June 21, 1960

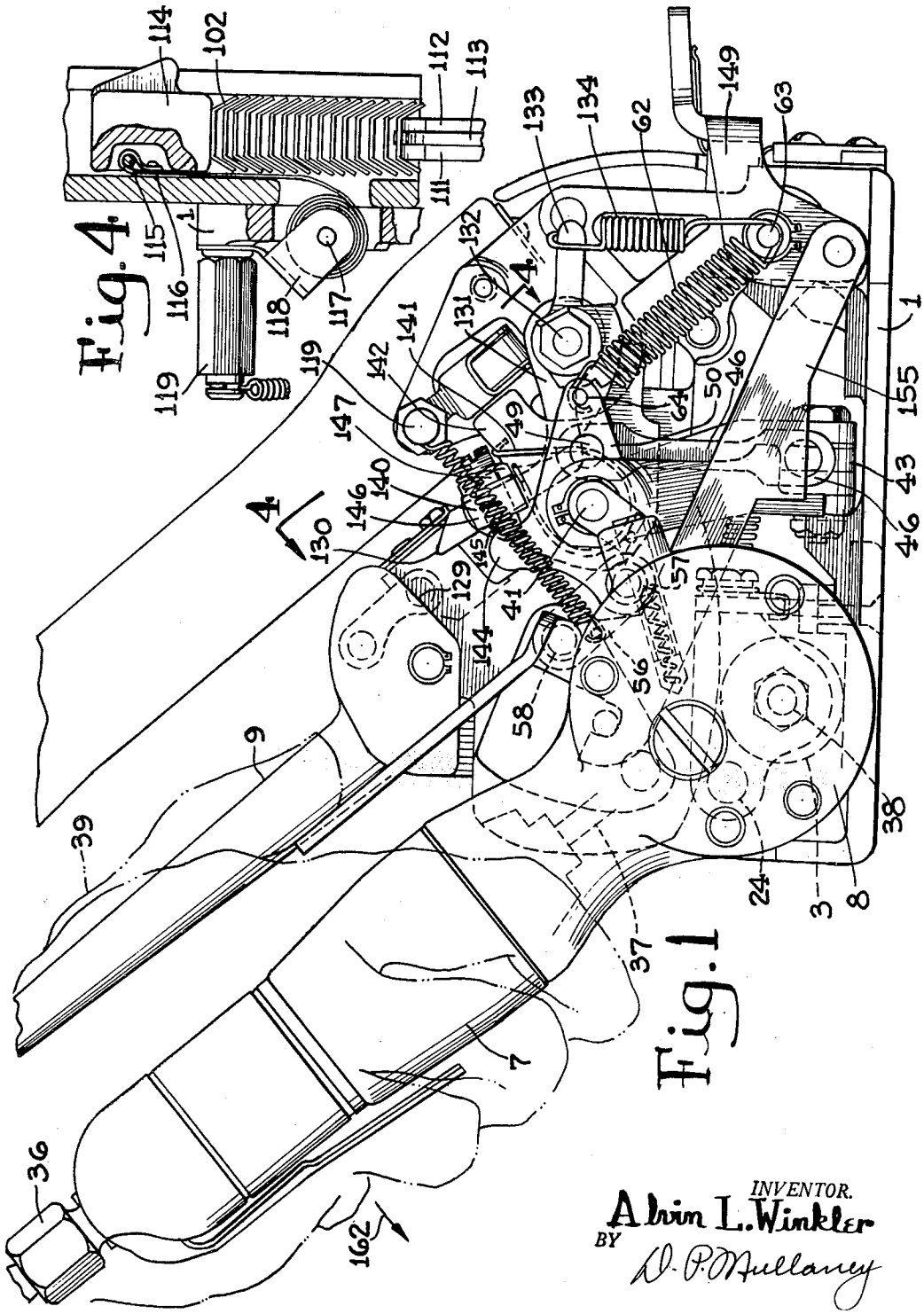
A. L. WINKLER

2,941,782

STRAPPING TOOL

Filed Aug. 29, 1957

6 Sheets-Sheet 1



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STRAPPING TOOL

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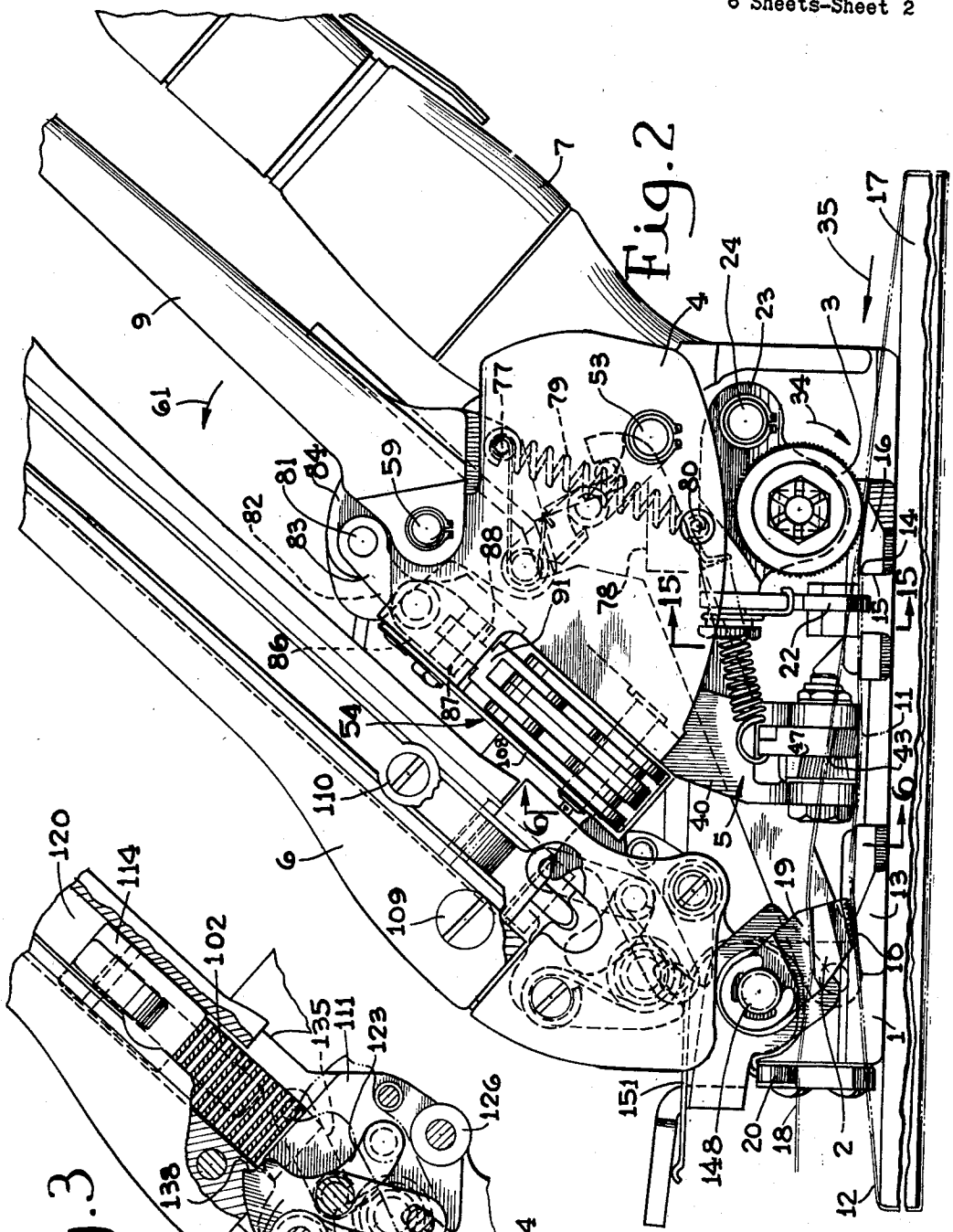


Fig. 2

Fig. 3

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STRAPPING TOOL

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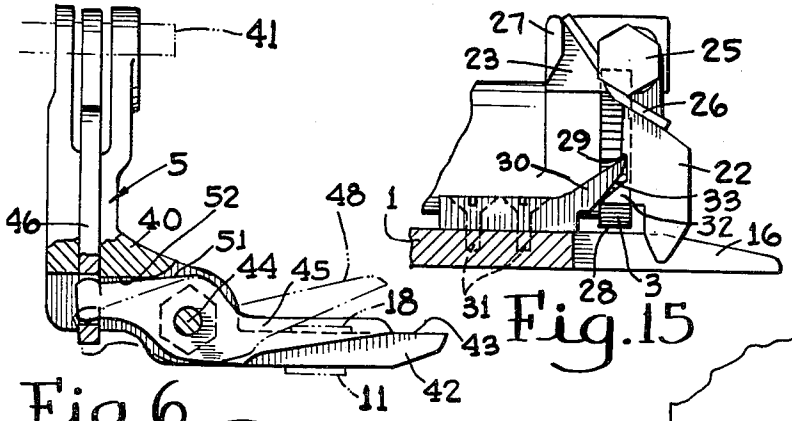


Fig. 6

Fig. 15

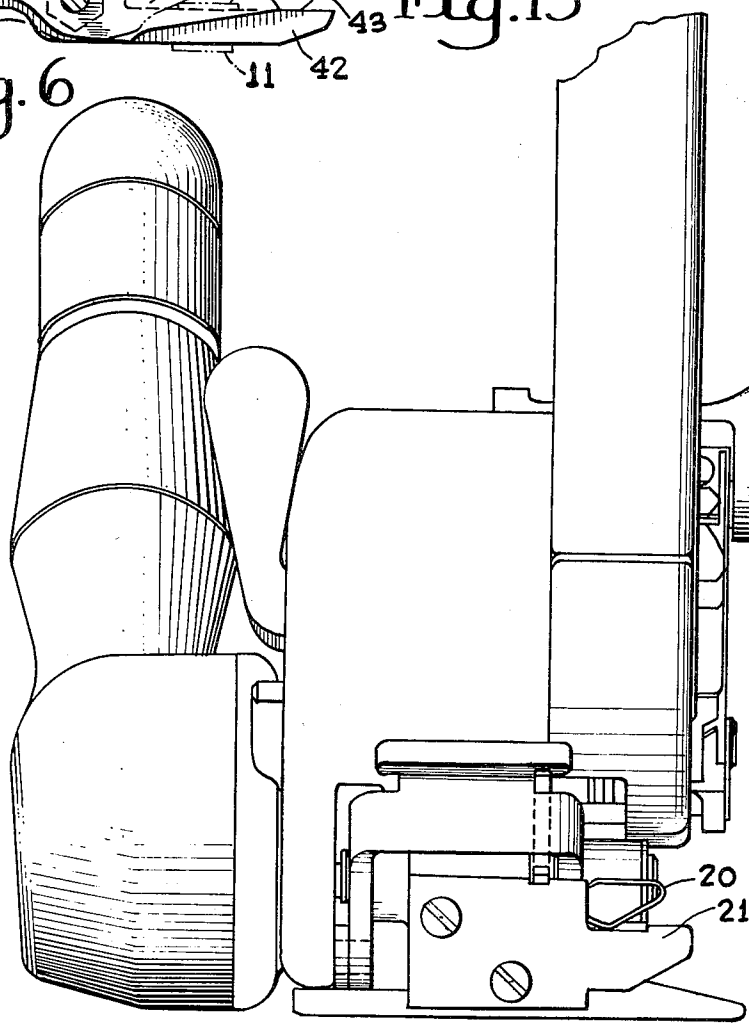


Fig. 5

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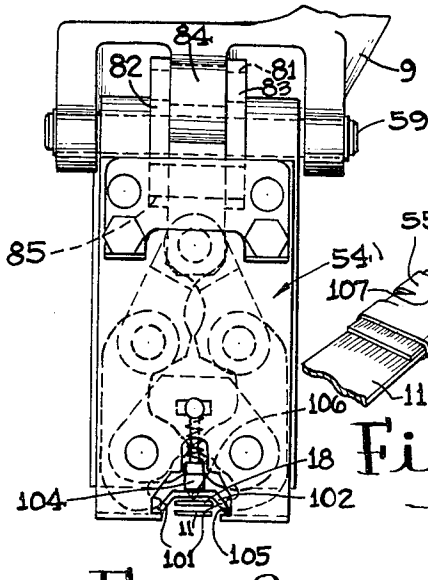


Fig. 8

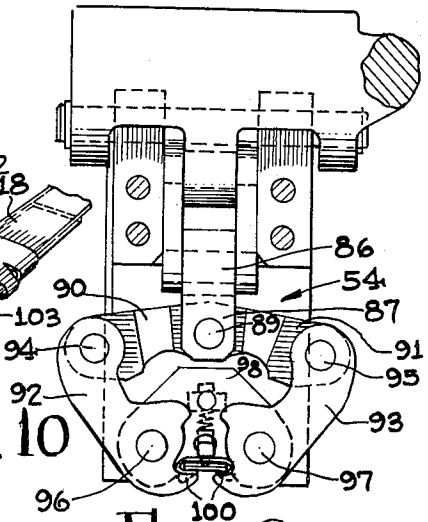


Fig. 9

Fig. 10

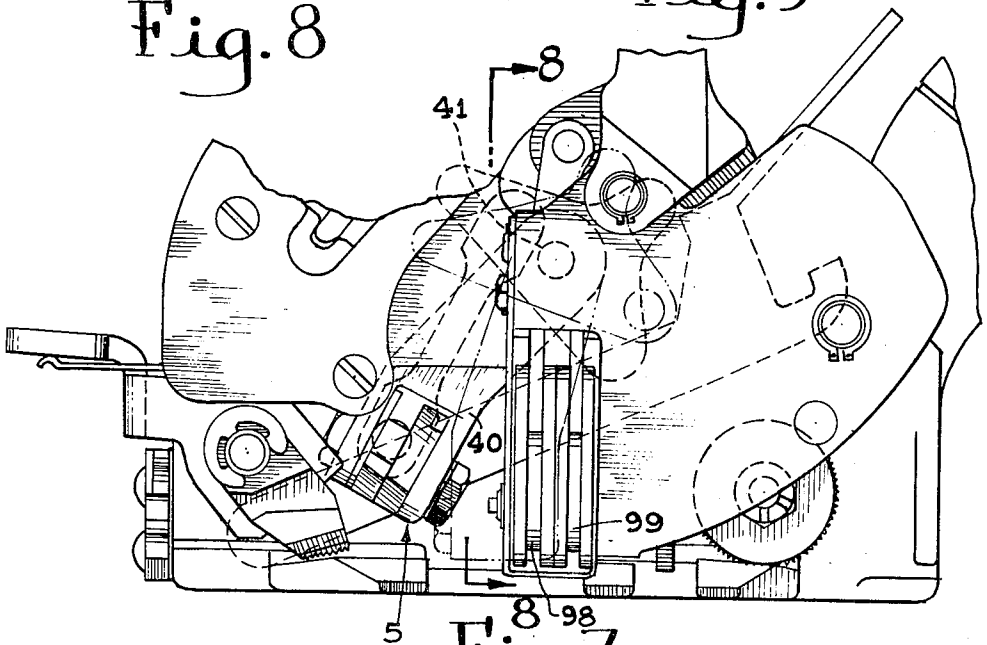


Fig. 7

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STRAPPING TOOL

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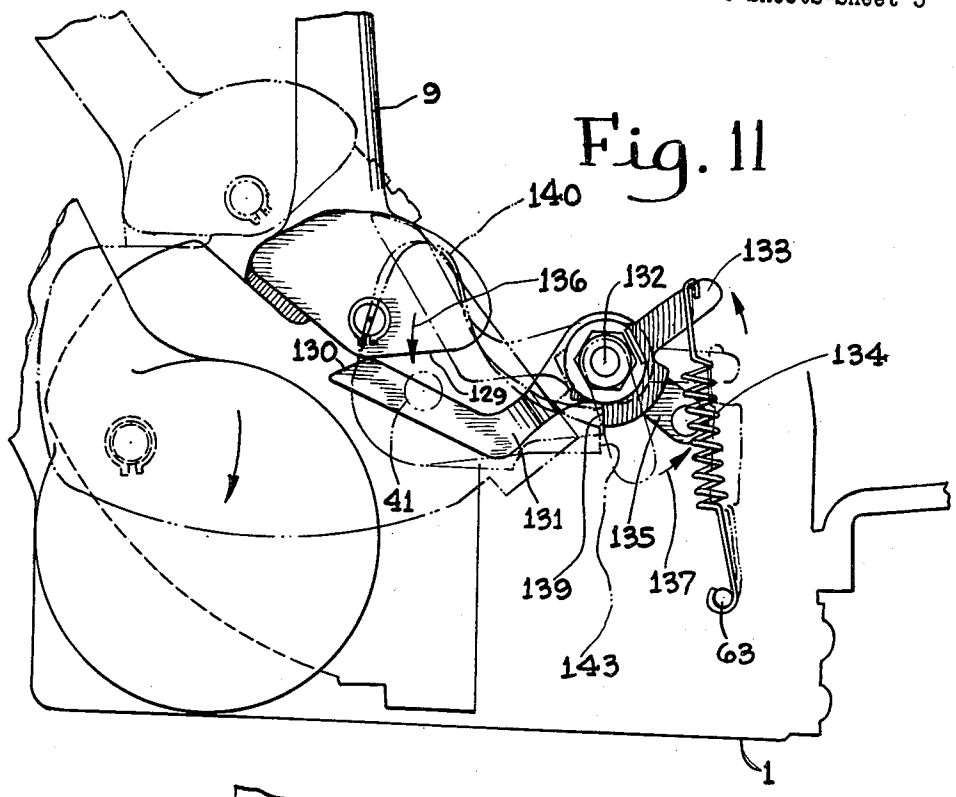


Fig. 11

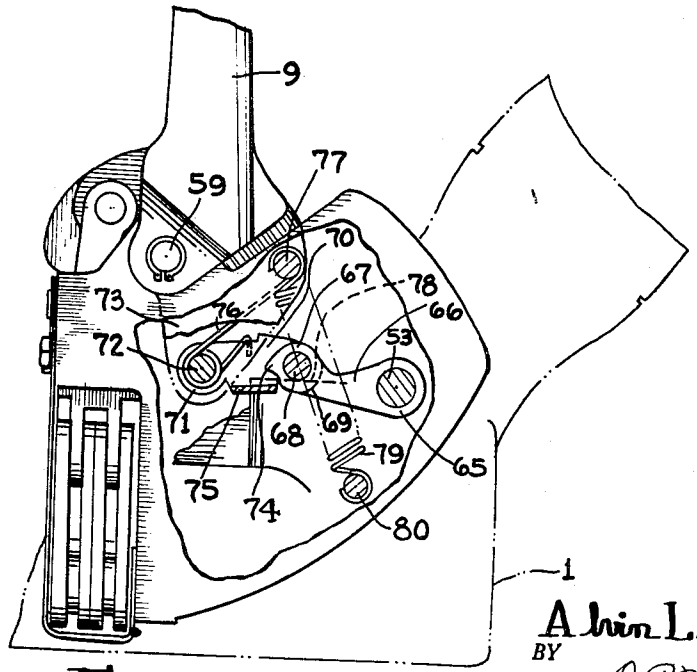


Fig. 12

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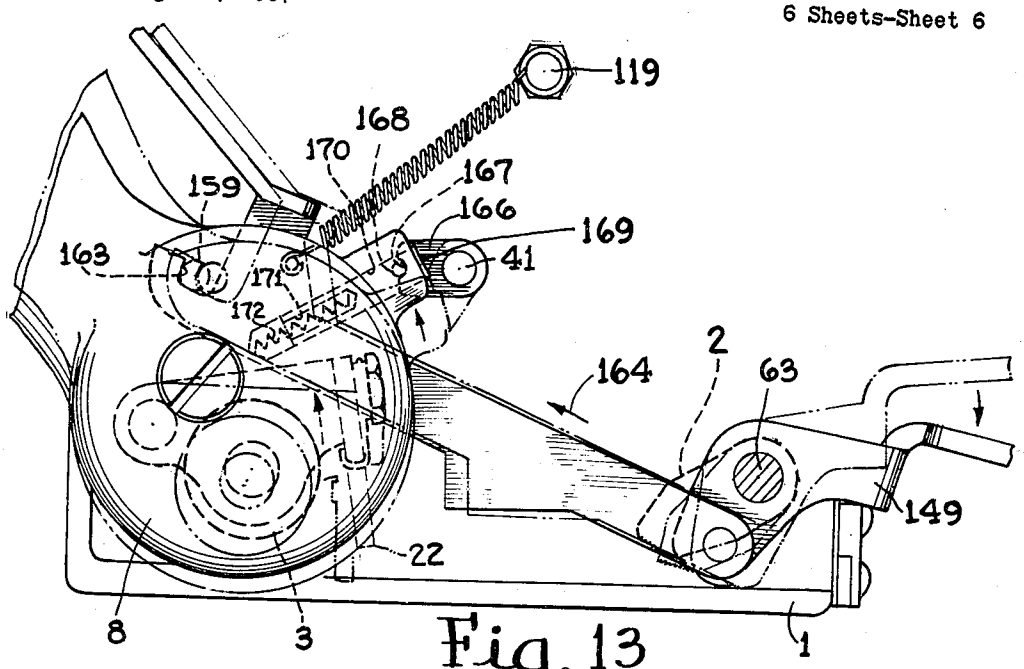


Fig. 13

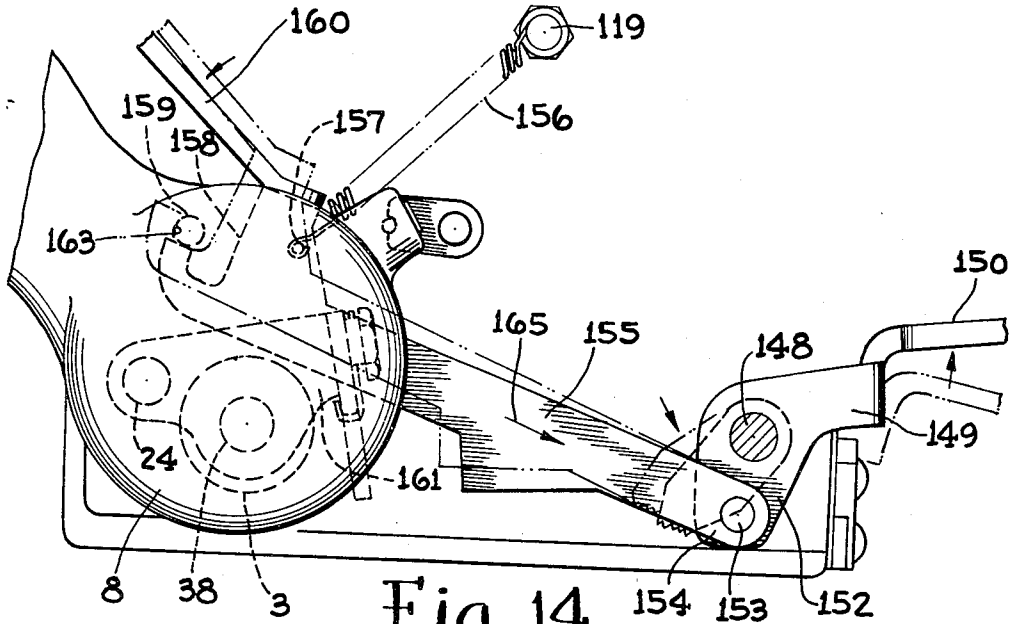


Fig. 14

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2,941,782

STRAPPING TOOL

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Filed Aug. 29, 1957, Ser. No. 680,968

5 Claims. (Cl. 254—51)

This invention relates to improvements in strapping tools of a type used for joining together the two overlapping strap ends of a loop of strap encircling a package or other object for binding purposes.

The general characteristic of a tool of the above-mentioned type may consist of a rotary strap tensioning wheel spaced from a strap gripping jaw. The strap gripping jaw is provided for holding the leading strap end positioned while the rotary strap stretching wheel is used to tension the strap by pulling the supply strap end. For the efficient operation of such a tool, it is required that the strap ends be sequentially gripped by the tool, first the leading end and then the supply end, after a strap loop is provided around the package or other object being bound. The usual means for actuating the strap gripping jaw and the strap tensioning wheel is by levers independently mounted of each other in the regions of the gripping jaw and the tensioning wheel, the lever associated with the gripping jaw being used to operate the gripping jaw while the lever associated with the tensioning wheel being used to position the tensioning wheel. The principal objection to such an arrangement is that direct control at two manual stations on the tool is required when it is necessary to operate the gripping jaw and the tensioning wheel for releasing or sequentially positioning them. Further, it is desirable to provide means for causing simultaneous release of the jaw and wheel from strap gripping position when removing the tool from the bound object after a strapping cycle and control from a single station is preferable for convenience and the most efficient operation of the tool because it will only require one hand of the operator and leaves his second hand free for alignment of the strap, steadying of the tool or for other reasons. Improvements have been made on this type of tool as evidenced by U.S. Patent No. 2,594,397, issued to William C. Childress et al., on April 29, 1952. The basic improvement of that patent is the particular linkage means between the gripping jaw lever and the tensioning wheel frame which permits simultaneous release of both the gripping jaw and the tensioning wheel by manipulation at a single station with one hand. However, in spite of this advantage, the Childress type tool has the disadvantage that the sequential positioning of the gripping jaw and the tensioning wheel to strap gripping positions is controlled at two stations, one in the region of the gripping, the other in the region of the tensioning wheel. Such an arrangement requires a more complex manipulation of both hands than if the gripping jaw and tensioning wheel are entirely controlled from one station where no more than one hand is required for control, and this imparts undue awkwardness and cumbersomeness to the use of the tool. A still earlier U.S. Patent No. 2,497,313, issued to John H. Leslie II on February 14, 1950 and entitled Package Binding Tool discloses a tool of a type wherein one of the claimed improvements is a particular camming means provided between the tensioning handle and the gripping jaw lever for causing momentary release of the gripping jaw during its stroke of travel for releasing the tensioning wheel from engagement with the strap. This tool has the advantage of one station control for release of both the gripping jaw and tensioning wheel by means of the tensioning handle. However, it has the disadvantage that the momentary release of the gripping jaw occurs during only a very short portion of the entire stroke of the tensioning handle, thereby making control of the gripping jaw operation highly sensitive, thus requiring the operator to exercise a greater amount of skill in the operation of the tool when both threading the tool with strap and when removing the tool from the strap loop after the sealing of the joint has been completed. It is the principal object of this invention to provide an improved linkage mechanism on such a tool between the actuating parts for both the gripping jaw and the tensioning wheel which eliminates the aforesaid difficulties of prior art devices by providing means for permitting the sequential operating of the gripping jaw and the tensioning wheel with simple and full positive control at a single station on the tool. This increases the effectiveness of the tool by decreasing operator fatigue and increasing efficiency and speed with which the operator can encircle and apply a strap about a package or other object.

Other objects and advantages of the invention should become apparent from the following description of a preferred embodiment of the invention which is shown in the accompanying drawings.

In the drawings:

Fig. 1 shows a side elevation of a tool embodying the invention as observed from the right by one who is operating the tool;

Fig. 2 is a side elevation of the tool as viewed from its left hand side;

Fig. 3 is a partial sectional view showing portions of the seal feed mechanism;

Fig. 4 is a sectional view of a portion of the seal feed mechanism as viewed along the line 4—4 of Fig. 3;

Fig. 5 shows a front end elevation of the tool as it appears looking toward the left in Fig. 1;

Fig. 6 shows a partial sectional view of the strap shearing device as viewed approximately along the line 6—6 of Fig. 2;

Fig. 7 shows a partial side elevation corresponding to the view of Fig. 2 except that the sealer head is shown rotated to sealing position while the shear device is shown pivoted out of the way of it;

Fig. 8 shows a view of the sealer head as viewed along the line 8—8;

Fig. 9 shows a view of the sealer head of Fig. 8 except with the cover plate removed and the sealer jaws in positions corresponding to the final formation of a sealed strap joint;

Fig. 10 shows a perspective view of a strap joint formed by the sealing head of Figs. 8 and 9;

Fig. 11 shows a somewhat diagrammatic view of the strapping tool with the seal feed actuating parts shown in bold outline;

Fig. 12 shows a partial diagrammatic view of the strapping tool with the sealer head and its associated frame shown in bold outline and particularly shows a linkage mechanism for preventing operation of the sealer head until after it is positioned.

Fig. 13 shows the actuating parts and linkages used for controlling the operations of the gripping jaw and the tensioning wheel;

Fig. 14 shows the same mechanism as Fig. 13 except in different positions.

Fig. 15 is a view taken along the line 15—15 of Fig. 2 and shows details of a strap guide used on the tool.

As shown in Figs. 1, 2 and 5, a preferred construction for a tool embodying this invention comprises a frame 1 on which all of the working parts of the tool are mounted.

The basic portions of the tool consist of a strap gripping jaw 2 mounted adjacent the forward end of the tool, a rotary strap tensioning wheel 3 adjacent the rear end of the tool, a sealer housing 4 above the wheel 3, a strap shear mechanism 5, a seal stack housing 6, a motor 7, a gear box 8, a sealing lever 9, and an actuating lever 155 provided for permitting the simultaneous releasing of the tensioning wheel 3 and the gripping jaw 2 from strap gripping positions and for the sequential positioning of them into strap gripping positions. When strapping a package or other object, the leading end 11 of a strap 12 is positioned beneath the gripping jaw 2 and above a strap rest plate 13. The extreme front surface 14 of the leading strap end is pressed up against the surface 15 of another strap rest plate 16. This leading strap end 11 is positioned at a time when the gripping jaw 2 is pivoted away from the strap rest plate 13 so that clearance is provided between the strap rest plate 13 and the teeth 10 of the gripping jaw 2 to permit insertion of the leading strap end 11. After the leading strap end 11 is positioned, as described, the strap 12 is formed into a loop around an object 17, as shown in Fig. 2 and the supply end 18 of the strap is passed over the strap rest plate 16 and beneath the rotary strap tensioning wheel 3, through an inside opened slot 19 in the gripping jaw 2 and back to the supply coil of strap (not shown). A projecting spring 20 is mounted to project above a projecting plate 21 and the supply strap end 18 is passed from the tool between the spring 20 and the plate 21. The spring 20 may be deflected upwardly to permit lateral insertion of the strap end 18 below the spring. The purpose of the spring 20 is to keep the strap end held in alignment through the tool. In addition, another strap guide 22 is provided adjacent the tensioning wheel 3. This strap guide 22 also prevents lateral movement of the strap after it is positioned beneath the tensioning wheel 3. At a time when the supply end 18 is inserted beneath the tensioning wheel 3, the tensioning wheel 3 is raised away from the strap rest plate 16 in order to provide clearance for it. In order to do this, the tensioning wheel frame 23 is pivoted upwardly on the pin 24 on which it is mounted to the frame and this movement also causes the guide 22 to be raised with it to permit lateral entry of the strap end 18. When the tensioning wheel 3 is returned downward to engage the strap, the guide 22 is also brought down with it. Not only does the guide 22 prevent lateral movement of the supply strap end 18, but it also serves the same function for the leading strap end 11.

More details of the strap guide 22 are shown in Fig. 15 where it is seen that the guide 22 is pivotally mounted on a pin 25 which is fastened to the tensioning wheel housing 23. A spring 26 is wrapped around the pin 25 and reacts between a lug 27 on the tensioning wheel frame 23 and the strap guide 22 to urge it in a clockwise direction as viewed in Fig. 15. It is necessary to provide a space 28 between the tensioning wheel 3 and the strap rest plate 16 so that the teeth of the tensioning wheel 3 do not dig in and wear away the top surface of the strap rest plate 16 when the tool is operated without any strap in position. In order to maintain this spacing, a shoulder 29 is provided on the strap guide 22 and it rests upon the upper end of a cam 30 which is fastened to the frame 1 by means of two screws 31. When the guide 22 is raised, a projection 32 slides up an angular cam surface 33 so that the guide 22 is pivoted outward simultaneously with its movement upward. This complex movement of the guide 22 insures that its lower end is well clear of the strap rest plate 16 so that there is plenty of room for inserting the strap.

After the strap 12 is positioned as shown in Fig. 2, with its two strap ends 11 and 18 properly threaded into the tool, it is then necessary to tension the strap 12 by rotating the tensioning wheel 3 in the direction of the

arrow 34 in order to draw the supply strap end 18 in the direction of the arrow 35. In order to rotate the tensioning wheel 3, the motor 7 is provided. The particular motor 7 shown is operated from a source of air pressure supplied to the motor at 36 from a suitable source. The air motor 7 may be of a conventional rotary type which rotates a shaft 37 at its inner end and the shaft 37 is connected by suitable gears provided in the gear box 8 to rotate the shaft 38 on which the tensioning wheel is mounted. Although an air motor is shown as the source of power for the tensioning wheel, other types of motors could be used as well in order to properly drive the tensioning wheel 3. The particular advantage of the air type motor is that it is small and it provides a convenient handle which can be gripped by the operator as indicated by phantom lines 39 in Fig. 1. Another advantage of the air pressure operated motor is that the maximum tension to be reached in the strap 12 can be adjusted by simply regulating the total pressure in the air line supplied to the air motor 7.

After tensioning of the strap 12 has been completed, the next step is to shear the strap loop from the supply strap end 18. This is accomplished by means of a strap shear mechanism 5 which consists of a depending frame 40 pivoted on a pin 41 mounted on the frame 1 (Figs. 1, 2, 6 and 7). The frame 40 is provided at its lower end with a fixed shear blade 42 projecting laterally of the tool. This shear blade 42, upon threading of the tool with the strap, fits between the strap ends; the leading strap end 11 being positioned beneath, and the supply strap end 18 being positioned above, the shear blade 42. The upper corner 43 of the shear blade 42 is provided as the shearing edge. Pivotally mounted on a pin 44 to the shear frame 40 is shear blade 45 whose rear end projects into an aperture in the lower end of a lever 46. The outer end of the shear blade 45 projects into the cutting region where its corner edge 47 rests against the fixed shear blade 42. When the shear blade 45 is pivoted from its position as shown in phantom lines 48 in Fig. 6 to a position as shown there in bold outline, the supply strap end 18 is caused to be severed from the strap loop as the cutting edge 47 passes the cutting edge 43. In order to actuate the pivoted shear blade 45. The lever 46 is raised. In order to raise the lever 46, a pin 49 to which the upper end of the lever is fastened is moved upwardly. The pin 49 is mounted in a triangular shaped lever 50 which is mounted on the shaft 41. Upon rotation of the triangular shaped lever 50 in a counterclockwise direction as viewed in Fig. 1, the lever 46 is raised to cause the shearing of the strap end 18 and the pivoted shear blade 45 travels until its surface 51 strikes surface 52 of the shear frame 40. At this point, upon further counterclockwise rotation of the triangular lever 50, the lever 46 causes the shear frame 40 to pivot from its position as shown in Figs. 1 and 2 to a position as shown in Fig. 7. From what has just been stated, it is apparent that the shearing of the strap end 18 occurs immediately prior to the time that the shear frame 40 is pivoted to the position in Fig. 7.

The reason for this pivotal movement of the shear frame 40 is to remove the shear frame from the region where the sealer head is to be positioned in order to provide room for it. Therefore, the shearing of the strap and the pivotal movement of the shear frame 40 is brought about during the time that the sealer housing 4 is pivoted down to sealing position.

The sealer housing 4 is pivoted on a pin 53 which is mounted on the frame 1. The sealer housing 4 carries the sealer head 54 which is used to form a strap joint between the two overlapping strap ends by interlocking the two strap ends with an encircling metal seal 55 as shown in Fig. 10. In order to fully pivot the shear frame 40 to the position shown in Fig. 7, the sealer housing 4 is pivoted on pin 53 from a position as shown in Fig. 2 to a position as shown in Fig. 7. During this time a link

56 mounted on pin 57 on the triangular shaped lever 50 and pin 58 mounted on the sealer housing 4 are moved downwardly as the sealer housing 4 is pivoted downwardly. This movement causes the counterclockwise rotation of the triangular shaped lever 50 as viewed in Fig. 1, the rotation of the lever 50 causing the shearing and pivotal movement of the shear frame 40, as previously described. A coil spring 62 is mounted between a shaft 63 fastened to the frame 1 and a pin 64 fastened to one end of the triangular lever 50. This spring 62 tends to urge the triangular lever 50 in a clockwise direction as viewed in Fig. 1.

Pivoted on the sealer housing 4 on a pin 59 is the sealing lever 9. The sealing lever 9 is provided with a bulbous end 60 which is used as a manual grip. When the sealing lever 9 is moved in the direction of the arrow 61 of Fig. 2, the sealer housing 4 is caused to pivot downwardly to its position as shown in Figs. 7 and 12. It is essential that the sealer head 54 is positioned before the mechanism within the sealer head is actuated in order to have the sealer head positioned over the overlapping strap ends where it can form a joint. In order to accomplish this, the sealing lever 9 is prevented from rotation on the pin 59 relative to the sealer housing 4 during the downward pivoting of the sealer housing 4. Special mechanism is provided for this purpose and it is particularly shown in Figs. 2 and 12. Pivotally mounted on the pin 53 is one end 65 of a lever 66 whose other end 67 is pivoted on a pin 68 to one end 69 of another lever 70. The other end 71 of the lever 70 is pivoted on a pin 72 mounted in a projecting lug 73 of the sealing lever 9. When the sealer housing 4 is in the raised position of Fig. 2, the levers 66 and 70 are positioned relative to each other so that the center of the pin 68 is below the center line joining the pins 53 and 72. A projecting tab 74 on the lever 66 contacts a web 75 on the lever 70 in order to prevent movement of the pin 68 further down than the position as shown in Fig. 2. A helical spring 76 is positioned on the shaft 72 with one end reacting against the lever 70 and its other end reacting against a pin 77 which is mounted in the projecting lug 73 of the sealing lever 9. This spring urges the pin 68 downward to keep it in the position as shown in Fig. 2. Because of these levers 66 and 70, when the sealing lever 9 is moved in the direction of the arrow 61, the sealing lever 9 does not rotate on pin 59 relative to the sealer housing 4 with the result that the sealing lever 9 and the sealer housing 4 pivot downwardly as a single unit. At a point when the sealer head 54 is approximately in sealing position, as shown in Figs. 7 and 12, the pin 68 strikes a ledge 78 and moves to the opposite side of the center line connecting pins 53 and 72. At this point, continued movement of the sealing lever 9 in the direction of the arrow 61 causes the sealing lever 9 to rotate on pin 59 relative to the positioned sealer housing 4 to thereby cause operation of the mechanism within the sealer head 54 to form a seal joint of the type shown in Fig. 10 between the overlapping strap ends.

When the sealing lever 9 is pivoted in the direction of the arrow 61 relative to the sealer housing 4, it is pulled against the force of a coil spring 79 whose ends are connected between a pin 80 mounted on the sealer housing 4 and the pin 77 mounted on the projecting lug 73 of the sealing lever 9. The sealing lever 9 is provided with another pin 81 which is pivoted to the upper ends of two links 82 and 83 which are mounted on opposite sides of a lug 84 of the sealing lever 9 in which the pin 81 is actually mounted. The lower ends of the links 82 and 83 are connected by means of another pin 85 which pivots these links to a block 86. The block 86 is provided with two depending lugs 87 and 88 which are pivoted on a pin 89 to the upper ends of two links 90 and 91 whose lower ends are pivoted to a total of eight sealer jaws 92 and 93 by means of pins 94 and 95, respectively. The sealer jaws 92 are pivoted at their lower ends on a pin 96 while the

sealer jaws 93 are pivoted on a pin 97, both pins 96 and 97 being mounted in a fixed position to the sealer housing 4. The sealer jaws 92 and 93 are superimposed upon each other and separated by means of two bridge plates 98 and 99 which are mounted in fixed position on the pins 96 and 97 and these bridge plates 98 and 99 are positioned between the outer sealer jaws 92 and 93 as shown particularly in Figs. 2, 7 and 12. Thus, there is provided on either side of the sealer head a sealer jaw, a bridge plate, two more sealer jaws, a bridge plate and then another sealer jaw. With this arrangement, when the sealer linkages are actuated from a position as shown in Fig. 8 to positions as shown in Fig. 9, a seal joint as shown in Fig. 10 is formed. Projecting hooks 100 on the sealer jaws 92 and 93 fold the legs 101 of the seal 102 around the two overlapping ends 11 and 18 and raise the seal and the two strap ends upwardly after the seal is wrapped tubularly around the strap ends. As the seal and strap ends are raised, the bridge plates 98 and 99 react against the top of the seal to form the downwardly extending lugs 103 as the seal and strap ends are sheared by this action.

A spring loaded plunger 104 is provided in the sealer head above the position where the seal 102 is placed. Its purpose is to press downwardly against the seal 102 to urge its legs 101 against ledges 105 provided on the sealer head 54 in order to keep the seal 102 positioned in the sealer head ready for sealing operation. The plunger 104 is preferably provided with a projecting tip 106 which engages an aperture 107 in the seal to insure that the seal is properly aligned in the sealer head. The outer end of the plunger 104 can be chamfered in order to permit the seal 102 to deflect the plunger 104 out of the way when the seal is fed into the sealer head as hereinafter described.

In order to get seals into the sealer head 54, the seal stack housing 6 is mounted on the frame 1 parallel to the cover plate 108 of the sealer head 54 by means of screws 109 and 110. This seal stack housing 6 is provided with a rectangular shaped opening 120 extending for substantially its full length and housing a stack of seals 102 superimposed one upon the other. The mechanism associated with the seal feed is best shown in Figs. 1, 2, 3, 4, and 11. The bottommost seal of the seal stack straddles two separated plates 111 and 112 between which is mounted a seal feed lever 113. The upper end of the seal stack is provided with a block 114 which is connected by means of a pin 115 to the free end of a helically wound spring 116 which is wound around a pin 117 mounted in a bracket 118 fastened to pin 119 mounted on the frame 1. The inner end of the spring 116 is connected in a fixed position to the pin 117 and is wound in such a manner that the spring exerts a downward force on the pin 115 so that the block 114 is urged against the top seal 102 of the seal stack. The seal feed lever 113 is provided with two pins, 121 and 122. Pin 121 projects from one side of the lever 113 into a groove 123 in the plate 111. The groove 123 is curved to provide the proper travel for the seal feed lever 113. The other pin 122 is positioned in grooves 124 at the lower ends of both of the plates 111 and 112 and is free to slide in those grooves. Two pins 125 and 126 are mounted between the plates 111 and 112 to limit the travel of the seal feed lever in opposite directions as it is moved between the side plates 111 and 112. A helical spring 127 is mounted around a pin 128 mounted on the frame 1. One end of the spring is connected to the pin 121 while the other end of the spring is connected to the pin 125 so that it urges the seal feed lever 113 to a position as shown in Fig. 2.

When the sealer housing 4 is being lowered to sealing position, the sealer head 54 is already provided with a seal 102 from the last cycle of operation. Therefore, the seal feed mechanism does not feed in a seal to the sealer head 54 during the time that the sealer housing 4 is first lowered, but rather at a time when the sealer housing

returns to approach its position as shown in Fig. 2. Upon downward movement of the sealer housing 4, a surface 129 on the sealing lever 9 pivots down to contact the end 130 of a lever 131. This lever 131 is mounted on a shaft 132 which is fastened to the frame 1. The lever 131 is provided with a projecting arm 133 to which is fastened one end of a spring 134 whose other end is fastened to a pin 63 mounted on the frame 1. An inner portion of the lever 131 is connected to another lever 135 which is fastened directly to it so that it moves with it. Upon this downward movement of the sealing lever 9 and movement of the end 130 of the lever 131 in the direction of the arrow 136, the lever 135 is caused to move in the direction of the arrow 137 as viewed in Fig. 11. This movement of the lever 135 causes the seal feed lever 113 to move from the position as shown in Fig. 2 to its position as shown in Fig. 3. At this point the seal feed lever 113 is prepared to feed the lowermost seal 102 of the seal stack into the sealer head 54. The seal feed lever 113 is provided with a shoulder 138 which engages the seal to cause it to be moved into the sealer head. However, the seal cannot be fed into the sealer head until the sealer head 54 returns again to its position as shown in Fig. 2. Therefore, a shoulder 139 on the lever 131 is provided for preventing seal feed until the sealer head 54 is in its returned position. In order for this shoulder 139 to act, another lever 140 is provided and this lever 140 is somewhat triangularly shaped and pivoted on the pin 41 which is the same pin that the plate 50 is mounted on. A helical spring 141 is wrapped around the shaft 41 to react against a lug 142 on the frame and a portion of the lever 140 to urge the lever 140 in a counterclockwise direction as viewed in Fig. 1. When the lever 131 has been rotated in a counterclockwise direction as viewed in Fig. 11 the shoulder 139 passes the end 143 of the lever 140 so that the lever 140 rotates in a counterclockwise direction and its end 143 contacts the shoulder 139. In this way the lever 131 is prevented from rotating in a clockwise direction to cause the seal feed lever to operate until the lever 140 is released from the shoulder 139. This occurs at a time when the sealer housing 4 is again in its position as shown in Fig. 2 when a lug 144 on the lever 50 strikes a screw 145 which is mounted in a block 146 fastened to the lever 140. The final travel of the lever 50 causes enough movement of the lever 140 to cause it to pivot clockwise as viewed in Fig. 11 and thereby disengage its end 143 from the shoulder 139. At this instant the lever 131 is free to rotate in a clockwise direction by the force of the spring 134 to cause the seal feed lever 113 to move from a position as shown in Fig. 3 to a position as shown in Fig. 2 to cause a seal 102 to be fed into the sealer head 54. The screw 145 is adjustable in and out of block 146 in order to vary the point in the travel of the lever 50 at which the lug 144 on it strikes the screw 145 and releases the lever 131 for causing a seal 102 to be fed into the sealer head 54. A lock nut 147 is provided on the screw 145 in order to maintain its position.

So far, everything that has been mentioned has been concerned with the operation of a preferred embodiment of a tool in which improvement of this invention may be incorporated. However, many of the features of the tool described could be varied considerably without departing from the true scope of the invention. As already emphasized in the advantages of this invention, improvement is directed toward an improved linkage mechanism between the actuating parts for both the strap gripping jaw 2 and the strap tensioning wheel 3 which eliminates the difficulty of prior art devices by providing means for permitting the sequential operation of the gripping jaw 2 and the tension wheel 3 with full positive control at a single station on the tool. This linkage mechanism is particularly shown in Figs. 1, 2, 13 and 14.

The strap gripping jaw 2 is pivoted on the frame 1 by means of a pin 148 which extends through the frame from one side of the tool to the other and is connected to a yoke shaped lever 149. The lever 149 is provided with a projecting arm 150 which may be depressed to cause pivotal movement of the lever 149 and of the gripping jaw 2 since both are connected together on the shaft 148. A helical spring 151 is mounted to react against the arm 150 and the frame 1 in order to urge the lever 149 and the strap gripping jaw 2 in a clockwise direction as viewed in Fig. 2. A depending ear 152 on one side of the lever 149 is connected by means of a pin 153 to one end 154 of the control lever 155. The other end 158 of the control lever 155 is urged upwardly by means of a spring 156 connected between pin 119 (already described) and a pin 157 fastened to the control lever 155. The end 158 of the control lever 155 is limited in its upward movement by means of a pin 159 projecting laterally from the gear box 8. Above the pin 157 the control lever 155 is provided with a thumb lever 160 used for depressing the control lever 155. The strap tension wheel 3, as already mentioned, is mounted on a shaft 38 which in turn is mounted on an auxiliary frame 161 which is pivoted on a pin 24 in the frame 1 of the tool. By pivoting the auxiliary frame 161 on the pin 24, it is possible to raise and lower the tension wheel 3 from and to strap gripping position. In addition to the auxiliary frame 161 being pivoted on the pin 24, the gear box 8 is also pivoted on this pin 24 and integrally connected to the auxiliary frame 161 so that only pivotal movement of the gear box 8 will cause pivotal movement of the auxiliary frame 161. Therefore, when pivoting the gear box 8 from a position as shown in Fig. 1 or as shown in phantom lines in Fig. 13 to a position as shown in bold outline in Fig. 13, the tension wheel 3 is raised from the strap rest plate 16. Further, when pivoting the lever 149 from a position as shown in Fig. 1 to a position as shown in bold outline in Fig. 13, the gripping jaw 2 is also raised from its strap rest plate 13. When it is desired to start a strapping cycle, the air motor 7 constitutes a lever which is gripped by the hand of the operator in a manner similar to what is shown in phantom lines in Fig. 1. The air motor 7 is moved downward in the direction of the arrow 162 with the result that the gear box 8 is pivoted on the pin 24 to cause the tension wheel 3 to be raised from the strap rest plate 16. Simultaneously with this movement, the pin 159 on the gear box 8 reacts against a shoulder 163 to pull the control lever 155 in the direction of the arrow 164 (Fig. 13). This causes pivotal movement of the gripping jaw 2, thus raising it up away from the strap rest plate 13. At this time, both the gripping jaw 2 and the tensioning wheel 3 being elevated from their strap rest plates, the tool is ready for the insertion of the strap ends 11 and 18. The strap end 11 is the first one to be inserted and it is positioned beneath the gripping jaw 2 in a position approximating that as shown in Fig. 2. After it is positioned, the lever 160 is depressed to cause the control lever 155 to assume a position as shown in bolt outline in Fig. 14. As the control lever 155 is lowered, it moves forward in the direction of the arrow 165 as the shoulder 163 clears the pin 159. This causes the gripping jaw 2 to grip the strap end 11 against the strap rest plate 13. Next, a strap loop is formed around the package 17 and the supply strap end 18 is threaded through the tool as indicated in Fig. 2. The strap end 18 passes beneath the tension wheel 3 while it is in its raised position and after the strap is located, the gear box 8 is rotated from a position as shown in Fig. 14 to a position as shown in Figs. 1 and 2 to thereby cause the tension wheel 3 to engage the strap end 18 and press it against the strap rest plate 16. After the tension wheel 3 has gripped the strap end 18 in this manner the remaining operations of the tool are carried out as previously mentioned. They include the tensioning of the strap 12, the shearing of the supply strap end 18 and finally the formation of a seal joint. After all of these operations have been performed, the

gear box 8 is again pivoted by moving the air motor 7 in the direction of the arrow 162 to thereby cause the simultaneous release of both the gripping jaw 2 and the tension wheel 3 from strap gripping positions.

A toggle link is provided for tending to keep the gear box 8 in either a position as shown in Fig. 1 or as shown in Fig. 14. The toggle arrangement consists of a link 166 mounted on the pin 41. The free end of the link 166 is provided with a rounded groove 167 which bears against a pin 168 provided adjacent the outer end of a larger pin 169. The pin 169 is located in a bore 170 provided in the gear box 8. The pin 169 is provided with an internal bore 171 which contains a coil spring 172 which reacts against the inner end of the bore 171 of the pin 169 and the bottom of the bore 170 in the gear box 8. The spring pressure of the spring 172 is sufficient to retain the gear box 8 in either of its positions as shown in Figs. 1 or 13. In order to pivot the gear box 8 from either of its positions to the other, it is necessary to work against the pressure of the spring 172 as the pin 169 is depressed into its bore 170 during the pivotal movement. In addition, the pressure of the spring 172 is used to bias the tension wheel 3 against its strap resting plate 16 when the tension wheel 3 is in strap gripping position. Although one embodiment of a tool incorporating the improvements of this invention has been shown and described, it should be understood that the embodiment can be quite substantially altered without departing from the true scope of the invention as set out in the following claims.

I claim:

1. In a strapping tool of a type having a gripping jaw for gripping one end of a strap loop encircled about a bundle and a rotary tensioning wheel for gripping and moving the other end of the strap loop to draw the strap loop taut about the bundle comprising a frame having a base for resting against a bundle being bound and having a pair of strap supports, one adjacent the gripping jaw and the other adjacent the rotary tensioning wheel, an auxiliary frame rotatably supporting the rotary tensioning wheel and pivotally mounted to the frame to permit movement of the rotary tensioning wheel toward and away from the strap support adjacent thereto, a first lever attached to the auxiliary frame for rocking the auxiliary frame to move the rotary tensioning wheel toward and away from its adjacent strap support, means on the first lever to cause rotation of the rotary tensioning wheel, a spring biased toggle mounted between the first lever and the frame for holding the rotary tensioning wheel either toward or away from its adjacent strap support, a shaft for pivoting the gripping jaw to the frame, a spring urging the gripping jaw toward its adjacent strap support, a second lever attached to the gripping jaw for rocking it toward and away from its adjacent strap support, a control lever pivotally connected at its far end to the second lever and having its inner end urged upward by means of a spring, the inner end engaging a projection on the first lever when both the rotary tensioning wheel and the gripping jaw are rotated away from their respective strap supports, the inner end disengaging the projection upon downward movement of the inner end of the control lever to thereby permit the gripping jaw to move toward its adjacent strap support under the force of said spring urging it in that direction, the inner end of the control lever extending in sufficient proximity to said first lever to permit one hand operation of the control lever and the first lever from the same approximate location on the tool without shifting the position of the operator's hand.

2. In a strapping tool of a type having a gripping jaw for gripping one end of a strap loop encircled about a bundle and a rotary tensioning wheel for gripping and moving the other end of the strap loop to draw the strap loop taut about the bundle comprising a frame having a base for resting against a bundle being bound and having a pair of strap supports, one adjacent the gripping jaw and

the other adjacent the rotary tensioning wheel, an auxiliary frame rotatably supporting the rotary tensioning wheel and pivotally mounted to the frame to permit movement of the rotary tensioning wheel toward and away from the strap support adjacent thereto, a first lever attached to the auxiliary frame for rocking the auxiliary frame to move the rotary tensioning wheel toward and away from its adjacent strap support, means on the first lever to cause rotation of the rotary tensioning wheel, a spring biased toggle mounted between the first lever and the frame for holding the rotary tensioning wheel either toward or away from its adjacent strap support, a shaft for pivoting the gripping jaw to the frame, a spring urging the gripping jaw toward its adjacent strap support, a second lever attached to the gripping jaw for rocking it toward and away from its adjacent strap support, a control lever pivotally connected at its far end to the second lever and having its inner end urged upward by means of a spring, the inner end having a notch engaging a pin projecting from the first lever when both the rotary tensioning wheel and the gripping jaw are rotated away from their respective strap supports, the notch disengaging the pin upon downward movement of the inner end of the control lever to thereby permit the gripping jaw to move toward its adjacent strap support under the force of said spring urging it in that direction, the inner end of the control lever extending in sufficient proximity to said first lever to permit one hand operation of the control lever and the first lever from the same approximate location on the tool without shifting the position of the operator's hand.

3. In a strapping tool of a type having a gripping jaw for gripping one end of a strap loop encircled about a bundle and a rotary tensioning wheel for gripping and moving the other end of the strap loop to draw the strap loop taut about the bundle comprising a frame having a base for resting against a bundle being bound and having a pair of strap supports, one adjacent the gripping jaw and the other adjacent the rotary tensioning wheel, an auxiliary frame rotatably supporting the rotary tensioning wheel and pivotally mounted to the frame to permit movement of the rotary tensioning wheel toward and away from the strap support adjacent thereto, a first lever attached to the auxiliary frame for rocking the auxiliary frame to move the rotary tensioning wheel toward and away from its adjacent strap support, a motor mounted on the first lever to cause rotation of the rotary tensioning wheel, a spring biased toggle mounted between the first lever and the frame for holding the rotary tensioning wheel either toward or away from its adjacent strap support, a shaft for pivoting the gripping jaw to the frame, a spring urging the gripping jaw toward its adjacent strap support, a second lever attached to the gripping jaw for rocking it toward and away from its adjacent strap support, a control lever pivotally connected at its far end to the second lever and having its inner end urged upward by means of a spring, the inner end having a notch engaging a pin projecting from the first lever when both the rotary tensioning wheel and the gripping jaw are rotated away from their respective strap supports, the notch disengaging the pin upon downward movement of the inner end of the control lever to thereby permit the gripping jaw to move toward its adjacent strap support under the force of said spring urging it in that direction, the inner end of the control lever extending in sufficient proximity to said first lever to permit one hand operation of the control lever and the first lever from the same approximate location on the tool without shifting the position of the operator's hand.

4. In a strapping tool of a type having a gripping jaw for gripping one end of a strap loop encircled about a bundle and a rotary tensioning wheel for gripping and moving the other end of the strap loop to draw the strap loop taut about the bundle comprising a frame having a base for resting against a bundle being bound and having a pair of strap supports, one adjacent the gripping and the other adjacent the rotary tensioning wheel, an auxiliary

frame rotatably supporting the rotary tensioning wheel and pivotally mounted to the frame to permit movement of the rotary tensioning wheel toward and away from the strap support adjacent thereto, a first lever attached to the auxiliary frame for rocking the auxiliary frame to move the rotary tensioning wheel toward and away from its adjacent strap support, means on the first lever to cause rotation of the rotary tensioning wheel, a spring biased toggle mounted between the first lever and the frame for holding the rotary tensioning wheel either toward or away from its adjacent strap support, a shaft for pivoting the gripping jaw to the frame, a spring urging the gripping jaw toward its adjacent strap support, a second lever attached to the gripping jaw for rocking it toward and away from its adjacent strap support, a control lever pivotally connected at its far end to the second lever and having its inner end urged upward by means of a spring, the inner end engaging a projection on the first lever when both the rotary tensioning wheel and the gripping jaw are rotated away from their respective strap supports, the inner end disengaging the projection upon downward movement of the inner end of the control lever to thereby permit the gripping jaw to move toward its adjacent strap support under the force of said spring urging it in that direction, the inner end of the control lever also engaging the projection on the first lever when both the rotary tensioning wheel and the gripping jaw are rotated toward their respective strap supports, the inner end of the control lever extending in sufficient proximity to said first lever to permit one hand operation of the control lever and the first lever from the same approximate location on the tool without shifting the position of the operator's hand.

5. In a strapping tool of a type having a gripping jaw for gripping one end of a strap loop encircled about a bundle and a rotary tensioning wheel for gripping and moving the other end of the strap loop to draw the strap loop taut about the bundle comprising a frame having a base for resting against a bundle being bound and having a pair of strap supports, one adjacent the gripping jaw and the other adjacent the rotary tensioning wheel, an auxiliary frame rotatably supporting the rotary tensioning wheel and pivotally mounted to the frame to permit movement of the rotary tensioning wheel toward and away from the strap support adjacent thereto, a first lever attached to the auxiliary frame for rocking the auxiliary frame to move the rotary tensioning wheel toward and away from its adjacent strap support, means on the first lever to cause rotation of the rotary tensioning wheel, a spring biased toggle mounted between the first lever and the frame for holding the rotary tensioning wheel either toward or away from its adjacent strap support, a shaft for pivoting the gripping jaw to the frame, a spring urging the gripping jaw toward its adjacent strap support, a second lever attached to the gripping jaw for rocking it toward and away from its adjacent strap support, a control lever pivotally connected at its far end to the second lever and having its inner end urged upward by means of a spring, the inner end having a notch engaging a pin projecting from the first lever when both the rotary tensioning wheel and the gripping jaw are rotated away from their respective strap supports, the notch disengaging the pin upon downward movement of the inner end of the control lever to thereby permit the gripping jaw to move toward its adjacent strap support under the force of said spring urging it in that direction, the notch on the control lever also engaging the pin on the first lever when both the rotary tensioning wheel and the gripping jaw are rotated toward their respective strap supports, the inner end of the control lever extending in sufficient proximity to said first lever to permit one hand operation of the control lever and the first lever from the same approximate location on the tool without shifting the position of the operator's hand.

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