

July 16, 1940.

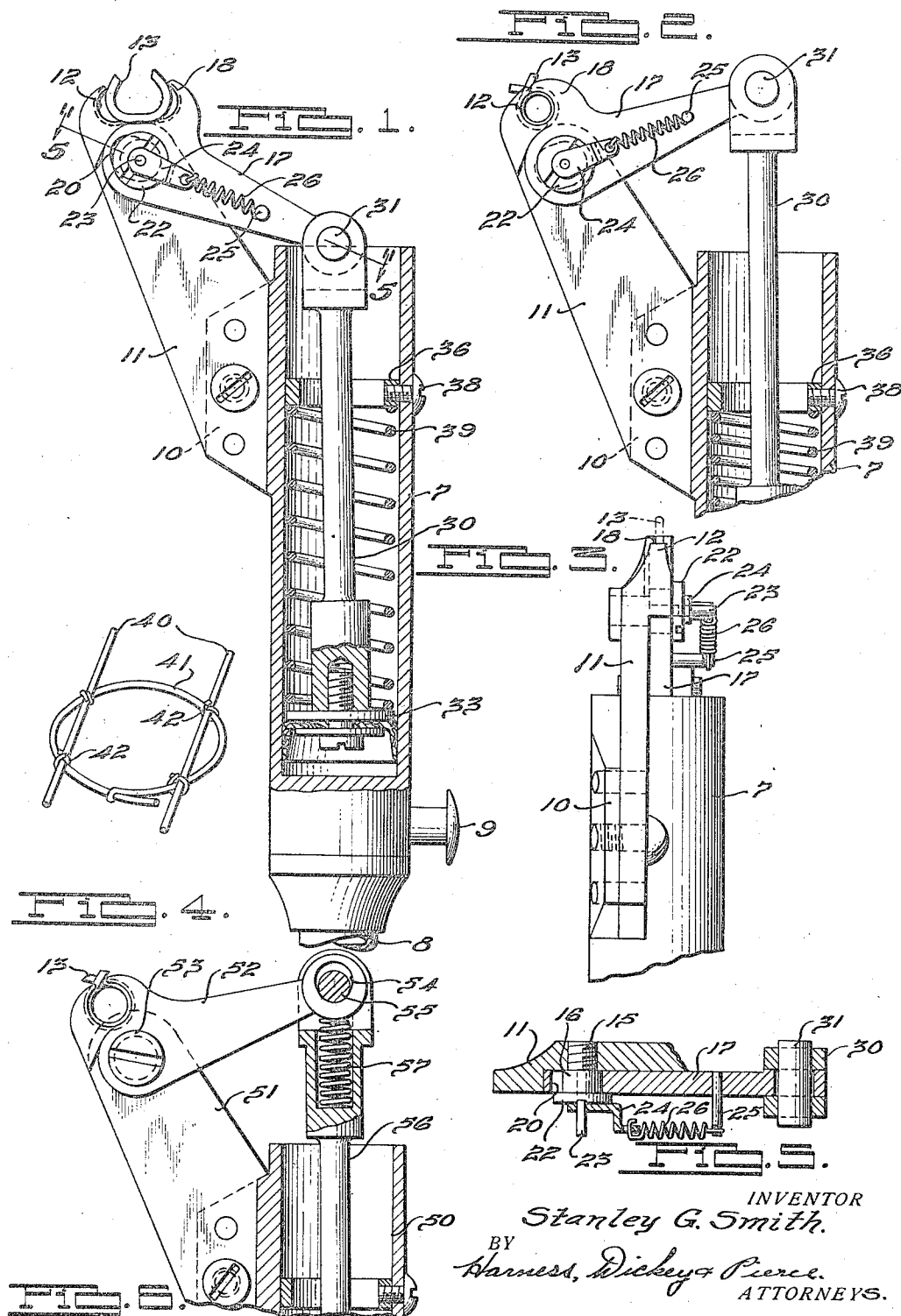
S. G. SMITH

2,208,058

RING CLINCHING MECHANISM

Filed June 12, 1937

2 Sheets-Sheet 1



July 16, 1940.

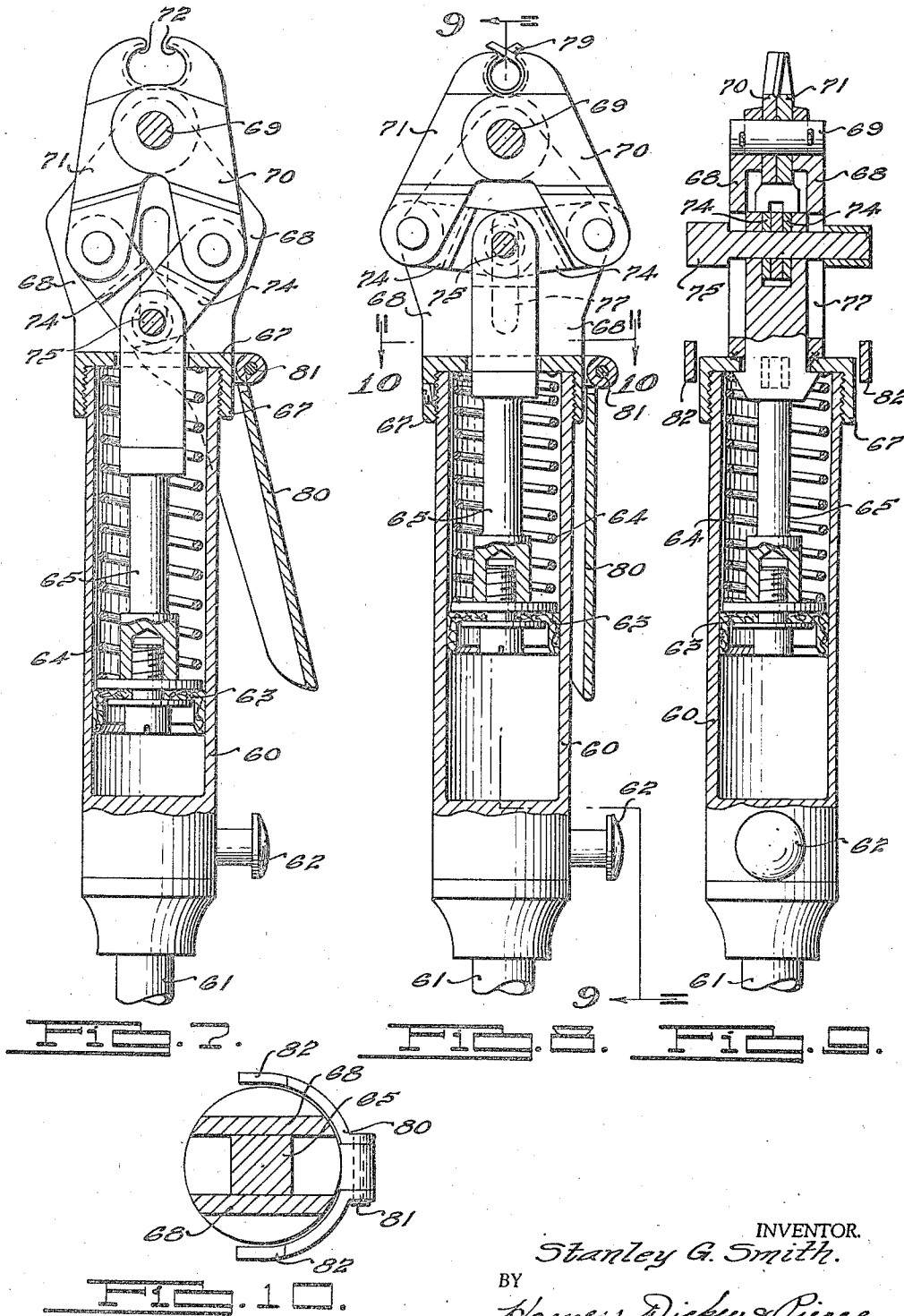
S. G. SMITH

2,208,058

RING CLINCHING MECHANISM

Filed June 12, 1937

2 Sheets-Sheet 2



INVENTOR.
Stanley G. Smith.
 BY
Harnes, Dickey & Pierce.
 ATTORNEYS.

UNITED STATES PATENT OFFICE

2,208,058

RING CLINCHING MECHANISM

Stanley G. Smith, Detroit, Mich., assignor to The
Murray Corporation of America, Detroit, Mich.,
a corporation of Delaware

Application June 12, 1937, Serial No. 147,926

5 Claims. (Cl. 140—55)

This invention relates to an apparatus for clinching rings. More particularly, it relates to a pneumatically operated pair of jaws primarily intended for use in connection with a machine for automatically clinching open ended rings to closed position.

The type of rings with which the improved mechanism of the present invention is adapted to be used, generally comprises a relatively short section of wire which has been preformed to provide a structure of substantially U-shape. This wire member is inserted between the jaws and upon the closing of the jaws, the wire member is deformed to move the ends of the wire member past each other to close the ring.

In its broad aspect, the invention is primarily concerned with the provision of a simple, efficient, and conveniently operated device for clinching U-shaped wire members to form rings and has for its principal object the provision of a construction in which the jaws, when in their open position, readily receive a ring and, in addition, means for retaining the jaws in partially closed condition to retain the ring in seated position therebetween prior to the additional clinching operation.

More specifically, it is an object of the present invention to provide a jaw structure for apparatus of this general type in which a lost motion connection is provided between the jaws which lost motion connection serves automatically to resiliently urge the jaws into partially closed condition in order that when a section of preformed wire is inserted between the jaws this wire member will automatically be retained in position therebetween prior to the time the jaws are actuated to clinch the same.

Still another object of the present invention consists of the provision of a lost motion connection having the function described above, which lost motion connection is associated with the pivotal connection between the jaws.

The present invention contemplates the provision of a cylinder on one side of which is rigidly mounted a fixed jaw member, a movable jaw member is pivotally connected to said fixed jaw member in co-operative relation therewith and one end of the movable jaw member is pivotally connected to the actuating rod of a piston disposed within said cylinder. A lost motion connection is provided between the piston rod and the movable jaw which serves at all times to resiliently urge the jaws into partially closed condition and it will be appreciated that the actuation of the piston rod serves to clinch a ring

which may be disposed between the jaws and resiliently retained therebetween.

Many other and further objects, advantages, and features of the present invention will become clearly apparent from the following specification when considered in connection with the accompanying drawings forming a part thereof.

In the drawings:

Figure 1 is a fragmentary sectional view of one form of the improved ring clinching mechanism illustrating the same with the jaws in open position and having a ring to be clinched disposed therebetween;

Fig. 2 is a fragmentary sectional view similar to Fig. 1, illustrating the apparatus shown in Fig. 1 with the jaws in closed position showing the manner in which the ring is clinched;

Fig. 3 is a fragmentary side elevational view of the ring clinching mechanism illustrated in Figs. 1 and 2;

Fig. 4 is a fragmentary perspective view of portions of a seat cushion illustrating one particularly advantageous use for the mechanism of the present invention;

Fig. 5 is a transversely sectional view taken substantially on the line 5—5 of Fig. 1 illustrating the pivotal connection between the jaw members and the lost motion connection for resiliently urging the jaw members into partially closed position.

Fig. 6 is a fragmentary sectional view of a modified form of the invention embodying a modified form of lost motion connection.

Fig. 7 is an elevational view with parts in section of a modified form of the tool of the present invention illustrating the same with the jaws in the extreme open position.

Fig. 8 is an elevational view similar to Fig. 7 showing the tool with the jaws moved to closed or clinching position.

Fig. 9 is a vertical sectional view taken substantially on the line 9—9 of Fig. 8 illustrating the construction and arrangement of parts of the improved modified form of the tool.

Fig. 10 is a transverse sectional view taken substantially on the line 10—10 of Fig. 8 illustrating in detail the mechanism for moving the jaws to engage an inserted ring to be clinched.

With more particular reference to the drawings, it will be appreciated that the mechanism of the present invention includes merely the pivotally connected jaws and the piston and cylinder for actuating the same. It will be readily appreciated that this mechanism will find particular adaptability in automatic machines in

which the rings are automatically preformed and automatically fitted into position between the jaws in response to actuation of the jaws. However, the present invention is primarily directed to the novel jaw and jaw actuating mechanism and it is immaterial as far as the present invention is concerned what specific type of apparatus is utilized in connection therewith.

The specific embodiment of the invention shown includes a cylinder 7, which is open at its upper end which may be supplied with a fluid under pressure by means of a suitable conduit 8, communicating with the lower end thereof, the supply of fluid being conveniently controlled by valve 9. The exterior wall of the cylinder has preferably formed integrally therewith a radially and axially extending flange 10, to which is rigidly secured a stationary jaw member 11. The upper end of the jaw member 11 is recessed to provide a concave face 12, adapted to engage one side of a preformed wire member 13, which when squeezed will automatically be bent into substantially circular form with overlapping ends. Rings of this general type have long been used for many and various purposes and the specific form and structure of the element operated on by the jaw forms no part of the present invention. A pivot pin has one end 15 threadably received by a suitable aperture adjacent the upper end of the jaw member 11 to mount the pivot pin in rigid position with respect to this jaw. The central portion of the pivot pin is enlarged to provide a substantially cylindrical jaw receiving pivot 16 for a movable arm 17, which arm is provided with a concave recessed face 18, adapted to co-operate with the recessed face 12 of the jaw member 11.

The jaw member 17 is provided with a slot 20 in the body portion thereof which slot is of sufficient width to closely engage the cylindrical portion 16 of the pivot pin and is of a length slightly greater than the diameter of this portion of the pivot pin. The pivot pin is provided with a shouldered portion 22, adapted to maintain the jaw members in assembled pivotally connected relation and has projecting therefrom an axial extension 23 which serves to mount an offset arm 24. An upstanding pin 25 is rigidly mounted in the arm 17 and a small tension coil spring 26 serves to interconnect the pin 25 and the arm 24 which spring it will be seen normally serves to retain the inner end of the slot 20 in engagement with the cylindrical pivot portion of the pivot pin and resiliently urge the jaws into partially closed position.

The extreme end of the arm 17 is adapted to enter between the bifurcated upper end of a piston rod 30 and these two members are pivotally connected together by means of a suitable transversely extending pin 31. The lower end of the piston rod 30 is preferably connected to a piston 33 which is adapted for reciprocal movement with the cylinder 7. Adjacent the upper end of the cylinder a collar 36 is preferably rigidly retained interiorly thereof by means of a screw 38, which collar serves to provide an abutment for the upper end of a compression coil spring 39 the lower end of which seats upon the upper surface of the piston 33 and it will be seen that this spring serves to normally retain the piston 33 in the lower end of the cylinder and consequently retain the jaws in substantially open position.

The lost motion connection provided by slot 20 in the arm 17 and the tension coil spring 26 which interconnects the arm 17 with the pivot

pin serves to resiliently urge the jaws toward partially closed condition. The force exerted by this spring is relatively light and consequently when an open ring such as 13 is inserted between the jaws the jaws may be partially opened and the spring will urge the jaws into engagement with the open ring 13 with sufficient force so that the open ring will not be deformed but will be firmly retained in position between the jaws.

When the valve 9 is opened, fluid under pressure may be admitted to the interior of the cylinder, causing upward movement of the piston 33 therein which movement will first serve to move the jaw member 17 sufficiently far so that the outer end of the slot 20 will engage the surface of the pivot pin the while retaining the open ring 13 resiliently seated between the jaws. Further upward movement of the piston will serve to close the jaws, consequently moving the ends of the open ring 13 into overlapping relation, thus clinching the same in substantially the manner shown in Figure 2.

While it will be apparent that the mechanism of the present invention will find broad and practical utility in many and various different fields, the mechanism of the present invention was designed primarily for use in connection with machines for assembling coil spring constructions of the general type illustrated in the fragmentary view of Figure 4. In this type of construction, a seat may be made up of a plurality of transversely extending wires 40, disposed in substantially spaced parallel relation. In constructions of this general character, it is usually desired to secure one end of a coil spring 41 to these wires. This may be conveniently accomplished by clinching rings 42 around the top convolution of the spring 41 and around one of the transversely extending wires 40 thus locking the members in assembled relation.

The lost motion connection afforded by the slotted movable arm 17 is extremely important, inasmuch as it provides convenient means for firmly retaining an open ring in position between the jaws prior to the time the ring is clinched.

In the modified form of the invention, illustrated in Fig. 6 of the drawings, the function of the apparatus shown, is substantially the same as that described in connection with the preferred embodiment of the invention shown in Figs. 1 to 5 inclusive. In this form of the invention, a cylinder 50 is provided substantially identical in construction with cylinder 7 described above and which has secured thereto a fixed jaw member 51 to which is pivotally connected a movable jaw member 52 by means of a pin 53. The inner end of the jaw member 52 is provided with a slot 54 and its end adapted to receive a transversely extending pin 55 interconnecting the bifurcated end of a piston rod 56, the upper end of the piston rod 56 may be provided with a bore in which is housed a compression coil spring 57 which is confined at one end by the lower end of the bore and at the other end by the inner end of the movable arm 52, consequently serving to resiliently maintain the lower end of the slot 54 in engagement with the pin 55 providing a lost motion connection which is substantially similar in function to the lost motion connection described above in connection with the preferred embodiment of the invention.

It will be clear that when the jaws are in open position, an open ended ring may be in-

served therebetween and the coil spring 57 will serve to normally urge the jaws towards partially closed position, thus resiliently retaining the open ended ring in position between the jaws.

5 Likewise, it will be apparent that when fluid pressure is admitted to the cylinder an upward movement of the piston rod 56 will take place serving to move the jaws 51 and 52 to closed position thus clinching the ring therebetween.

10 In Figs. 7 to 10, inclusive, a still further modified form of the invention is illustrated in which a tool is provided of somewhat different construction but yet at the same time embodying the same generic improvements found in connection with the preferred embodiments of the invention described above.

15 The modified form of tool shown in Figs. 7 to 10, inclusive, comprises a cylinder 60 to which fluid under pressure will be supplied by means of a conduit 61. The supply of such fluid pressure and the bleeding of the cylinder are controlled by means of a conventional plunger valve 62. A piston 63 is mounted within the cylinder and is urged to an extreme downward position of movement by means of a compression coil spring 64. The piston 63 has a piston rod 65 connected therewith which piston rod extends upwardly and out through the upper end of the cylinder. The upper end of the cylinder 60 is preferably closed by a cap member 67 which serves to support a pair of rigidly mounted jaw supporting members 68 which together provide means for mounting a transverse pin 69 on which a pair of jaws 70 and 71 are mounted for rotation. The jaws 70 and 71 have recesses 72 in their faces adapted to receive a U-shaped wire member which, when the jaws are closed, will be deformed into a ring in substantially the manner set forth above in connection with the preferred embodiment of the invention. The members 70 and 71 extend downwardly a substantial distance below their pivotal mounting 68 and each have a toggle link 74 pivotally connected to their lower ends. These toggle links 74 are pivotally connected together and to the upper end of the piston rod 65 by means of a relatively long transversely extending pin 75 which, as is clearly seen in Fig. 9, extends a substantial distance laterally from the toggle links 50 and piston rod and projects through suitable vertically disposed slots 77 formed in the support members 68. The slots 77 serve to guide the piston rod during vertical movement and also serve the purpose of insuring positive equal movement of the jaw members. The slots 77 serve the further purpose of limiting the movement of the jaw members throughout a predetermined range.

60 The parts of the apparatus are preferably proportioned in such a manner that when the pin 75 is moved to a position adjacent the upper end of the slot, the jaws will close sufficiently to clinch a wire member 79 sufficiently so that its ends overlap and it may serve the purpose for which it is intended. When fluid pressure is bled from the cylinder 60, the piston 63 will move downwardly therein urged by the spring 64 until the transverse pin 75 comes in contact with the lower end of the slots 77 thereby limiting the opening movement of the jaws to a predetermined maximum. This maximum opening movement is preferably sufficient to permit the insertion of a predetermined wire member between the jaws.

75 A hand lever 80 is pivotally connected by means

of a pin 81 to the cap member 67 of the cylinder and as is clearly seen in Figs. 9 and 10, this hand member 80 is provided with a pair of lugs or ears 82 adapted to engage the underside of the transverse pin 75 so that when the pin is in the extreme downward position of movement, the hand lever 80 may be moved inwardly toward the cylinder 60 thus closing the jaws sufficiently to positively retain a wire member to be clinched therebetween.

10 In the operation of the device, it will be apparent that after the jaws have been moved to the extreme open position shown in Fig. 7, a wire member to be clinched may be inserted between the jaws which are at this time in sufficiently open position to permit easy insertion of the wire member to be clinched. The hand lever 80 may then be moved toward the cylinder sufficiently to lock the wire member in position between the jaws without clinching the same. The tool may then be used to position the wire member to be clinched adjacent the parts to be connected thereby and the plunger 62 depressed to supply fluid under pressure to the cylinder 60 in order that the clinching operation will be effected by means of this fluid pressure.

15 It will be readily apparent that the inventive principles embodied in this modified form of the invention are substantially similar to those disclosed in connection with the preferred form of the invention described above in that in both instances means are provided for positively positioning a wire member to be clinched between the jaws and, in addition, means for positively retaining the member to be clinched between the jaws prior to and independent of the actual clinching operation.

20 It will be readily understood that the specific embodiments of the invention illustrated in the accompanying drawings and described above are merely illustrative of the generic inventive concept presented in this application. Many other and further modifications thereof falling within the scope of the invention as defined in the subjoined claims will become clearly apparent to those skilled in the art.

What I claim is:

1. Apparatus of the class described including in combination a pair of pivotally connected jaws, means for closing said jaws, means providing a lost motion connection associated with said closing means, and a spring to resiliently urge said jaws to partially closed position.

2. Apparatus of the class described including in combination a pair of pivotally connected jaws, positively actuated reciprocable means for closing said jaws, means providing a lost motion connection between said means and said jaws, and a spring serving to resiliently urge said jaws to partially closed position.

3. Apparatus of the class described including in combination a fixed jaw, a pivot pin carried thereby normal to the plane of movement of said jaw, a movable jaw having a slot therein adapted to receive said pivot pin to establish a pivotal connection between said pair of jaws which are in aligned relation, and resilient means interconnecting said movable jaw and said pivot pin to resiliently urge said jaws to partially closed position.

4. Apparatus of the class described including in combination a fixed jaw, a movable jaw aligned therewith and pivotally connected thereto and having a slot therein, a rod for actuating said movable jaw connected thereto by means of a pin

passing through said slot and spring means adapted to resiliently retain said pin in one end of said slot to retain said jaws in partially closed position.

- 5 5. Ring clinching mechanism including in combination, a cylinder, a piston within said cylinder, support members rigidly mounted on said cylinder, pivotally connected jaw members mounted on said support member, a piston within said

cylinder having a piston rod extending from one end thereof, toggle linkage interconnecting said piston rod and said jaw members whereby movement of said piston serves to actuate the same, and means independent of said piston for moving said jaw members to partially closed position to retain a member to be clinched therebetween. 5

STANLEY G. SMITH.