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2,605,467

HOG RING CLINCHING DEVICE

Filed Dec. 12, 1949

2 SHEETS—SHEET 1

FIG. 3A.

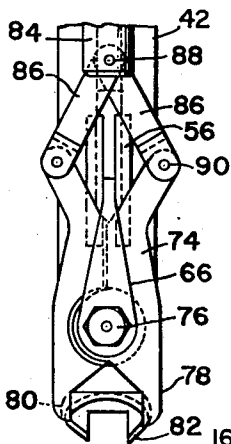


FIG. 3B.

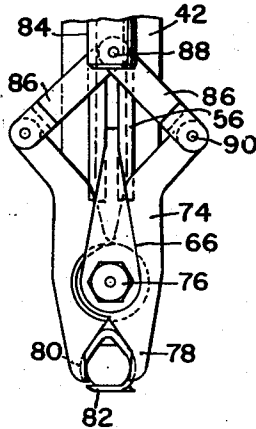


FIG. 4.

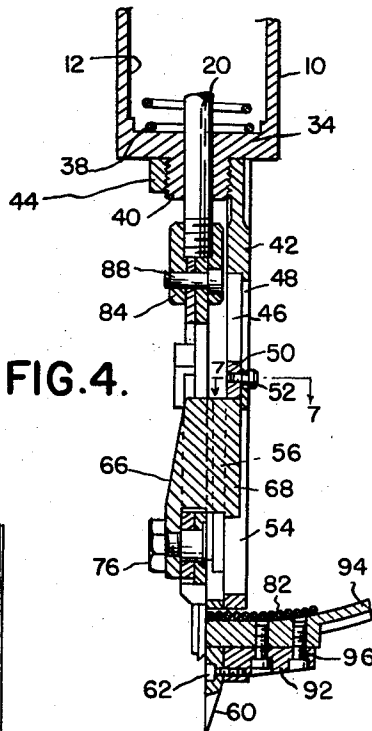
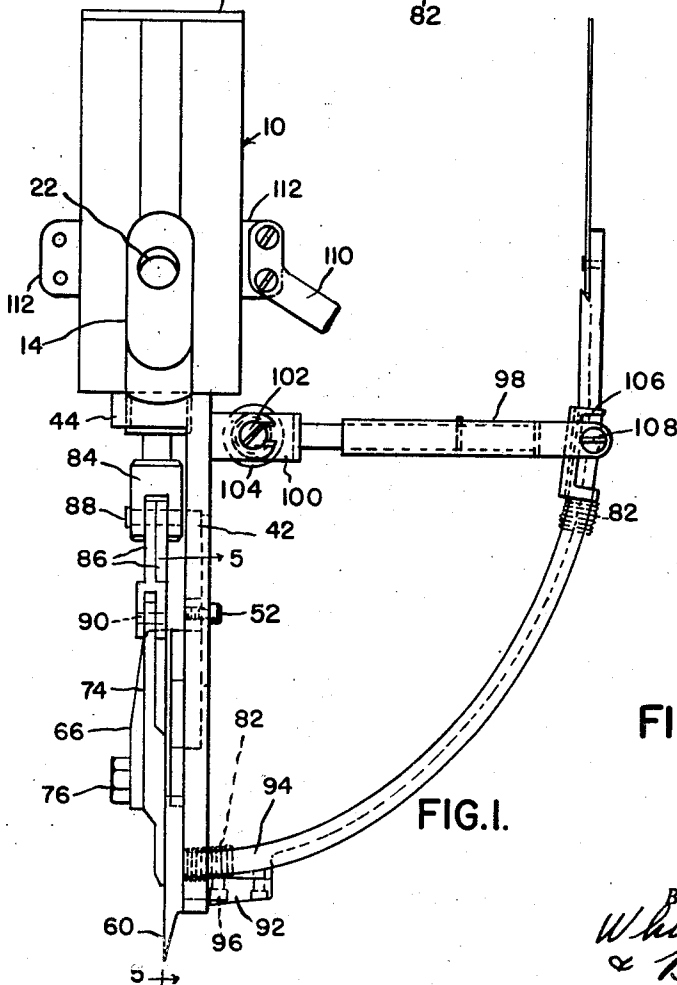
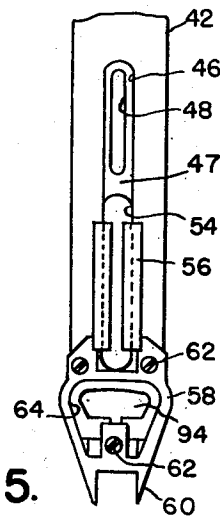


FIG. 1.

FIG. 5.



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HOG RING CLINCHING DEVICE

2 SHEETS—SHEET 2



UNITED STATES PATENT OFFICE

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HOG RING CLINCHING DEVICE

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16 Claims. (Cl. 1—187)

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The present invention relates to a hog ring clinching device.

It is an object of the present invention to provide a hog ring clinching device characterized by its simplicity, efficiency in operation, and the economy with which it may be produced.

It is a further object of the present invention to provide clinching apparatus adapted to engage a generally U-shaped clinching element, advance it into clinching position and thereafter to close the element into the form of a ring.

It is a further object of the present invention to provide a clinching apparatus having means for advancing a series of separate clinching elements into position to be engaged by a clinching mechanism.

It is a feature of the present invention to provide clinching apparatus employing a pair of clinching jaws mounted for reciprocation with and relative rocking movement about a single axis on a slidable block.

It is a further feature of the present invention to provide clinching apparatus comprising a power head, a slidable block actuated by said power head, clinching jaws pivoted about a single axis on said block, and links connected to said jaws and pivoted about a single axis on said head.

It is a further feature of the present invention to provide clinching apparatus comprising a frame provided with an elongated slot having guide rails adjacent one end of the slot, and a slidable block mounted on said guide rails and shaped to be positioned in alignment therewith by introducing the frame into the end portion of said slot beyond said guide rails.

Other objects and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawings wherein:

Figure 1 is a front elevation of the improved clinching apparatus.

Figure 2 is a plan view of the structure shown in Figure 1.

Figure 3 is a side elevation of the apparatus with parts in section.

Figure 3A is a fragmentary view similar to Figure 3 showing the parts in an intermediate position.

Figure 3B is a fragmentary view similar to Figure 3 showing the parts in the relationship which they assume upon completion of the clamping operation.

Figure 4 is a section on the line 4—4, Figure 3.

Figure 5 is a section on the line 5—5, Figure 1 with parts removed.

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Figure 6 is a section on the line 6—6, Figure 3.

Figure 7 is an enlarged section on the line 7—7, Figure 4.

Figure 8 is an enlarged fragmentary elevation showing the recess at the bottom of the clinching jaw.

Figure 9 is a section on the line 9—9, Figure 8.

Referring now to the drawings, the apparatus illustrated is designed to apply hog rings or staples to seat spring assemblies. Thus for example, the apparatus is useful in fastening burlap coverings to either the coil springs or to the wire frames of the spring assemblies. In use a series of generally C-shaped hog rings are advanced into position and are there engaged by clinching jaws which carry the hog rings into the position in which they are to be clinched. At such last position the jaws are suitably actuated to close the hog ring in clinching relation.

The apparatus comprises a casting 10 having a portion formed to provide a cylinder 12 and another portion formed to provide a pistol grip handle 14. The upper end of the cylinder 12 is closed by a removable plug 16. Located within the cylinder 12 is a piston 18 having secured thereto a piston rod 20. Means are provided for admitting air into the cylinder above the piston 18 and for exhausting air therefrom. This means comprises a drilled passage 22 extending through the pistol grip handle 14 to a valve chamber 24 which contains a suitable air valve indicated generally at 26 connected to a trigger type valve actuator 28. The valve 26 controls the flow of air and when the valve is in a position corresponding to the inner position of the trigger 28, air from a suitable external source passes through the passage 22, past the valve 26, and through an elongated drilled passage 30 and a cooperating passage 32 into the interior of the cylinder 12. The lower end of the cylinder 12 is formed with an integral closure wall 34 provided with an air escape port 36. A compression spring 38 seats against the wall 34 and bears against the underside of the piston 18, thus returning the piston to the uppermost position when the valve 26 is in position corresponding to the outermost position of the trigger 28. At this time the air passage 22 is closed and air may be exhausted from the interior of the cylinder through the passages 32 and 30 and thence outwardly past the valve.

While the details of the valve indicated generally at 26 form no part of the present invention, it may be observed that it includes a conical valve portion which is off its seat when the trigger 28 is in outer position, thus permitting air to

escape from the cylinder 12 as the piston 13 is moved upwardly by the spring 33. Air at this time flows through passages 32 and 30 to atmosphere past the conical portion of the valve. Air in passage 22 is prevented from escape by the inner part of the valve. When the trigger is pressed, the conical portion of the valve seats, and air flows from passage 22 into passage 30 and thence into the cylinder through passage 32.

The casting 10 at its lower side is provided with a threaded extension 40 to which is secured an elongated frame or support member 42, the upper portion of which is laterally offset as indicated at 44 and internally threaded to engage the extension 40. An axially extending opening is provided through the extension 40 which receives and guides the piston rod 20.

The frame 42 as best seen in Figures 4 and 5, comprises an elongated flat portion provided with a relatively deep groove or channel 46 at one side thereof, leaving a thin bottom wall 47 therein, as best seen in Figure 5. Adjacent the upper end of the channel 46 is an elongated opening 48. An adjustable stop element 50 is located in the channel 46 and is secured in adjusted position therein by a clamping screw 52 which extends through the elongated opening 48. Stop element 50 serves to limit upward movement of a slide movable vertically in groove or channel 46, and is adjustable along the channel. The lower end of the channel 46 is provided with an elongated through opening 54 and forwardly from the front of the frame 42 are provided a pair of ribs 56 best seen in Figure 6.

At its lower end the frame 42 has secured thereto a piercing element 58 having a pair of pointed projections 60 adapted to penetrate the material prior to introduction of the open clinching ring thereto. As best illustrated in Figure 5, the piercing element 58 is secured to the lower end of the frame 42 by a plurality of screws 62. The piercing element 58 is provided with a transversely extending opening 64 of a size sufficient to permit passage of open clinching rings therethrough.

Mounted on the frame 42 for vertical reciprocation is a slide 66 having a cross sectional shape best illustrated in Figure 6. The slide 66 includes a vertically extending rib 68 adapted to be received within the channel 46 in rear of the ribs 56. Forwardly of the rib 68 the slide is reduced as indicated at 70 providing a portion adapted in use to be located between the ribs 56. Forwardly of the portion 70 there are vertically extending flanges 72 adapted to engage the front surface of the ribs 56.

Mounted on the slide 66 are a pair of clinching jaw members 74. The jaw members 74 are each pivoted intermediate their ends to the slide 66, the pivot being illustrated in the figures as comprising a bolt 76. At their lower ends the jaws 74 have clinching portions 78 which are recessed at their inner surfaces as indicated at 80 to receive the end portions of an open clinching ring 82.

The piston rod 20 is provided at its lower end with a head 84 to which a pair of links 86 are pivoted on a pivot pin indicated at 88. The construction is best illustrated in Figure 1 in which the head 84 is illustrated as bifurcated and the links 86 are provided with apertured ends extending into the bifurcated head and receiving the pivot pin 88. The lower ends of the links 86 are each pivoted to the upper ends of one of the clinching jaws 74, pivot pins for this purpose being illustrated at 90.

At its lower end the frame element 42, as best

seen in Figure 4, has a rearwardly extending projection 92 to which is secured a generally curvilinear guide element 94, attaching means for the guide element being illustrated as comprising the screws 96. The forward end of the guide or supply element 94 extends through the opening 62 in the piercing element 60 as best seen in Figure 5, and provides space for the clinching rings 82 to pass therethrough.

A series of independent clinching elements 82 is mounted on the guide or supply arm 94. According to the present invention these clinching rings 82 in open condition have a generally C-shape as best illustrated in Figure 3. Furthermore, each of the clinching rings is entirely separate from the adjacent rings so that they may be fed freely into clinching position without requiring force to separate one ring from another in a series of rings.

In order to provide for feed of the rings as they are sequentially applied, a telescoping pusher or feed arm 98 is provided, this arm being pivoted to a bracket 100 by a pivot pin 102 and provided with a coil biasing spring 104 urging the pusher arm in clockwise position as seen in Figure 1, to advance the series of rings 82 toward the clinching jaws 78. At its outer end the arm 98 is provided with a pusher shoe 106 which is pivoted to the arm by pivot pins indicated at 108.

In order to load the guide or supply arm 94 the feed arm 98 is swung upwardly to free the shoe 106 from the supply arm 94. A retaining spring 110 is provided comprising spaced arms between which the feed arm 98 is received and retained in position. At this time a supply of open clinching rings may be introduced over the open end of the supply arm 94. Thereafter, the shoe 106 is introduced over the upper end of the supply arm and the action of the spring 104 urges the arm and shoe in a direction to push the assembly of rings toward the clinching jaws. It is contemplated that the tool may be reversed if used by a left handed operator and accordingly, the casting 10 is provided with lugs 112 at both sides thereof to which the retaining springs 110 may be secured as desired.

The slide 66 and the support 42 are designed to facilitate assembly of the structure. In order to assemble the slide 66 on the support 42, the stop 50 is moved upwardly in the slot 48. Thereafter, the rearwardly extending rib 68 of the slide is introduced into the channel 46 above the upper ends of the ribs 56, then moved downwardly to engage the rib 68 behind the ribs 56 provided on the support 42. Thereafter the stop 50 may be adjusted downwardly and locked in proper position by the screw 52.

In use the hand tool is manipulated by the operator to cause the pointed projections 60 to pierce the material to be clinched. Thereafter the trigger 28 is pushed admitting air into the cylinder 12 above the piston 13. Downward motion of the piston 13 results in corresponding downward motion of the slide 66, force being applied from the piston head 84 to the slide through the links 86 and the clinching jaw members 74. At this time an open clinching ring 82 is in position between the clinching ends 78 of the jaws and will effectively prevent closing of the jaws during initial movement of the slide 66. Continued downward movement of the slide 66 results in the rib 68 thereof engaging the bottom of the opening 54 provided through the support 42. This also arrests further downward movement of the slide 66. Thereafter further

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downward movement of the piston 18 moves head 84 which results in rocking the upper ends of the jaw members 74 outwardly and a corresponding inward rocking movement of the lower clinching ends thereof, which closes the clinching ring 82. Clinching movement of the jaws is terminated by engagement between the head 84 and the upper ends of the ribs 56 provided at the forward side of the support 42, which condition is illustrated in Figure 3B.

Release of the trigger 23 cuts off the supply of air to the interior of the cylinder 12 and permits escape of air therefrom to atmosphere. At this time the spring 38 returns the piston 18 upwardly which draws the slide 66 upwardly until the rearwardly projecting rib 68 thereon engages the adjustable stop 50. Further upward movement of the piston results in opening the jaws to their position shown in Figure 3. Also, depending upon the resistance to motion offered by the pivot parts, the jaws may open before the slide 66 moves upwardly. In any event, the parts come to rest as illustrated in the several figures.

The inner surfaces of the jaws 74 above the ring receiving recesses 82 are smooth and during downward movement of the jaws relative to the frame 42, these surfaces engage the foremost one of the rings 82. When the slide reaches its uppermost position, the recesses 80 register with the openings 62 and the foremost ring of the series on the supply arm 94 advances into the recesses 80 thus preparing the apparatus for the succeeding operation.

It will be apparent that the present apparatus is adapted to apply and clinch hog rings with extreme simplicity, accuracy, and rapidity. The provision of a single pivot point for both the clinching jaw members 74 and for the links 83 increases the effectiveness of the apparatus, while at the same time keeping its overall dimensions within reasonable limits. By this construction relatively great force is available for clinching the hog rings due to the toggle arrangement between the links and the upper ends of the jaw members.

Moreover, the construction is characterized by its extreme simplicity and the few number of parts required. Assembly of the parts into the operating apparatus is facilitated by a particular design which permits introduction of the slide into the guide ways provided by the ribs 56 on the supporting frame 42 and accidental removal of the slide 66 is prevented by the provision of the adjustable stop 50.

The drawings and the foregoing specification constitute a description of the improved hog ring clinching device in such full, clear, concise and exact terms as to enable any person skilled in the art to practice the invention, the scope of which is indicated by the appended claims.

What we claim as our invention is:

1. A clinching device comprising a frame having a slideway thereon, a slide slidable on said slideway, an abutment on said frame limiting movement of said slide in one direction, a pair of jaws pivoted to said slide, a power actuator movable on said frame longitudinally of said slideway, each of said jaws having a rigid arm extending toward said actuator, a pair of links connecting said actuator to said arms, said links being connected to said arms such that motion of said actuator in one direction establishes forces through said links tending to move said slide toward said abutment and such that motion

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of said actuator in said one direction tends to rock said jaws in closing relation, said jaws having portions shaped to receive an open C-shaped ring therebetween in position to oppose closing of said jaws, initial movement of said actuator in said one direction thereby moving said slide against said abutment, and further movement of said actuator thereafter forcing said jaws in closing direction to clinch the C-shaped ring, said arms and links arranged to form toggles which provide increasing mechanical advantage during closure of said jaws.

2. A clinching device as defined in claim 1 in which said frame carries a second abutment limiting movement of said slide in the opposite direction, whereby reverse movement of said actuator moves said slide into engagement with said second abutment to insure full opening movement of said jaws.

3. A clinching device as defined in claim 2 comprising means for carrying a series of open C-shaped rings, and means for advancing an open C-shaped ring into position between said jaws as said actuator completes its reverse movement.

4. In a clinching device, a frame having an elongated channel therein, inwardly extending guide rails adjacent one end of the channel, the other end of the channel being wider than the space between said rails, a slide having grooves in opposite sides for receiving said rails and supporting said slide in slidable relation longitudinally of the channel in said frame, the grooved portion of said slide being movable into the channel to position said grooves in alignment with said rails, clinch jaws pivoted to said slide, and linkage mechanism connected to said jaws for reciprocating said slide and pivoting said jaws.

5. In a clinching device, a frame comprising a plate having an elongated channel therein, a pair of rails extending forwardly from said plate and inwardly of the channel, one end of said rails being adjacent one end of the channel and the opposite end of said rails being intermediate the ends of the channel, a first abutment intermediate said rails at the said one end thereof, an elongated slot in said channel adjacent the other end thereof, a second abutment in said channel having clamping means extending through said slot, means for adjusting said second abutment longitudinally of said slot, a slide having a portion movable in the channel of said frame, grooves in said slide slidably receiving said rails, clinching jaws on said slide, an actuator for said jaws comprising a head movable parallel to the slot in said frame, links connecting said head and jaws, means to move said slide between said first and second abutments, said rails being in the path of movement of said head, the ends of said rails constituting a stop for limiting movement of said head in one direction.

6. In a clinching device of the class described, a slide mounted for reciprocation, a stop in the path of movement of said slide, a pair of clinching jaws, a single pivot support on said slide for mounting both of said jaws intermediate their ends for rocking movement, a head spaced from said slide, means for reciprocating said head in the path of movement of said slide, a pair of links pivoted concentrically to said head at one end and pivotally connected to the upper end of said jaws at the other end.

7. In a clinching device of the class described,

a slide mounted for reciprocation, a first stop in the path of movement of said slide, a pair of clinching jaws, a single pivot support on said slide for mounting both of said jaws intermediate their ends for rocking movement, a head spaced from said slide, means for reciprocating said head in the path of movement of said slide, a pair of links pivoted concentrically to said head at one end and pivotally connected to the upper end of said jaws at the other end, a second stop in the path of movement of said head positioned to limit movement of said head to a predetermined amount after arrest of said slide by engagement with said first stop.

8. A clinching device comprising a frame having an elongated channel at one side thereof, said channel having a bottom wall adjacent one end thereof, parallel ribs adjacent the other end of said recess extending forwardly of said frame and inwardly of said channel so as to partially overlie the front of said channel, said ribs being parallel to said channel, said bottom wall having an elongated slot therethrough, a stop element slidable in said channel for adjustment to different positions, a clamping member carried by said stop element and extending through said slot, a slide having a rib slidable longitudinally in said channel and a reduced portion received between the ribs of said frame, the rib of said slide being movable into said channel beyond the ends of the ribs of said frame, clinching arms on said slide, and toggle mechanism for actuating said arms.

9. A clinching device comprising a frame having an elongated channel at one side thereof, guide ribs partially overlying said channel adjacent one end thereof, said channel having a bottom wall adjacent the other end thereof, a stop element mounted in said channel adjacent said other end thereof for adjustment longitudinally of said channel, clamping means carried by said stop element, said wall having a slot through which said clamping means extend, a slide having an elongated rib movable into said channel at the said other end thereof, and movable longitudinally of said channel into position behind the ribs of said frame, said stop serving as an adjustable abutment to limit movement of said slide relative to said frame in one direction, clinching jaws on said slide, and toggle mechanism for actuating said jaws.

10. A clinching device comprising a frame having an elongated channel at one side thereof, guide ribs partially overlying said channel adjacent one end thereof, said channel having a bottom wall adjacent the other end thereof, a stop element mounted in said recess adjacent said other end thereof for adjustment longitudinally of said channel, clamping means carried by said stop element, said wall having a slot through which said clamping means extend, a slide having an elongated rib movable into said channel at the said other end thereof, and movable longitudinally of said channel into position behind the ribs of said frame, said stop serving as an adjustable abutment to limit movement of said slide relative to said frame in one direction, the said one end of said channel serving as a stop to limit movement of said slide in the other direction, clinching jaws on said slide, and toggle mechanism for actuating said jaws.

11. A clinching device comprising a frame having an elongated channel at one side thereof, guide ribs partially overlying said channel adjacent one end thereof, said channel having a

bottom wall adjacent the other end thereof, a stop element mounted in said channel adjacent said other end thereof for adjustment longitudinally of said channel, clamping means carried by said stop element, said wall having a slot through which said clamping means extend, a slide having an elongated rib movable into said channel at the said other end thereof, and movable longitudinally of said channel into position behind the ribs of said frame, said slide having flanges engageable with the front surfaces of the ribs on said frame, said stop serving as an adjustable abutment to limit movement of said slide relative to said frame in one direction, clinching jaws on said slide, and toggle mechanism for actuating said jaws.

12. A clinching device comprising a frame having an elongated channel at one side thereof, guide ribs partially overlying said channel adjacent one end thereof, said channel having a bottom wall adjacent the other end thereof, a stop element mounted in said channel adjacent said other end thereof for adjustment longitudinally of said channel, clamping means carried by said stop element, said wall having a slot through which said clamping means extend, a slide having an elongated rib movable into said channel at the said other end thereof, and movable longitudinally of said channel into position behind the ribs of said frame, said stop serving as an adjustable abutment to limit movement of said slide relative to said frame in one direction, the said one end of said channel serving as a stop to limit movement of said slide in the other direction, clinching jaws on said slide, and toggle mechanism for actuating said jaws, said toggle mechanism comprising a movable head, links interconnecting said head and said jaws, the ends of said guide ribs intermediate the ends of said channel being located in the path of movement of said head to limit movement of said head in one direction.

13. A clinching device comprising a frame, a slideway on said frame, a slide slidable on said slideway, abutments on said frame limiting movement of said slide in both directions, a pair of levers pivoted intermediate their ends to said slide, each of said levers having a clinching jaw at one end thereof, a power actuating member movable on said frame parallel to said slideway, a pair of links, a single pivot means connecting said links at one end to said member and pivot means pivotally connecting said links at their other ends to the ends of said levers remote from the jaws thereon, the pivot connections between said links and levers being disposed laterally from the path of movement of said actuating member, said links and levers constituting the driving connection between said actuating member and said slide whereby the resistance to closing movement of said jaws provided by an open clinching element therebetween prevents closure of said jaws and results in motion of said slide upon movement of said actuator member in jaw closing direction until said slide is moved into engagement with one of said abutments, and thereafter closes said jaws.

14. A clinching device comprising a frame, a slideway on said frame, a slide slidable on said slideway, abutments on said frame engageable by said slide to limit its movement in said slideway, a pair of levers, single pivot means on said slide mounting both of said levers for swinging movement about an axis intermediate their ends, each of said levers having a clinching jaw at one

end thereof, a power actuator movable on said frame longitudinally of said slideway, toggle links connecting said actuator to the ends of said levers remote from said jaws, first pivot connections between said actuator and one end of said links and second pivot connections between the other ends of said links and the ends of said levers remote from said jaws, said second pivot connections being located outwardly from the path of movement of said actuator with respect to said first pivot connections such that movement of said actuator toward said slide tends to rotate said levers in clinching relation.

15. A clinching device comprising a frame, a vertical slideway on said frame, a slide slidable vertically on said slideway, abutments on said frame engageable with said slide to limit its motion in said slideway between an upper position and a lower clinching position, a pair of levers, a single lever pivot means on said slide mounting both of said levers for swinging movement about an axis intermediate their ends, clinching jaws at the lower ends of said levers, a power actuator on said frame directly above said lever pivot means and movable vertically thereon, the upper ends of said levers extending upwardly and outwardly from said lever pivot means, a pair of links pivoted at their lower ends to the upper ends of said levers, single link pivot means pivotally connecting the upper ends of both of said links to said actuator, said link pivot means being disposed directly above said lever pivot means, said links extending downwardly and outwardly from said link pivot means, whereby downward movement of said actuator applies forces through said links tending to rock said levers and to cause downward motion of said slide.

16. In a clinching device, a pair of clinching jaws, a frame on which said jaws are mounted for sliding movement in separated position to carry an open hog ring into clinching position and for rocking movement to move said jaws toward each other to clinch the ring, a slideway on said frame, a slide movable along said slideway, a pair of levers on said slide, a single pivot on said slide supporting both of said levers for

swinging movement about the axis of said pivot intermediate the ends of said levers, one of said jaws being carried at one end of each of said levers, a power actuator on said frame movable parallel to said slideway beyond one end thereof, the ends of said levers remote from said jaws extending toward said actuator and diverging outwardly from their pivot axis, a pair of links pivoted to the ends of said levers nearer to said actuator, said links converging inwardly from the points of connection with said levers, a single pivot on said actuator connecting both of said links thereto, said links and levers constituting the sole connection between said slide and said actuator, an abutment on said frame limiting sliding motion of said slide in the direction away from said actuator, the aforesaid disposition of said links being effective to apply a force to said levers upon movement of said actuator toward said slide tending to rock said levers in a direction to move said jaws toward each other, the aforesaid disposition of said links and levers being effective to apply a force tending to move said slide along said slideway toward said abutment upon movement of said actuator toward said slide, said jaws being shaped to receive an open hog ring when in separated position which prevents rocking of said jaws into clinching relation upon movement of said actuator toward said slide until movement of said slide is arrested by engagement of said slide with said abutment.

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