

Oct. 15, 1940.

L. C. HILL

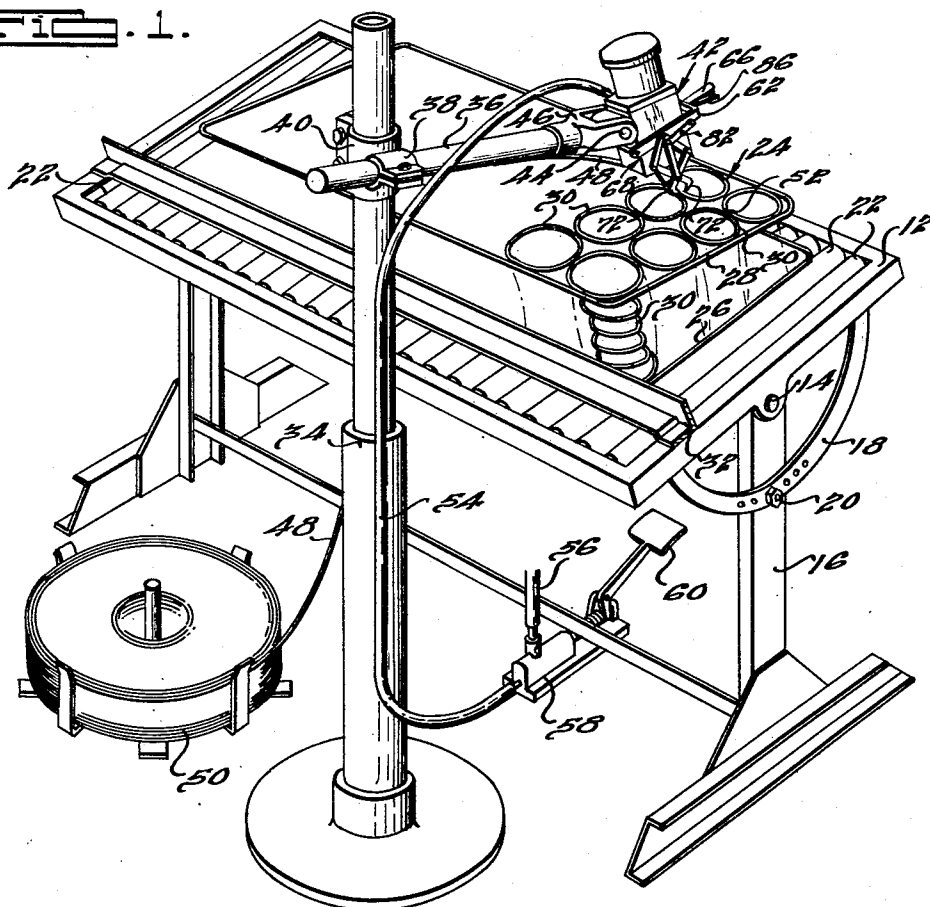
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RING CLINCHING MECHANISM

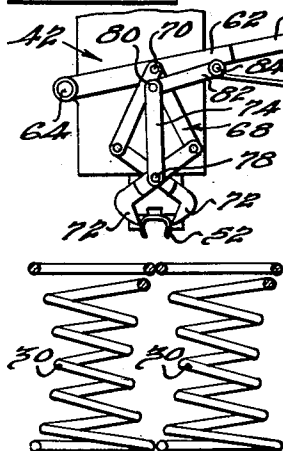
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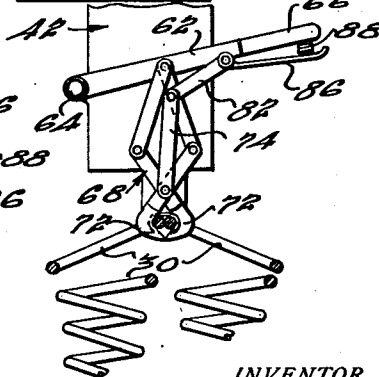
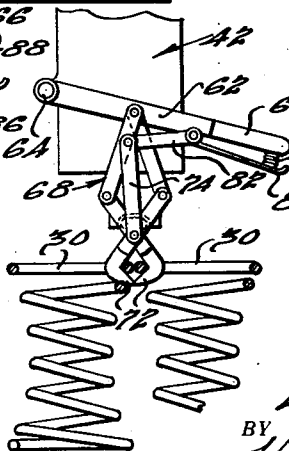
Fig. 1.



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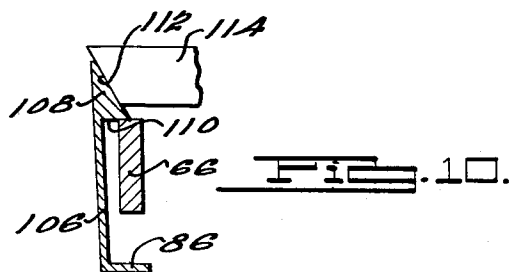
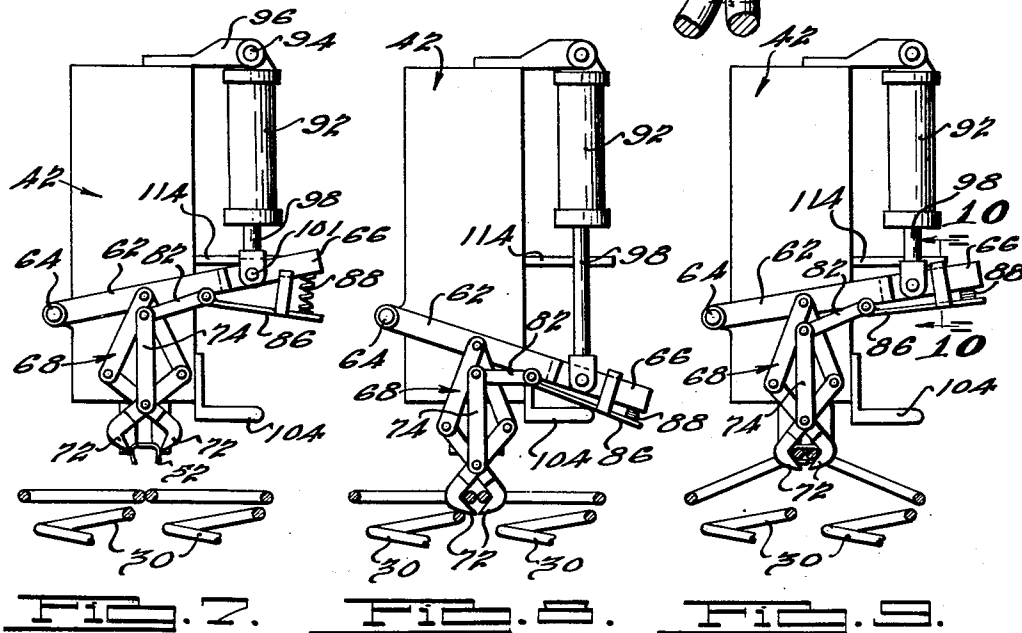
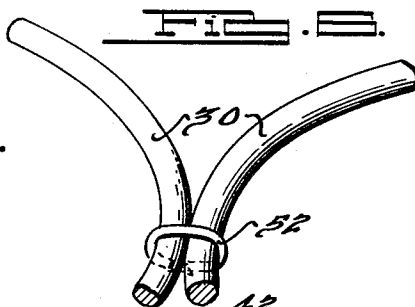
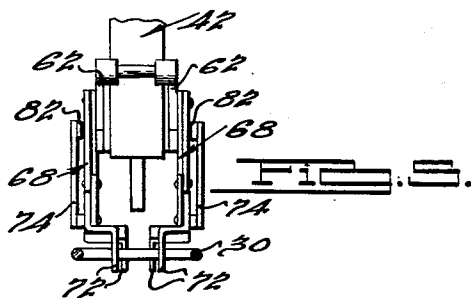
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2 Sheets-Sheet 2



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RING CLINCHING MECHANISM

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9 Claims. (Cl. 140—55)

This invention relates to ring clinching mechanism and particularly relates to ring clinching mechanism in which the elements being clinched together are moved to a position for proper engagement by the clinching elements.

One of the primary objects of the present invention is to provide a simplified mechanism by which the elements to be clinched together are raised to the position of the clinching elements, so that the relatively heavy clinching elements and the associated operating mechanism need not be lowered and raised during the clinching operation.

Another object of the present invention is the provision of a positioning mechanism in combination with a ring forming and clinching device which is simple in construction, positive in operation, and economical to manufacture.

Other objects of the invention will become apparent from the following specification, the drawings relating thereto and from the claims hereinafter set forth.

In the drawings, in which like numerals are used to designate like parts in the several views throughout:

Figure 1 is a perspective view of the mechanism of the present invention showing such mechanism in its association with a work-table having the work supported thereon;

Fig. 2 is a fragmentary side elevational view of the clinching and raising mechanism showing such mechanism in its association with the elements being clinched together;

Figs. 3 and 4 are views similar to Fig. 2 showing the parts in different operative positions;

Fig. 5 is a fragmentary front elevational view, with parts removed, of the structure illustrated in Fig. 2;

Fig. 6 is a fragmentary, perspective view illustrating the manner in which two elements are clinched together according to the present invention;

Fig. 7 is a view similar to Fig. 2 illustrating a modified form of the present invention;

Figs. 8 and 9 are views similar to Fig. 7 illustrating the parts in different operative positions; and,

Fig. 10 is an enlarged cross-sectional view taken substantially along the line 10—10 of Fig. 9.

The present invention is particularly adapted for clamping elements, such as coil springs and border elements, which go together to form spring cushion constructions. The coil springs and border elements are secured together by clinching elements, known in the art as "hog-rings", and the device for forming such rings and clinching the rings about the coil springs or other wire elements is preferably such as that disclosed in the patent to Stanley G. Smith, No. 2,145,461, issued January 31, 1939, and assigned to the as-

signee of the present invention. The device there disclosed and claimed is portable and is intended for suspension over the members which are to be secured together. During the clinching of one hog-ring the device operates to sever a length of wire which is delivered to an anvil when the jaws are retrieved from clamping the prior ring. The clinching device embodies in general a hydraulic cylinder which operates a piston to move a slide downwardly on which a pair of arms are pivotally swung. The arms bend a length of wire, previously cut and delivered to an anvil, about the anvil by a further movement of the arms. The arms then produce a clinching of the hog-ring, and the severance of another length of wire is delivered to the anvil upon the retraction of the arms and slide by the piston. During the retrieving of the piston, another length of wire is fed into the cutting dies in position to be operated on by the dies when the device is again operated.

According to the present invention the clinching elements are not moved down and up toward and from the elements being clinched, but the clinching elements are maintained in a position above the elements being clinched together and such elements are raised to the clinching device. The raising mechanism, according to the present invention, may be either hand operated or automatically operated and includes movable claws which engage the elements to be clinched together at spaced points therealong so that the hog rings may be clinched to the elements between the two points of engagement of the claws.

For a better understanding of the invention, reference may be had to the accompanying drawings and particularly to Figs. 1 to 6 thereof in which one embodiment of the present invention is illustrated. The invention includes the provision of a work supporting table 12 pivotally mounted at its ends by pivot pin 14 to standard 16. The table 12 may be pivoted about the pivot pin 14 and fixed in position by means of an arcuate member 18, at each end of the table, which is fixed to the table 12 and which has a cooperating means such as a nut and bolt 20 which extends through one of suitable openings in the arcuate member 18 and through an opening in the standard 16.

The top of the table 12 is preferably formed of a plurality of rollers 22 which are pivotally mounted at their ends to the frame of the table 12 and which serve to support a work-piece generally indicated at 24. The work-piece 24 in the present instance is a cushion construction having a lower border wire element 26 and an upper border wire element 28 having a plurality of coil springs 30 disposed therebetween and connected thereto. The cushion construction 24 may be readily moved along the table over the rollers 22.

A stop in the form of a longitudinally extending bar 32 may be suitably and preferably adjustably fixed to the top of the table 12 so that the work may not accidentally slide from the table.

5 The border wire elements 28 and 28 and the coil springs 30 are adapted to be secured together by means of hog rings, and the present invention is particularly directed to a mechanism for clamping such hog rings to the elements of the
10 spring construction.

The ring forming and punching mechanism includes a portable standard 34 having an arm 36 projecting therefrom. The arm 36 is slidably received within a clamping bracket 38 which in
15 turn is fixed to a sliding sleeve 40. The sliding sleeve 40 is adjustably mounted on the upright of the standard 34. By this structure, the arm 36 may be vertically adjusted relative to the standard 34, and the arm 36 may also be laterally ad-
20 justed within the bracket 38.

The ring forming and clamping device is generally indicated at 42 and is of the type disclosed in the above-mentioned patent of Stanley G. Smith. The device 42 is pivotally mounted by
25 pivot pins 44 on the bifurcated element 46 at the forward end of arm 36. For the details of the ring forming and punching mechanism 42, reference may be had to the patent referred to, it being understood that a continuous length of
30 wire 48 on a spool 50 is fed to the device 42. The wire 48 is severed into suitable lengths within the device 42 to form rings 52 which are clamped about adjoining portions of the elements joined
35 together. In the drawings, the structure is disclosed as clamping the upper convolutions of adjacent coil springs 30. The device 42 is hydraulically operated by means of a hydraulic feed line 54 which is fed by a line 56 through a
40 suitable valve 58. The valve 58 is operated by a treadle 60 which is normally held in its upper position and which is depressed to open the valve to thereby actuate the clinching mechanism.

The clinching mechanism, including the hog ring 52, is normally, fixedly supported at a pre-
45 determined point above the work; and, according to the present invention, the work is raised to the level of the clinching mechanism so that those portions of the coil springs being joined together are positioned within the open ring 52.
50 These elements are held in this position while the clinching takes place, during which the ring 52 is clamped about the abutting portions of the coil springs.

The lifting mechanism includes a U-shaped lever member 62 which straddles the clinching
55 device 42 so that the legs of the U-shaped member are disposed on opposite sides of the device 42. The rear end of each of the legs is pivotally connected by means of a pivot pin 64 to suitable
60 brackets on the device 42. A forwardly projecting handle 66 is fixed to the base of the U-shaped member 62 at substantially the center thereof and serves as a means by which the member 62 may be pivoted about the pin 64.

A lazy tong mechanism, generally indicated at
65 68, is disposed at each side of the member 62 and is pivotally connected thereto by means of suitable pivot pins 70. The lower ends of the lazy tong mechanisms 68 each terminate in claws
70 72 which are adapted to move toward each other as the lazy tongs are extended and thereby grab the adjacent portions of the coil springs 30 on opposite sides of that portion to which the ring
75 52 is to be clamped. The lazy tongs 68 are extended by means of a linkage member 74 pivotally

connected to the tongs at 78. The upper end of the link 74 is pivotally connected at 80 to another link member 82. The link member 82 is
5 also generally U-shaped so that the legs extend on opposite sides of the device 42 with the base
10 extending transversely thereof under the base of the lever 62. The base of the link member 82 is pivotally connected by pivot pins 84 to brackets fixed to the undersides of the U-shaped member
15 62. A forwardly extending finger member 86 is rigidly secured to the base of the link member 82 immediately under the arm 66. The finger member 86 is normally urged to its downward
20 position by means of a compression spring 88 which is disposed between the upper surface of the member 86 and the under surface of the arm 66, and the spring 88 may be fixed at its ends
25 to these two elements so that it may not become displaced. The spring 88 normally urges the finger member 86 downwardly, and as the finger
30 member 86 is rigidly connected to the link 82, the lazy tongs 68 are normally held in their upper position. By moving the finger member 86 toward the handle 66, the link member 74 is moved
35 downwardly, thus extending the lazy tongs and causing the claws 72 to move toward each other.

In operation, the handle 66 is depressed from the position shown in Fig. 2 to the position shown
40 in Fig. 3, so that the claws 72 extend around the adjacent portions of the coil springs 30 in open position. To close the claws 72, the finger member 86 is pulled upwardly, and the handle 66 is then pushed upwardly while maintaining the
45 claws 72 closed. This upward movement of the handle 66 to the position indicated in Fig. 4 disposes the portions of the coil springs 30 which are to be clinched together between the open
50 ends of the ring 52. The treadle 60 may then be actuated so that the clinching operation takes place, during which the spring 52 is clinched around the adjacent portions of the coil springs
55 30 and these elements are thus locked together. The finger 86 may then be released, in which event the claws 72 are forced apart and the coil spring elements spring back to their original
60 positions. The work may then be moved or the arm 36 readjusted so that the mechanism is in position for clinching the next succeeding hog ring by repeating the above-mentioned opera-
65 tions.

In Figs. 7 to 10, a modified form of the present
70 invention is illustrated in which the handle 66 and finger member 86 are automatically actuated to first lower the claws 72 to engaging position, then move the claws toward each other to engage
75 the adjacent coil springs 30, then lift the coil springs so that the hog rings may be clamped thereon, and then automatically release the claws so that the coil springs return to their original
80 position after the completion of the clamping operation.

Such automatic means include an air cylinder 92 pivotally mounted at 94 on a suitable bracket
85 96 which in turn is fixed to the top of the clinching device 42. The lower end of the cylinder 92 has a piston rod 98 projecting therefrom which is pivotally connected at 101 to the handle 66. The connections for applying the air under pressure
90 to the cylinder 92 are not here shown but may be of the conventional type for causing reciprocation of the piston rod 98 and may have associated therewith suitable means for supplying
95 such air to the cylinder 92 either intermittently under the periodic control of the operator or continuously.

When the piston rod 98 is in its retracted position, as shown in Fig. 7, the toggle mechanism 68 is in its raised position. Upon extension of the piston rod 98, the toggle mechanism is lowered to the position shown in Fig. 8. Stop 104 is fixed to the device 42 and extends into the path of the finger member 86, so that as the handle 66 is lowered the member 86 abuts against the stop 104. As shown in Fig. 8, the stop 104 causes upward movement of the member 86. The member 86 has a spring strip member 106 fixed thereto, the top of which is wedge shaped as indicated at 108 forming a shoulder 110. The shoulder 110 springs over the top of the handle 66, and, until released, holds the finger member 86 in its upper position and therefore maintains the claws 72 in their clamping position.

The piston rod 98 is then retracted to lift the top convolutions of the coil springs to the position shown in Fig. 9. The clamping mechanism is so timed that the hog ring 52 is clamped about the abutting portions of the coil springs 30 when the coil springs have been moved to their upper position; and the wedge shaped portion 108 of the spring member 106 then abuts against the sloping surface 112 of a stop 114 which urges the shoulder 110 out of engagement with the handle 66. The spring 88 then acts to separate the claws 72 so that the coil springs are released and return to their original position.

The above operations have been described specifically with adjacent coil springs 30, but it is of course evident from the above description that the border wire elements 26 and 28 may be similarly attached to abutting portions of the coil springs. It is also evident that the above structure is not limited to use with coil spring cushion constructions, although it has particular utility when so used, while it may be used with a variety of elements which are to be clamped together.

Formal changes may be made in the specific embodiments of the invention described without departing from the spirit and substance of the invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. In combination, a work support adapted to support a plurality of springs to be ringed together, ring clinching means disposed above said support, and movable means so constructed and arranged as to engage a pair of said springs and move them into operative position relative to said ring clinching means.

2. In combination, a work support adapted to support a plurality of springs to be ringed together, ring clinching means disposed above said support, and reciprocating means so constructed and arranged as to move downwardly into engagement with a pair of springs and then move them upwardly into operative position relative to said ring clinching means.

3. In combination, a work support adapted to support a plurality of springs to be ringed together, ring clinching means fixedly disposed at a predetermined point above said support, and movable means mounted on said ring clinching means, said movable means being so constructed and arranged as to move into engagement with a pair of springs and then move them into operative position relative to said ring clinching means.

4. In combination, a work support adapted to support a plurality of elements to be clamped together, clinching means disposed above said support, and movable lifting means mounted on said clinching means, said movable lifting means in-

cluding lazy tong mechanism, means operatively connected to said lazy tong mechanism to move said lazy tong mechanism into engagement with said elements and then move said elements into operative position relative to said clinching means.

5. In combination, a work support adapted to support a plurality of elements to be clinched together, clinching means disposed above said support, and movable lifting means mounted on said support, said lifting means including a lever pivotally mounted relative to said clinching means, a lazy tong mechanism connected to said lever, and means to extend said lazy tong mechanism into engagement with said elements, whereby upon movement in one direction of said lever said elements are moved into operative position relative to said clinching means.

6. In combination, a work support adapted to support a plurality of elements to be clamped together, clinching means disposed above said support, and lifting means mounted on said clinching means, said lifting means including a U-shaped lever member with the legs of said U-shaped member disposed on opposite sides of said clinching means and pivotally connected thereto, a lazy tong mechanism mounted on each of said legs, and means to extend said lazy tong mechanism into engagement with said elements whereby said elements are moved into operative position relative to said clinching means upon movement of said lever in one direction.

7. In combination, a work support adapted to support a plurality of elements to be clamped together, clinching means disposed above said support, and movable lifting means mounted on said clinching means, said movable lifting means including a U-shaped lever member pivotally mounted to said clinching means with the legs of said U-shaped member disposed on opposite sides of said clinching means, a handle member connected to the base of said U-shaped member, a lazy tong mechanism having claws at the end thereof connected to each of said legs, and a finger member disposed under said handle and operatively connected to said lazy tongs to extend said claws into engagement with said elements.

8. In combination, a work support adapted to support a plurality of elements to be clamped together, clinching means disposed above said support, and movable lifting means mounted on said clinching means, said movable lifting means including a lever member pivotally mounted to said clinching means, a lazy tong mechanism having claws at the ends thereof pivotally connected to said lever, means for moving said lever, and means automatically moving said claws into engagement with and out of engagement with said elements upon movement of said lever.

9. In combination, a work support adapted to support a plurality of elements to be clamped together, clinching means disposed above said support, and reciprocating lifting means mounted on said clinching means, said lifting means including a lever member pivotally connected to said clinching means, a lazy tong mechanism having claws at one end thereof connected to said lever member, linkage mechanism operatively connected to said tong and connected to said lever for movement therewith, means for reciprocating said lever, and stop means located in the path of said linkage member to automatically extend and retract said tong.