)

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This invention relates in general to clinching devices adapted to clinch clips, fasteners, etc. and, more particularly, to a clinching device of this type intended for use in mounting individual wire springs on the rail member of a frame structure by clinching struck-up ear portions of such rail member around wire portions of wire springs for securing same to the rail member.

In its broadest aspect the invention is primarily concerned with the provision of a simple, efficient, pneumatically-operated clinching device adapted to engage and clinch ear portions of a sheet metal rail of a frame construction around predetermined portions of wire springs, all for the purpose of mounting the springs on the rail and form a supporting spring structure for upholstered seat and back constructions.

One of the main objects of the invention is the provision of a pneumatically actuated clinching device including vertically shiftable anvil means, vertically shiftable, pivotally supported, clinching jaws, and actuating means cooperating with a pneumatic cylinder in effecting by a single stroke of such pneumatic cylinder shifting of the anvil means toward a spring supporting rail member, simultaneous shifting of the clinching jaws in the same direction for engagement with ear portions on such rail member and, thereafter, shifting of the clinching jaws in an opposite direction for clinching of the ear portions of the rail member around the wire of wire springs seated on the rail member to rigidly attach the springs to the rail member.

Another object of the invention is the provision of a pneumatically actuated clinching device constructed to include a frame structure and a pneumatically actuated clinching structure yieldingly shiftable supported by said frame structure for limited movement with respect thereto, the clinching structure including an anvil mounting frame, a pneumatic cylinder the cylinder of which is directly secured to the anvil mounting frame, shiftable, spring-supported plate means slidably arranged in the frame structure for limited vertical movement when the pneumatic cylinder is actuated, and clinching jaws pivotally and vertically slidably arranged in the anvil supporting frame and coupled with the spring-supported plate means by a lost motion coupling to effect by a single stroke of the pneumatic cylinder joint shifting of the anvil supporting frame and the clinching jaws in an upward direction, and, thereafter, arresting the upward movement of the anvil supporting frame and shifting of the clinching jaws in a downward direction for proper gripping and clinching action of the clinching jaws.

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The above and additional objects and novel features of construction, combinations and relations of parts by which the objects in view have been attained will appear and are set forth in detail in the course of the following specification.

The drawings accompanying and forming part of the specification illustrate a certain practical embodiment of the invention, but it will be apparent as the specification proceeds that the structure may be modified and changed in various ways without departure from the true spirit and broad scope of the invention.

In the drawings:

Fig. 1 is a front view partly in section of a clinching device constructed in accordance with the invention, the device being shown in inoperative position;

Fig. 2 is a vertical sectional view on line 2—2 of Fig. 1;

Fig. 3 is a view similar to Fig. 1 shown in an operative position prior to the shifting of the jaw members into clinching operations;

Fig. 4 is a view similar to Fig. 1 shown in another operative position at the end of the downward clinching stroke of the jaw members;

Fig. 5 is a longitudinal sectional view on line 5—5 of Fig. 2;

Fig. 6 is a longitudinal sectional view on line 6—6 of Fig. 1; and

Fig. 7 is a cross-sectional view on line 7—7 of Fig. 2.

Referring now more in detail to the exemplified form of the invention shown in the drawings, the clinching device 2 disclosed therein is mounted on a frame structure (not shown) including a supporting plate 3 and a table top 4. Supporting plate 3 suspends the clinching device so that its lower end is extended through an opening 5 in said plate and its upper end is partly extended into an opening 6 in table top 4, bolts 7 being used to rigidly secure clinching device 2 to the supporting plate.

Clinching device 2 principally embodies a frame 8, a supporting and clinching assembly 9 and an actuating assembly 10 including a pneumatic cylinder 11. Frame 8 which yieldingly shiftable supports the supporting and clinching assembly and the actuating assembly as will be later described, consists of a mounting plate 12 secured to supporting plate 3 by bolts 7, a hanger plate 14 and hanger spacers 15 and 16 attached to mounting plate 12 and hanger plate 14 by screw members 17.

The supporting and clinching assembly 9 and the actuating assembly 10 are rigidly secured to

each other by a pair of guide posts 20 which are slidably extended through bushed holes 18 and 19 in mounting plate 12 and hanger plate 14 and have their opposite ends 21, 22 secured to base plate 23 of the frame 24 of supporting and clinching assembly 9 and to pneumatic cylinder plate 25 of cylinder 11 of actuating assembly 10.

Frame 24 embodies a head 27 secured to base plate 23, which head consists of two side plates 28 and 29 connected with each other by cross member 30. Head 27 mounts an anvil 31 attached to cross member 30 by a screw 32 and has arranged between its side plates 28 and 29 (see Figs. 5 and 6) a U-shaped head block 33 secured to base plate 23, which head block includes a central bore 34 for a draw bolt 35 later to be described, and two pairs of symmetrically arranged bores 36 and 37. Bores 36 slidably mount shifting elements 38 which are supported by compression springs 40 in said bores and include head portions 38' axially offset with respect to the axes of elements 38 and extended from head block 33 through bores 39. The bores 37 mount compression springs 41 which are seated in recesses 42 of base plate 23 and engaged with a shiftable head yoke member 43 shiftable supported in head 27 and threadedly connected with the threaded end 44 of draw bolt 35. Head yoke member 43 pivotally supports two oppositely arranged clinching jaws 45 and 46 with male and female ear portions 47 and 48, respectively, pivotally supporting the clinching jaws members on a pin 49 which is rigidly held by opposed side members 50 and 51 of yoke member 43. The clinching jaws 45 and 56 are substantially symmetrically constructed and include at their upper ends clinching hooks 52, 53 and at their lower ends cam-shaped extensions 54 and 55 arranged for cooperation with the outwardly extended head portions 38' of spring-pressed shifting elements 38. Clinching jaws 45 and 46 are yieldingly held in opened up position by tension springs 56, 57 tensioned between eye bolts 58, 59 on the respective jaws and eye bolts 60 and 61 on the U-shaped head block 33.

Supporting and clinching assembly 9 which, as stated above, is coupled by guide posts 20 with the cylinder plate 25 of the pneumatic cylinder 11 has draw bolt 35 coupled with piston 62 of pneumatic cylinder 11 by a lost motion coupling 63 arranged within the confines of frame 8 between its plates 12 and 14. For such purpose piston 62 has its piston rod 64 connected to a draw bell 65 provided with an internally threaded lower end portion 66 which is extended through a bore 67 in hanger plate 14 and threadedly engaged with the threaded end 68 of piston rod 64. Draw bell 65 includes a cylindrical chamber 69 which is covered by a perforated draw plate 70. This draw plate has extended through its central, bushed bore 71 the shank portion 72 of draw bolt 35. The lower end of draw bolt 35 extends into chamber 69 and is enlarged to a head member 73 sized to fit chamber 69 to limit shifting of the draw bolt within the confines of said chamber for a purpose later to be described. The draw plate 70 is secured to draw bell 65 by screw members 74 and arranged within the confines of frame 8 between its plates 12 and 14. Draw plate 70 is slidably mounted on guide posts 20 which extend through bushed bores 75 and 76 in said plate and is yieldingly forced into engagement with mounting plate 12 by compression springs 77, 78 sleeved upon guide posts 20 and engaging washers 79 on said guide posts.

The described, pneumatically actuated clinching device is operated by pneumatic cylinder 11 and passed through a working cycle by each stroke of said pneumatic cylinder. Each working cycle of the clinching device includes the successive steps of shifting the supporting and clinching assembly 9 away from frame 8, arresting the movement of the supporting and clinching assembly, tilting the clinching jaws 45, 46 of the assembly into clinching position, shifting these jaws toward frame 8 and repeating all steps referred to in reverse to return the supporting and clinching assembly and its elements to starting positions.

In operation of the clinching device air under pressure is fed through pipe 81 into cylinder 26 of pneumatic cylinder 11, as indicated by arrow 80, so that the compression springs 77 are free to shift cylinder 26 and frame 24 connected thereto from Fig. 1 to Fig. 3 position, the compression springs 77 yieldingly forcing draw plate 70 of lost-motion coupling 63 against mounting plate 12 and lost-motion coupling permitting limited movement between piston 62 and frame 24. This upward movement of frame 24 is imparted to head yoke member 43 and draw bolt 35, as head yoke member 43 is yieldingly supported by frame 24 and draw bolt 35 is attached to head yoke member 43. The described upward movement of cylinder 26 and frame 24 is halted and changed to a downward movement of the piston 62 of pneumatic cylinder 11, when draw bolt 35 engages with its head member 73 the hardened plate 86 of draw plate 70. Such downward movement of piston 62 is transferred by lost-motion coupling 63 to head yoke member 43 which mounts pin 49, pivotally supporting clinching jaws 45 and 46 and which, when moved downwardly in frame 24 against springs 41, lowers the pivot support for the clinching jaws and causes their inward tilting by shifting elements 38, the heads 38' of which engage lower end portions 54, 55 of the clinching jaws. The downward movement of head yoke member 43 in addition to inward tilting of clinching jaws 45, 46 effecting curling of ear portions 83 of rail member 82 around wire 84 of spring member 85, causes near the end of the inward tilting of clinching jaws 45, 46 a setting of the clinch thus made. After the clinching operations described above, the clinching jaws 45, 46 are released and the supporting and clinching assembly and its elements are returned to starting positions by air under pressure fed into cylinder 26 through pipe 87 to repeat in reverse all movements of the supporting and clinching assembly and its elements.

Having thus described the invention, what we claim is:

1. In a pneumatically actuated clinching device a supporting frame, a clinching assembly including a housing and a clinching arrangement yieldably shiftable mounted in said housing, pneumatic cylinder means embodying a cylinder and a piston, and a lost-motion coupling connecting the piston of said pneumatic cylinder means with said clinching arrangement, the cylinder of the pneumatic piston means being rigidly connected to said housing by elongated members extended through and guided by said supporting frame and said lost-motion coupling being formed by aligned members shiftable interengaged for limited movement with respect to each other, one of said members being attached to said piston and spring-supported in said frame to yieldingly shift said member to a

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predetermined position in said frame, and the other one of said members being attached to the clinching arrangement, said pneumatic cylinder means adapted to successively effect by its coupling connection with said housing and said clinching arrangement shifting of such housing and actuation of said clinching arrangement.

2. In a pneumatically actuated clinching device a supporting frame, a clinching assembly including a housing and a clinching arrangement yieldably shiftably mounted in said housing, pneumatic cylinder means including a cylinder and a piston, and a lost-motion coupling connecting said piston with said clinching arrangement, said cylinder being rigidly connected to said housing by elongated guide rods shiftably mounted in said supporting frame, and said lost-motion coupling being formed by aligned elongated members shiftably interengaged for limited movement with respect to each other, one of said members being secured to the piston and yieldingly shiftably supported in said supporting frame to be shifted to predetermined position with respect thereto, and the other one of such members being rigidly coupled with said clinching arrangement, said pneumatic cylinder means by said coupling with the housing and the clinching arrangement being adapted to effect successively by each single stroke shifting of said housing, clinching action of said clinching arrangement and returning of housing and clinching arrangement to their starting positions.

3. A pneumatically actuated clinching device as described in claim 2, wherein said one member of the lost-motion coupling includes a guide plate shiftably mounted in said supporting frame on the guide rods connecting the cylinder of the pneumatic cylinder means with the housing of the clinching assembly, and wherein spring means arranged in said supporting frame effect yielding shifting of said guide plate to its predetermined position in the supporting frame.

4. A pneumatically actuated clinching device as described in claim 2, wherein the said one member of the lost-motion coupling includes a guide plate arranged in said supporting frame and shiftably engaged with the guide rods rigidly connecting said cylinder with said housing, and

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wherein compression springs axially aligned with said guide rods engage and yieldingly shift the said guide plate to its predetermined position in said supporting frame.

5. In a pneumatically actuated clinching device a clinching assembly including a housing, a supporting member yieldably shiftably mounted in said housing, clinching jaws pivoted to said supporting member and spring actuated means arranged in said housing and adapted to effect tilting of the clinching jaws when the supporting member is shifted in said housing, and pneumatic cylinder means for actuating said clinching assembly including a cylinder rigidly connected with said housing, a piston and a lost-motion coupling slidably connecting said piston with said supporting member to effect by actuation of said pneumatic cylinder means joint shifting of said housing and the clinching assembly and thereafter shifting of the supporting member of the clinching assembly with respect to the housing for successive gripping and clinching operations of such clinching assembly.

6. A pneumatically actuated clinching device as described in claim 5, wherein the clinching assembly is shiftably mounted on a frame including parallelly spaced plates, wherein the housing of the clinching assembly and the cylinder of the pneumatic cylinder means are secured to each other by elongated guide rods slidably extended through bores in said plates, wherein said lost-motion coupling includes shiftably interengaged members one of which includes a plate member guided by said posts, and wherein spring means yieldingly shift said plate member into engagement with one of said plates.

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