United States Patent

[11] **3,552,450**

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[54] **PNEUMATIC SEAL-CRIMPING TOOL FOR TENSIONED STRAPPING LOOPS**
10 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** **140/93.4**
[51] **Int. Cl.** **B21f 9/02,**
B21f 15/06
[50] **Field of Search** 81/9.1H,
9.1M; 100/30; 140/93.2, 93.4, 93.6

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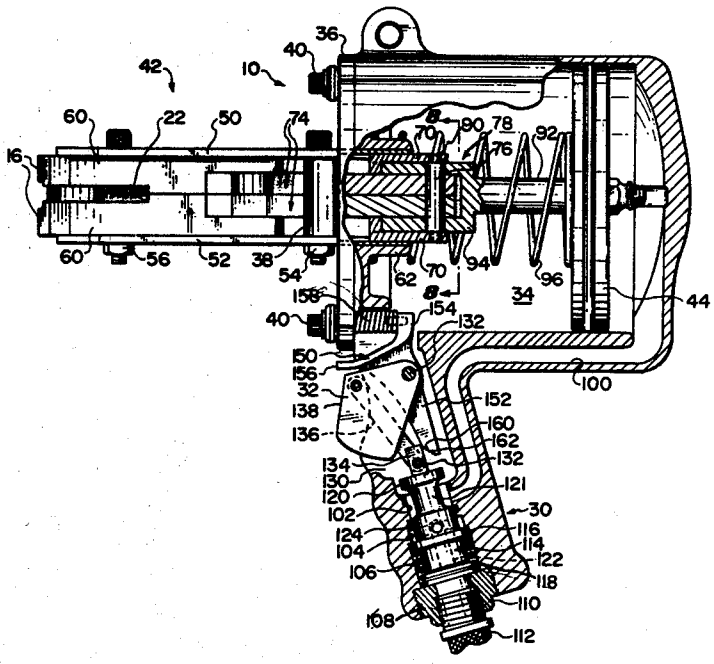
ABSTRACT: A trigger-actuated pneumatic tool for crimping a metal seal around the overlapping portions of a tensioned strapping loop, utilizing a pair of piston-actuated crimping jaws to compress the seal. Full crimping depth is assured by a pneumatic control arrangement whereby the crimping jaws will not release the seal until the latter has been fully crimped. A secondary feature resides in a particular jaw structure which enables a shorter piston stroke to effect a full seal crimp, thereby reducing tool height and weight.



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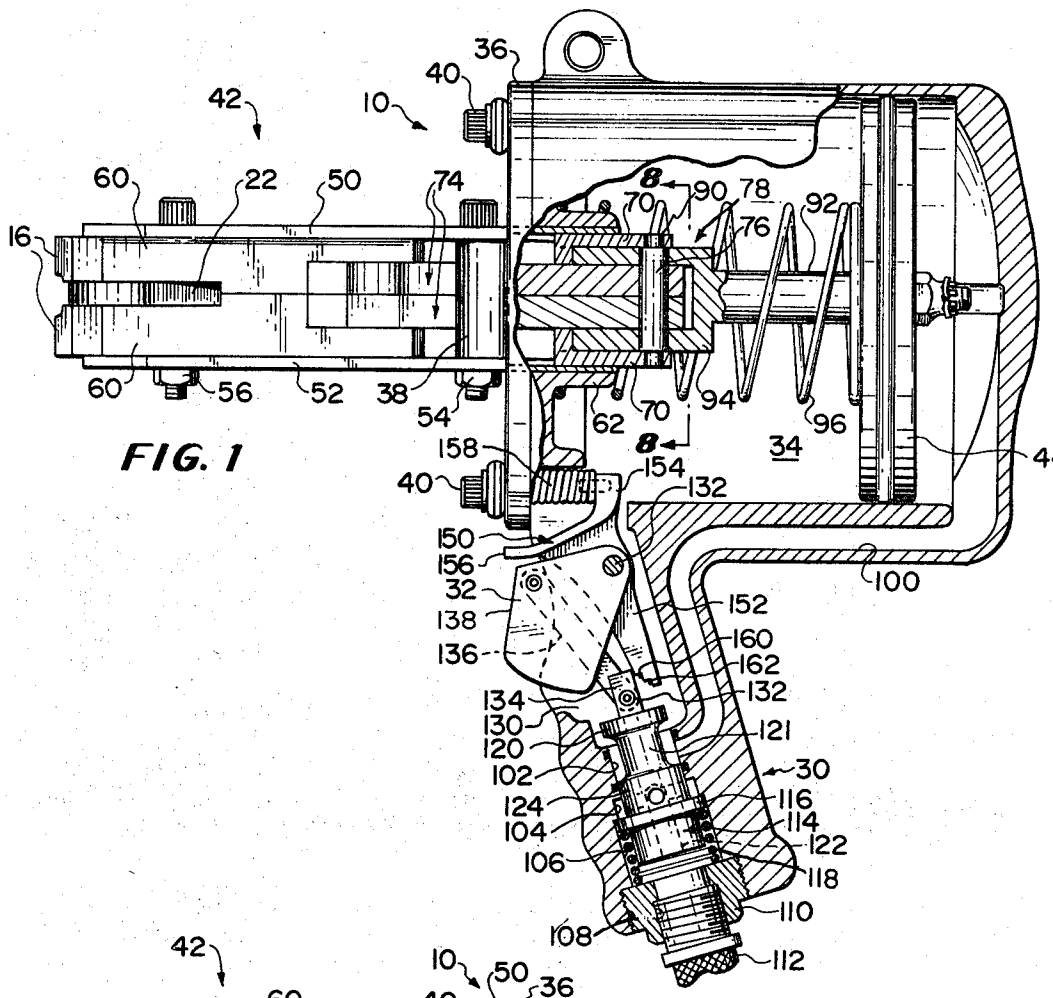

FIG. 1

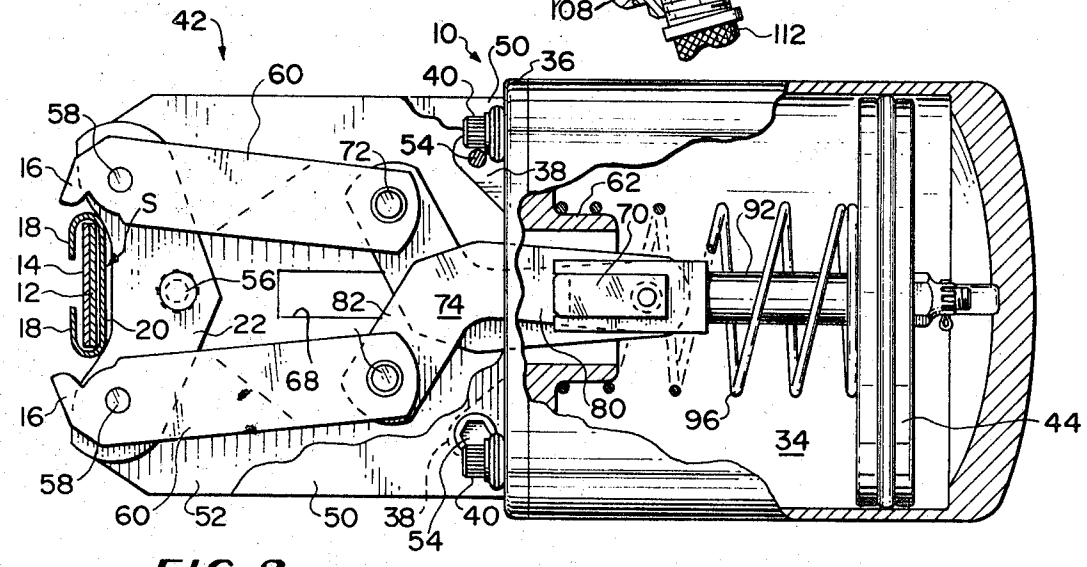

FIG. 2

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FIG. 4

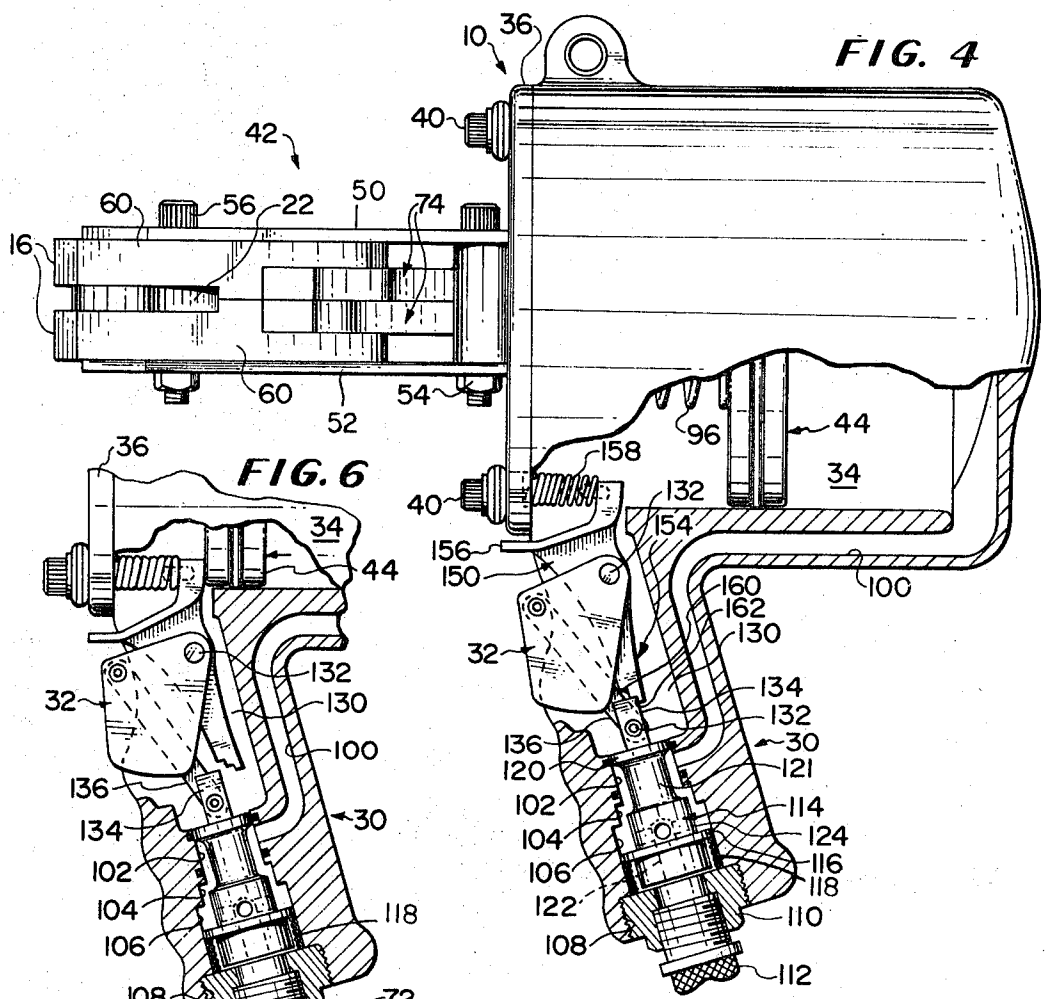

FIG. 6

FIG. 5

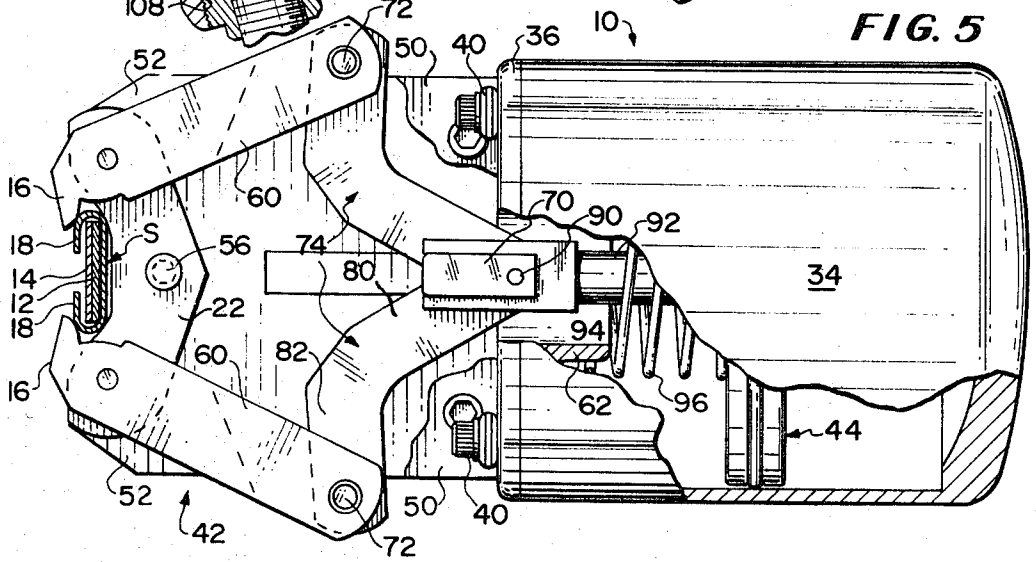

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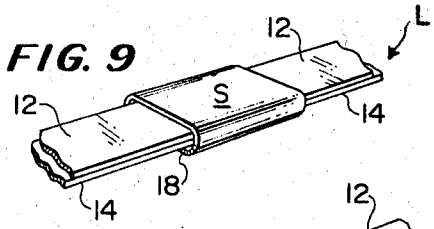
FIG. 9



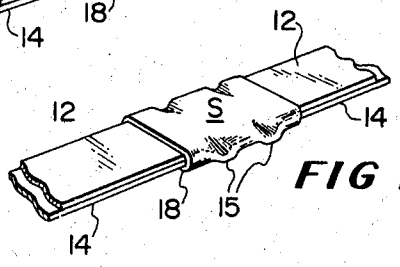


FIG 10

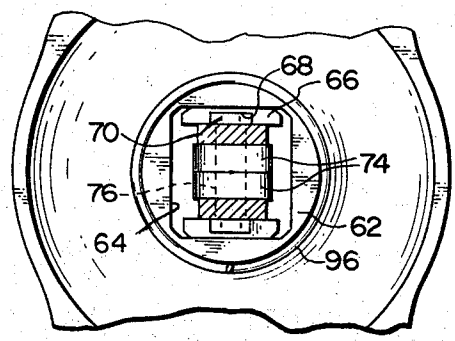


FIG. 8

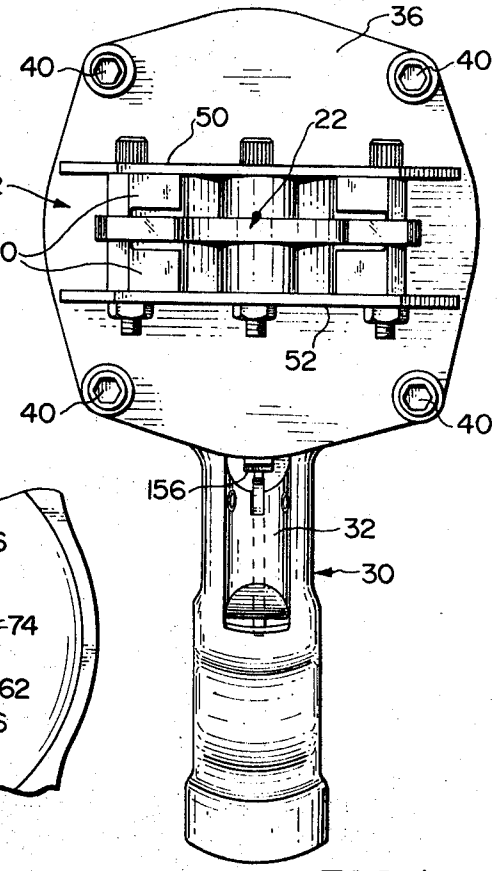
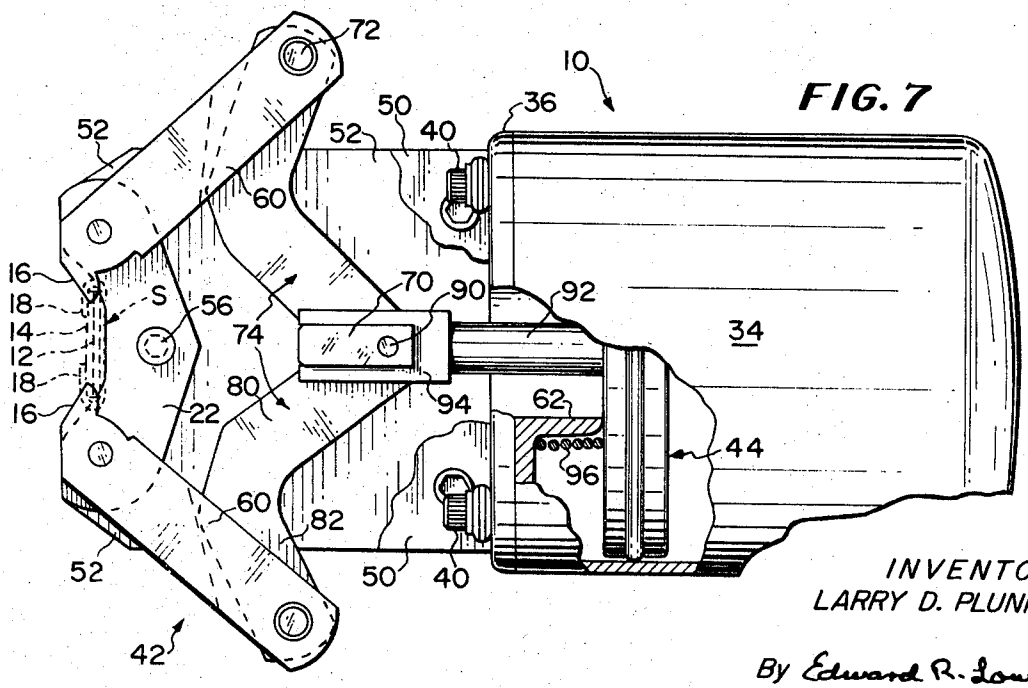


FIG. 3

FIG. 7



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PNEUMATIC SEAL-CRIMPING TOOL FOR TENSIONED STRAPPING LOOPS

The present invention relates to a pneumatically operable tool for crimping a metal seal about the overlapping portions of a tensioned loop of strapping which has been caused to encircle an object for strapping purposes. More specifically, the invention is concerned with improvements in power-operated hand tools of the general type shown and described in U.S. Pat. to Meier, No. 2,996,939, dated Aug. 22, 1961 and entitled "Crimping Mechanism."

Air-powered crimping tools of the type under consideration, and as exemplified by the aforementioned patent to Meier, are possessed of certain limitations, principal among which is the inability of such tools (or "sealers" as they are commonly referred to) to provide an adequate safeguard against improper sealing. For example, in assembly line work where rapid and repetitive sealing is desirable, a drop in air line pressure below a predetermined minimum will be reflected by the inability of the piston-actuated sealing jaws of the sealer to carry the crimping operation to the full seal-crimping depth, thus resulting in an unsafe and only partially crimped seal. Upon release of the actuating trigger by means of which air is conducted to the sealing cylinder, the sealing jaws will open and release the partially crimped seal so that the operator may proceed with the next succeeding sealing operation. The difference, appearancewise, between a fully crimped seal and one which is only partially crimped is seldom apparent and, as a consequence, in the past, dangerous situations have occurred where a long succession of bundles have left the sealing area in an unsafe condition.

The present invention is designed to overcome the above noted limitation that is attendant upon conventional sealers and, toward this end, the invention contemplates the provision of a sealer which has associated therewith novel means whereby, in the event of a decrease in air line pressure below the predetermined safe minimum, or for any other reason whatsoever, the sealing jaws fail to traverse their full seal crimping stroke, release of the actuating trigger will fail to initiate the jaw-opening operation so that the operator may not detach the tool from the seal until remedial measures have been taken, as for example by restoring full air line pressure, or by manipulating a special jaw-release finger which, although effective to release the jaws from the seal, places the operator on notice that the particular seal is defectively crimped.

Another limitation that is attendant upon conventional sealers of the type under consideration is concerned with a matter of overall tool dimensions wherein the effective stroke of the jaw-actuating piston and the expansion stroke of the toggle linkage associated with the sealing jaws and piston are additive factors which contribute toward overall tool height. According to the present invention, by the use of a novel jaw and toggle linkage structure, an overlapping of these two formerly additive factors permits an appreciable reduction in overall tool height and consequently in total tool weight.

The provision of a seal-crimping tool or sealer of the character briefly outlined above, and possessing the stated advantages, constitutes the principal object of the present invention. Other objects and advantages, not at this time enumerated, will readily suggest themselves as the nature of the invention is better understood.

In the accompanying three sheets of drawings forming a part of this specification, one illustrative embodiment of the invention has been shown.

In these drawings:

FIG. 1 is a side elevational view of the improved pneumatic seal-crimping tool with a portion of the tool casing broken away to more clearly reveal the nature of the invention;

FIG. 2 is a reduced top plan view of the tool with a portion of the casing, as well as other parts similarly broken away in the interest of clarity;

FIG. 3 is an end view of the structure shown in FIGS. 1 and 2;

FIG. 4 is a side elevational view similar to FIG. 1 showing the parts in the positions which they assume when partial seal crimping has been effected;

FIG. 5 is a top plan view similar to FIG. 2 but representing the parts in the positions they assume in FIG. 4;

FIG. 6 is a fragmentary side elevational view, largely in vertical section and similar to FIG. 4, showing the parts in the positions which they assume when full and effective seal-crimping operations have been completed;

FIG. 7 is a top plan view similar to FIGS. 2, 4 and 5, showing the parts in the positions which they assume upon completion of the seal-crimping operation;

FIG. 8 is a sectional view taken substantially along the line 8–8 of FIG. 1;

FIG. 9 is a perspective view of a metal seal operatively positioned on the overlapping portions of a strapping loop preparatory to the seal-crimping operation; and

FIG. 10 is a perspective view of a fully and twice-crimped seal, showing the same effectively applied to the overlapping portions of the strapping loop.

Referring now to the drawings in detail and in particular to FIGS. 1 and 2, a seal-crimping tool embodying the principles of the present invention has been designated in its entirety at 10. This tool is of the general type shown and described in the aforementioned U.S. Pat. to Meier, No. 2,996,939 and is designed for the same purpose, namely to crimp a metal seal such as has been shown at S in FIG. 9 about the overlapping portions 12 and 14 of a loop L of metal strapping which has been tensioned and remains under tension while the seal-crimping operation is being effected. Both the tools of the Meier patent and that of the present invention operate upon the seal S to produce a crimped seal such as is shown in FIG. 10 wherein the tool is applied to the seal S twice to produce offset deformations at 15 along the opposite edge regions of the seal. These deformations are created by means of two opposed pairs of jaws 16 (FIG. 2) which swing beneath the seal S and effectively force the inturned seal flanges 18 upwardly so as to displace the strapping laminae 12 and 14, as well as the crown portion 20 of the seal, to bend localized areas of the seal and strapping around the bottom edge of a notcher bar 22 which is centered between the two jaws and acts as a fixed reaction member during such metal bending operations, all in a manner that will become clear when the nature of the strapping tool 10 is better understood.

Considering now the crimping tool or sealer 10, this tool is of the air-operated pistol-grip-type and involves in its general organization a hand grip 30 having a trigger 32 and supporting a cylinder 34 which is integral therewith and the forward end of which is closed by a mounting plate 36 having a pair of forwardly extending attachment lugs 38. The mounting plate 36 is secured to the forward open rim of the cylinder 34 by means of screws 40. The mounting lugs 40 serve as a support for a crimping jaw assembly 42 which is operable under the control of a piston 44 reciprocable in the cylinder 34.

Still referring to FIGS. 1 and 2, the crimping tool 10 may be regarded as being comprised of three principal sections, the crimping jaw assembly 42 constituting a jaw section, the piston 44 and cylinder 34, together with their adjuncts, constituting a cylinder section for actuating the jaw section, and the pistol grip 30 constituting a control valve section for supplying air to the cylinder section in a selective manner to control the operation of the latter.

The jaw section which comprises the jaw assembly 42 includes a pair of side plates 50 and 52 which extend in parallelism, are identical in configuration, and are secured to the mounting plate 36 by bolts 54 which pass through the mounting lugs 40. The aforementioned notcher bar 22 is carried at the forward ends of the side plates by means of a transversely extending bolt 56 and a pair of transverse pins 58, the latter constituting pivot pins for two pairs of jaw members 60, there being one pair on each side of the notcher bar 22 so that the jaw members serve as spacer members as clearly shown in FIG. 3 for maintaining the notcher bar in a central position

between the two side plates 50 and 52. The aforementioned crimping jaws 16 are disposed at the extreme forward ends of the jaw members 60.

The mounting plate 36 is formed with a centrally disposed, rearwardly extending circular boss 62 having a generally square opening 64 extending therethrough (FIG. 8), the latter communicating with the interior of the cylinder 34. A pair of opposed rearward extensions 66 on the side plates project into the opening 64, each extension being recessed to provide a longitudinally extending guideway 68 for a pair of pin-retaining plates 70 the function of which will be made clear presently.

The various jaw members 60 are in the form of elongated links and the pivot pins 58 are disposed in close proximity to the jaw members 16. In the normal position of the jaw members 60 they are disposed entirely within the generally rectangular confines of the two side plates 50 and 52 and the rear ends thereof are pivotally connected by pins 72 to the forward ends of a pair of spreader links 74, there being one spreader link for each pair of adjacent jaw members 60. The rear ends of the two spreader links 74 are pivotally connected together for movement in unison by means of a pivot pin 76 which constitutes an element of a crosshead assembly 78.

It is to be noted at this point that the two spreader links 74 are each generally of J-shape design, each link having proximate portions 80 which normally extend in close proximity and parallelism, and distal portions 82 which cross each other and extend outwardly in divergent fashion. By such an arrangement the respective vectorial thrust exerted by the spreader links 74 upon the jaw members 60 during forward travel of the crosshead 78 is such that the links 74 will spread the rear ends of the jaw members 60 apart, despite the fact that normally the jaw members are inclined toward each other in a rearward direction. Stated otherwise, the toggle joint which is established by the jaw members and spreader links is such that it is incapable of passing over a dead center position and thus becoming jammed so as to prevent jaw-closing movements.

The pivot pin 76 has reduced ends 90 which project into openings provided in the rear ends of the aforementioned pin-retaining plates 70. The pin 76 is operatively connected to the piston 44 for movement in unison therewith by means of a piston rod 92 which is provided with a forward forked end 94, the fork tines of which straddle the rear pivoted ends of the spreader links 80 and receive therethrough the reduced end regions of the pin 76. By such an arrangement, the two plates 70 confine the pivot pin 76 therebetween and prevent axial shifting of the pin and possible dislodgment thereof at such time as the piston is in a retracted position and the pins have moved outside of the confines of the guideways 68 associated with the boss 62. The piston 44 is normally maintained in its fully retracted position as shown in FIGS. 1 and 2 by means of a compression spring 96 which encircles the piston rod 92, is piloted at its forward end by the circular boss 62, and bears at its rear end against the piston.

Although the tool 10 has been illustrated as being assembled so that the jaw members 60 and spreader links 80 operate in a plane which is at a right angle to the general plane of the hand grip 32, it will be understood that by removing the fastening screws 40 and rotating the mounting plate 36, together with its supported jaw assembly 42 in either direction, the jaw members 60 and links may be caused to operate, after replacement of the screws 40, in the plane of the hand grip.

When the tool is applied to a seal S for the purpose of crimping the same about the overlapping portions 12 and 14 of a strapping loop L, the tool is manipulated initially so that the sealing jaws 16 straddle the side edges of the seal while the crown portion of the seal is engaged by the notcher bar 22 as clearly shown in FIG. 2. Assuming that full rated air line pressure is admitted to the rear end of the cylinder 34 for driving the piston 44 forwardly, the initial movement of the piston will effect a spreading movement of the toggle joint which is established by the various spreader links 74 and jaw members 60 so that the latter swing in opposite directions about their pivotal axes 58 and cause the jaws 16 to close upon the seal. Initial engagement of the seal by the jaws 16 takes place at spaced apart regions along the seal flanges 18 and, as shown in FIG. 5, the seal S as a whole is clamped between these jaws 16 and the forward recessed edge of the notcher bar 22. Because full rated air line pressure is supplied to the cylinder 34, continued closing movement of the jaws 16 will then initiate the actual seal-crimping operation wherein the jaws 16 displace the metal of the seal flanges 18 and force the same against the overlapping strapping laminae, as well as against the longitudinal edge regions of the crown portion 20 of the seal. Since the forward edge of the notcher bar serves as a reaction anvil against the medial region of the crown portion of the seal, the side edges of the seal and strapping become "crimped" by a partial wrapping of the seal and its container strapping around the forward edge of the notcher bar 22 to produce a single pari of oppositely disposed depressions such as are shown at 15 in FIG. 10. During a succeeding operation of the tool, a second pair of such depressions 15 will be formed alongside the first pair, it being considered good crimping practice to crimp each seal S twice.

Upon bleeding of the rear end of the cylinder 34 to the atmosphere after the seal has been fully crimped, the spring 96 will restore the piston to its fully retracted position, thus moving the crosshead assembly 78 rearwardly and collapsing the aforementioned toggle joint associated with the crimping jaws 16 to open the latter and release the jaws from the crimped seal.

According to the present invention, means are provided whereby in the event of failure of the crimping jaws 16 to effect full depth of crimping, the crimping jaws 16 are prevented from releasing the seal so that the tool may not inadvertently be put to use for a succeeding crimping operation. This means is in the form of a novel latch mechanism associated with the control valve section 30 of the tool and nature and operation of which will be described in detail subsequently.

Considering now the control valve section of the tool 10 as embodied in the hand grip 30, the rear end of the cylinder 34 communicates through a passage 100, which extends along the underneath side of the cylinder, with the interior of the hand grip and, specifically with a valve-receiving bore or chamber 102 provided in the hand grip. The bore 102 is of stepped configuration and includes enlarged counterbores 104, 106 and 108 of progressively increasing diameter. The counterbore 108 is internally threaded for reception therein of a nipple fitting 110 designed for attachment to an airhose 112 leading from a source of air under pressure (not shown).

A spool-type valve body 114 is slidable in the bore 102 and is formed with an annular flange 116 which normally seats against the annular shoulder which exists between the counterbores 104 and 106, and which is held thereagainst by a spring 118 which bears at its lower end against the nipple fitting 110 and at its upper end against the flange 116. The upper end of the valve body 114 is provided with an annular sealing flange 120 immediately below which there is a recess 121 which remains in register with the passage 100 in all positions of the valve body. The valve body 114 is provided with an axial bore 122 which communicates with a series of radial passages 124, these latter passages remaining at all times in communication with the bore 104 below the level of the flange 116.

The pistol grip 30 is recessed as at 130 to accommodate the trigger 32 and the latter is mounted for swinging movement about the horizontal axis of a fixed pin 132 which extends across the recess 130. The upper end of the valve body 114 is provided with an attachment post 134. A thrust link 136 is pivoted at its upper end to an eccentric point on the trigger while the lower end of the link is pivoted to the post 134. From the above description it will be seen that the trigger 32 and link 136 constitute, in effect, a toggle point for effecting sliding movement of the valve body 114 within the bore 102. The

overhanging edge 138 of the trigger 32 constitutes, in effect, a lever arm adapted to be engaged by the finger of the operator so that when the trigger is depressed a mechanical advantage is attained whereby relatively light finger pressure will displace the valve body against the action of the spring 118.

Considering now the normal operation of the control valve section 30 of the tool, assuming the nipple fitting 110 to be connected through the airhose 112 to a source of air under adequate pressure to effectively perform a sealing operation by the jaw section 42 upon a seal S, depression of the trigger 32 will cause the valve body 114 to shift downwardly in the bore 102 to a projected position so that the annular depression 121 thereof will establish communication between the counterbore 104 and the air passage 100 as shown in FIG. 4. Air will then flow from the nipple fitting 110, through the passages 122 and 124 to the air passage 100 so as to admit pressurized air to the rear end of the cylinder 34 and drive the piston 44 forwardly to effect the seal-crimping operation in the manner previously described. At this time the sealing flange 120 will seal the passage 100 from the recessed portion 130 of the hand grip 30. After the seal has been fully crimped, release of the trigger 32 will restore the valve body 114 to its upper position, thus sealing off communication between the counterbore 104 and the air passage 100 so that the supply of pressurized air to the cylinder 34 is discontinued, whereupon the spring 96 will restore the piston to its retracted position, thereby opening the seal-crimping jaws 16 and releasing the fully crimped seal. Air in the rear end of the cylinder will escape to the atmosphere through the passage 100, past the spool flange 120 and into the recessed portion of the hand grip which is in open communication with the atmosphere.

The previously mentioned means for preventing release of the sealing jaws 16 from the seal S in the event that for any reason whatsoever, as for example lack of adequate operating air pressure in the line, the jaws fail to effect full crimping depth upon the seal, comprises a latching member or pawl 150 of spiderlike design and which is mounted for rocking movement on the fixed pin 132. This latching pawl is provided with a depending radial latch arm or dog 152 designed for cooperation with the post 134 on the valve body 114, a second radial arm or abutment finger 154 which projects past the wall of the cylinder 34 and into the interior thereof for engagement by the piston 44 when the latter reaches the end of its forward stroke, and a third radial arm or release finger 156 which underlies the lower edge of the mounting plate 36 in close proximity thereto. A compression spring 158 is interposed between the abutment 154 and mounting plate 36 and yieldingly urges the latching pawl in a clockwise direction as viewed in FIGS. 1, 3 and 6.

Referring now to FIG. 1, the lower end region of the radial latch arm or dog 152 of the latching pawl 150 normally bears against the post 134 on the valve body 114 and the extreme lower end of this arm is stepped to provide a pair of latching shoulders 160 and 162. During the progressive downward movement of the valve body 114 incident to depression of the trigger 32 as previously described, these two shoulders 160 and 162 are designed for successive register with the upper end of the post 134 under the influence of the biasing action of the compression spring 158. The overall length of the valve body 114 is such that at no time does it clear the lower end of the latch arm 152 but, when the valve body is in its fully depressed position, the shoulder 162 directly overlies the upper end of the post 134 as shown in both FIGS. 4 and 6.

In the operation of the crimping tool 10, assuming for purposes of discussion that line pressure in the airhose 112 is below that which is required for effecting a full depth of seal crimp, initial depression of the trigger 32 will exert a downward force upon the valve body 114 through the medium of the thrust link 136 and, as the valve body moves downwardly, the latch arm 152 will slide upon the adjacent side of the post 134 until such time as the upper end of the post encounters the shoulder 160, at which time the biasing action of the spring 158 will cause this shoulder to latch over the upper end of the post. At this time a point of no return, as far as the trigger 32 is concerned, is reached and release of finger pressure on the trigger will fail to restore it to its fully retracted position. If the trigger is fully depressed the shoulder 162 will latch over the end of the post 134. At the same time the sealing flange 120 on the valve body will have moved to a position where it seals the passage 100 from the recess 130 while at the recessed area 121 of the valve body will have established at least partial communication between the bore 104 and the passage 100. Air under pressure will thus be admitted to the rear end of the cylinder 134 to drive the piston 44 forwardly and close the crimping jaws 16 upon the seal S in the manner previously described. At a predetermined point in the travel of the piston the crimping jaws 16 will initially engage the flanges 18 of the seal S as shown in FIG. 5. Because the seal is comprised of relatively heavy gauge steel while air pressure in the cylinder 34 is below the required pressure, the reaction force of the seal against the jaws will produce a condition of stall wherein the parts assume substantially the positions in which they are shown in FIG. 5. If air pressure is extremely low, no deformation whatsoever of the seal flanges will take place and the shoulder 162 will remain effective to prevent return of the valve body 114. At higher pressures a partial deformation of the seal flange 18 may occur, as well as some deformation of the strapping laminae 12 and 14, thus allowing the piston 44 to travel slightly further forwardly in the cylinder 34. The distance which the piston 44 will travel forwardly in the cylinder 34 will be a function of seal resistance coupled with available air pressure but, in any event, release of the trigger 32 will be ineffective to stop the air supply to the rear end of the cylinder 34 until such time as the piston reaches the end of its forward stroke and engages the abutment 154 of the latching pawl 150 and thus swings the latch arm 152 out of the path of return movement of the valve body 114 so that the latter may return to its fully retracted position under the influence of the spring 118. With the valve body 114 thus in its original position, the rear end of the cylinder 34 is bled to atmosphere while the supply of air to the cylinder is discontinued in the manner previously set forth.

It will be appreciated that since the latching pawl is effective to prevent return of the trigger 32 to its retracted position unless the piston 44 travels throughout its entire forward stroke, the air supply to the cylinder 34 is maintained effective to maintain the piston at its position of stall as shown in FIG. 5 wherein the jaws 16 remain closed upon the seal S but are unable to exert sufficient pressure to complete the crimping operation. Under these conditions the operator is unable to remove the tool from the seal S which, in turn, is loosely held to the strapping against removal despite the fact that the seal remains to be fully crimped. As soon as the air pressure in the line is restored to its full rated value, the crimping cycle will continue to completion from the point at which it was interrupted by reason of piston stall.

The forwardly extending release finger 156 is provided for the purpose of permitting the operator to kick out the latch arm 136 from its blocking position with respect to the valve body 114, thus releasing the jaws 16 from the seal, if full line pressure cannot be restored promptly or if the phenomenon which prevented full crimping depth from being attained cannot be alleviated. By inserting the end of a suitable prying tool such as a screwdriver, or the narrow edge of a fresh seal between the release finger 156 and the adjacent edge of the mounting plate 36, a manual kick-out operation may be performed, the edge of the mounting plate constituting a reaction shoulder for the prying action of the tool. Despite the fact that in this manner an operator may release the tool from the seal for performance of a succeeding sealing operation the operator is however placed on notice that the seal from which the jaws 16 have just been released is a defective one.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawings or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit of

the invention. Therefore, only insofar as the invention has particularly be pointed out in the accompanying claims is the same to be limited.

I claim:

1. In a fluid-actuated tool for crimping a seal about the overlapping portions of a strapping loop, in combination, a pair of seal-crimping jaws movable toward and away from each other between a fully closed seal-crimping position and a fully open seal-releasing position, a cylinder having a piston reciprocable therein and operatively connected to said jaws, said piston being movable between a retracted position wherein the jaws assume their fully open position and an advanced position wherein the jaws assume their fully closed position, spring means yieldingly urging the piston to its retracted position, a manually operable control valve in communication with the cylinder and having a movable valve body effective in a projected position to supply air to said cylinder to drive the piston to its advanced position and effective in a retracted position to bleed said cylinder to the atmosphere and allow said spring means to return the piston to its retracted position, a spring yieldingly urging said valve body to its retracted position, releasable latch means for automatically latching upon movement of said valve body to its projected position, said latch means in said projected position, and means for releasing said latch means when said piston moves to its fully advanced position and for returning the valve body to its retracted position whereby said cylinder is bled to the atmosphere and said spring means returns the piston to its retracted position.

2. In a fluid-actuated tool, the combination set forth in claim 1, wherein said releasable latch means comprises a movable spring-biased latch member yieldingly and slidingly bearing against said valve body and having a latch shoulder thereon capable of projection into the path of return movement of the valve body when the latter is in its projected position, and an abutment finger on said latch member projecting into said cylinder and engageable by the piston when the latter moves to its advanced position for automatically shifting the position of the latch member to withdraw the same from said path of return movement.

3. In a fluid-actuated tool, the combination set forth in claim 2, wherein said latch member further includes a release finger by means of which the member may be manually shifted to withdraw said latch shoulder from said path of return movement.

4. In a fluid-actuated tool, the combination set forth in claim 1, wherein said releasable latch means comprises a latch member mounted for rocking movement about a fixed axis and having a radial latch dog projecting alongside the valve body and slidingly engageable therewith, spring means yieldingly biasing said latch member in a direction to maintain said dog in sliding contact with the valve body, a latch shoulder on said dog capable of projection into the path of return movement of the valve body when the latter is in its projected position, and a radial abutment finger on said latch member projecting into said cylinder and engageable by the piston when the latter moves to its advanced position for automatically shifting the latch member in the opposite direction to withdraw said latch shoulder from said path of return movement.

5. In a fluid-actuated tool, the combination set forth in claim 4, wherein said latch member is further provided with a radial release finger by means of which the latch member may be manually shifted to withdraw said latch shoulder from said path of return movement.

6. In a fluid-actuated hand tool for crimping a seal about the overlapping portions of a strapping loop, in combination, a casing defining a jaw section, a cylinder section and a control valve section, said jaw section including a pair of seal-crimping jaws movable toward and away from each other between a fully closed seal-crimping position and a fully open seal-releasing position, said cylinder section including a cylinder, a piston reciprocable in said cylinder and operatively connected to said jaws and movable between a retracted position wherein the jaws assume their fully open position and an advanced position wherein the jaws assume their fully closed position, and spring means yieldingly urging the piston to its retracted position, said control valve section being in the form of a hand grip and including a valve in communication with the cylinder and having a movable valve body effective in a projected position to supply air to said cylinder to drive the piston to its advanced position and effective in a retracted position to bleed the cylinder to the atmosphere and allow said spring means to return the piston to its retracted position, a spring yieldingly urging the valve body to its retracted position, a depressible trigger effective upon depression thereof to move the valve body to its projected position, a latch member pivoted to said casing for rocking movement about an axis and having a radial latch dog projecting alongside the valve body and slidingly engageable therewith, spring means yieldingly urging said latch in a direction to maintain the dog in sliding contact with the valve body, a latch shoulder on said dog capable of projection into the path of movement of the valve body when the latter is in its projected position, and a radial abutment finger on said latch member projecting into said cylinder and engageable by the piston when the latter moves to its advanced position for automatically shifting the latch member in the opposite direction to withdraw said latch shoulder from said path of return movement.

7. In a fluid-actuated hand tool, the combination set forth in claim 6, wherein said latch member is further provided with a radial release finger which projects outwardly of the casing and by means of which the latch member may be manually shifted to withdraw said latch shoulder from said path of return movement.

8. In a fluid-actuated hand tool, the combination set forth in claim 7, wherein said casing is provided with a reaction shoulder in the vicinity of the projecting portion of said radial release finger to the end that the finger may be manually actuated by the prying action of a tool inserted between the finger and reaction shoulder.

9. In a fluid-actuated hand tool, the combination set forth in claim 8, wherein said trigger is pivoted for rocking movement about the axis of rocking movement of the latch member, and is operatively connected to the valve body for movement in unison therewith by a thrust link which is pivoted at one end to the valve member and at the other end to an eccentric point on the trigger.

10. In a fluid-actuated hand tool, the combination set forth in claim 8 wherein said valve body is effective in a range of projected positions to supply air to the cylinder and wherein said latch dog is provided with a second latch shoulder likewise capable of projection into the path of movement of the valve body when the latter moves beyond an initial projected position so that the valve body may be selectively latched in progressively projected positions.