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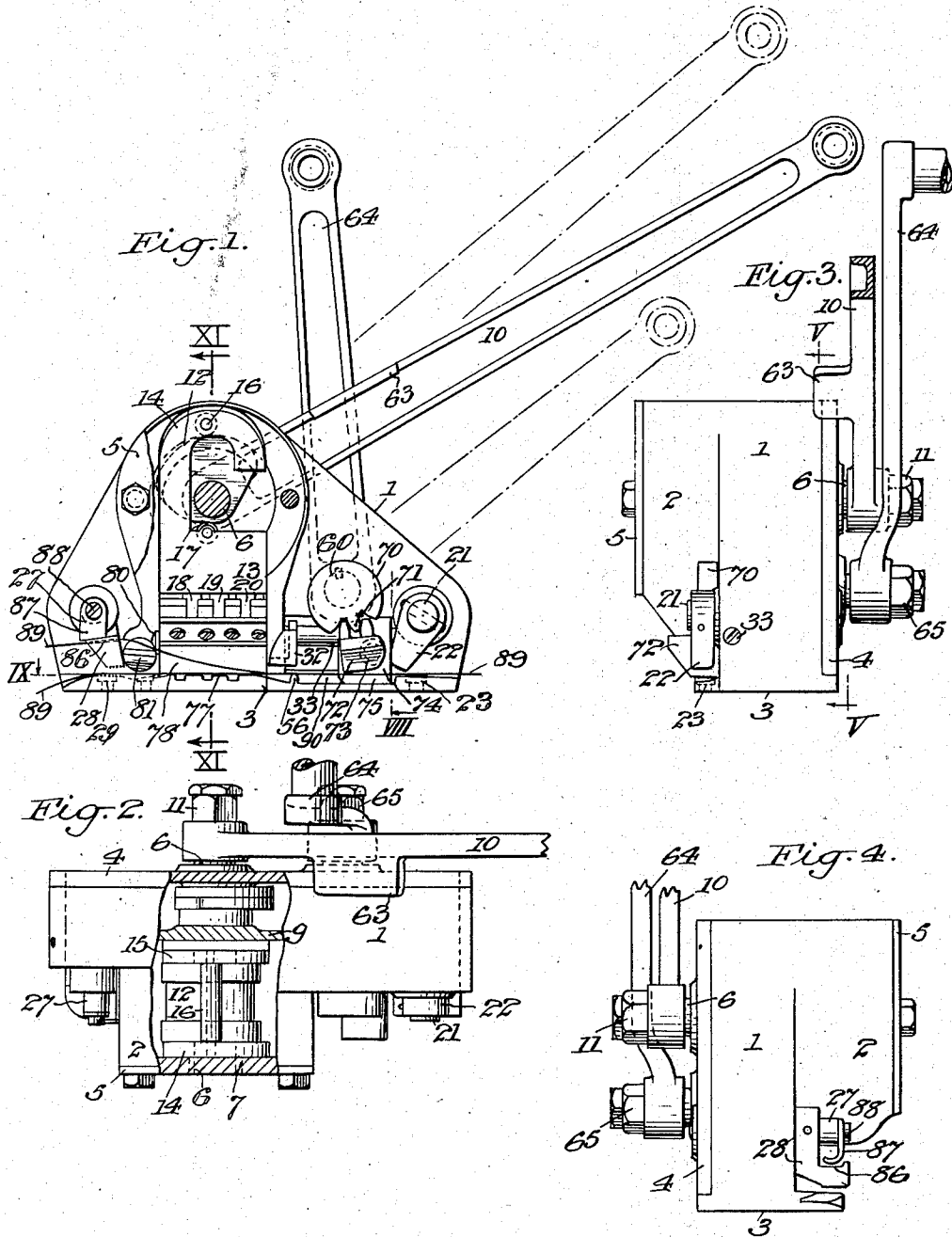
B. L. WATT ET AL

2,386,153

BAND TIGHTENING AND SEALING TOOL

Original Filed Aug. 10, 1939

2 Sheets-Sheet 1



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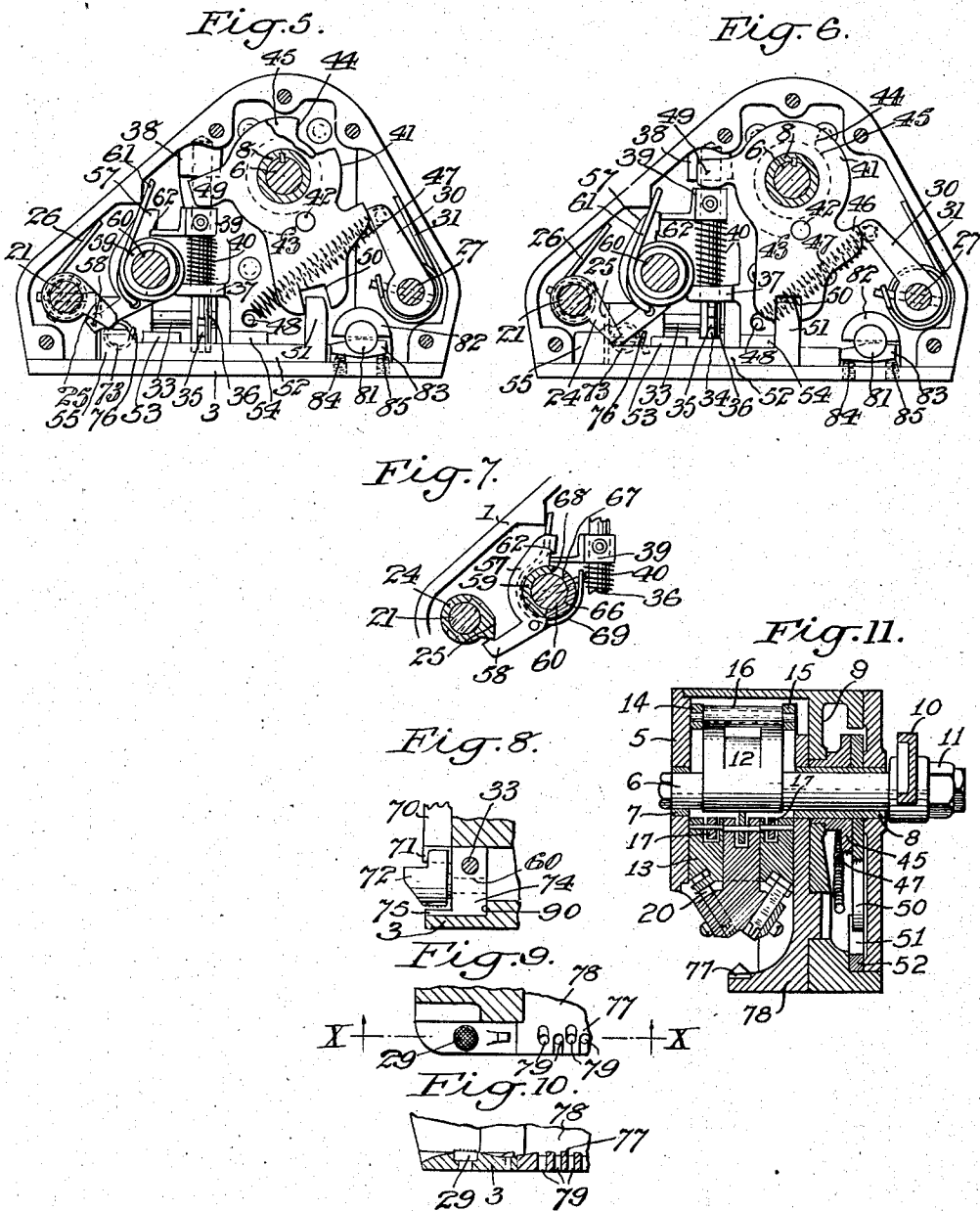
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2,386,153

BAND TIGHTENING AND SEALING TOOL

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Original application August 10, 1939, Serial No. 289,352, now Patent No. 2,324,609, dated July 20, 1943. Divided and this application January 13, 1943, Serial No. 472,216

7 Claims. (Cl. 254—79)

This invention relates to a band tightening and sealing tool and has for an object to provide a manually operable device capable of accurately tensioning and sealing a band round a bundle or container with a minimum of physical effort and with a high degree of uniformity.

Another object consists in providing such a device in which a preliminary movement of the manually operable element for actuating the sealing mechanism serves to move certain of the parts to inactive position for permitting operative association of the tool with the band.

Another object consists in providing such a device in which a preliminary movement of the manually operable element for actuating the tensioning mechanism restores said last named parts to active position with respect to the band for cooperation during the tensioning of the band.

Another object consists in providing such a device in which the manually operable element for actuating the tensioning mechanism has a relatively long stroke and is out of contact with the parts that hold the band against reverse movement during tensioning, whereby the opportunity for slippage of the band is eliminated.

Another object consists in providing such a device which has improved and simplified means for holding the free or loose end of the strap during the tensioning and sealing operations.

Another object consists in providing such a device in which the operating mechanism is very largely enclosed, and yet is made readily accessible for adjustment, repair, or replacement, by the provision of two easily removable face plates.

A further object consists in providing certain improvements in the form, construction, and arrangement of the several parts whereby the above named and other objects may effectively be obtained.

This application is a division of our application Serial Number 289,352, filed August 10, 1939, now Patent No. 2,324,609, granted July 20, 1943.

A practical embodiment of the invention is represented in the accompanying drawings, in which

Fig. 1 represents a side view of the device, partly broken away, and with the operating handles shown in different positions in full and dot-dash lines;

Fig. 2 represents a top view of the same, partly broken away;

Fig. 3 represents an end view of the same, partly broken away;

Fig. 4 represents an end view of the same opposite to Fig. 3, partly broken away;

Fig. 5 represents a side view with the operat-

ing handles and one face plate removed, and with certain parts broken; the view being taken substantially in the plane of the line V—V of Fig. 3, looking in the direction of the arrows, and the parts being shown in the position represented by the dot-dash lines showing the operating handles in Fig. 1;

Fig. 6 represents a similar view with the parts shown in the position represented by the full lines showing the operating handles in Fig. 1;

Fig. 7 represents a detail section, partly in elevation, showing the relationship of certain parts in the tensioning mechanism;

Fig. 8 represents a detail vertical section taken in the plane of the line VIII of Fig. 1, looking in the direction of the arrow;

Fig. 9 represents a detail horizontal section taken in the plane of the line IX of Fig. 1, looking in the direction of the arrow;

Fig. 10 represents a vertical section taken in the plane of the line X—X of Fig. 9, looking in the direction of the arrows; and

Fig. 11 represents a transverse section taken in the plane of the line XI—XI of Fig. 1, looking in the direction of the arrows.

The tool or device includes a housing that consists of a main body portion 1, a lateral extension 2, a bottom 3, and opposite removable side plates 4, 5.

A shaft 6 has one end journaled in a bushing 7 located in an aperture formed in side plate 5, while its other end carries a sleeve 8 that finds a bearing in an aperture in side plate 4 and also in a web 9 that is cast integral with the housing. The last named end of shaft 6 protrudes outside of side plate 4 and has an operating handle 10 keyed thereto and fixed in place by a nut 11.

On an intermediate portion of the shaft 6 is fixed a cam 12 that is adapted to depress and elevate the sealing elements on their operative and inoperative strokes. To this end a vertically movable head 13 is mounted to slide between side plate 5 and web 9. This head has upwardly extending bifurcations 14, 15, which support the ends of a roller 16 that cooperates with cam 12 for the purpose of elevating the head 13 and mechanism carried thereby to inoperative position, while cam roll 17 is mounted in the head 13 below cam 12 for cooperating with it to depress the said head on the downward or operative stroke. From the immediately foregoing description it will be seen that rotative movement of the shaft 6 by means of oscillating handle 10 will vertically reciprocate the head 13 and parts carried thereby.

The head 13 carries six punches or sealing elements for interlocking the overlapped ends of the strap or band, three of which are shown in Fig. 1 and marked 18, 19, 20. As the construction, arrangement, mode of operation and function of the said sealing elements are fully set forth in our Patent No. 2,324,609, of which this application is a division, and as the said subject matter is not being claimed in this application, it is deemed unnecessary to further illustrate or describe the same.

Turning now to the mechanism for tensioning the strap or band, a shaft 21 is journaled in a side of the main body portion 1 of the housing and in side plate 4 and has an outwardly protruding end to which is pinned a foot 22 that is preferably roughened or serrated on its lower extremity for cooperation with a serrated plug 23 that is preferably composed of hardened material and set into a laterally projecting portion of housing bottom 3. The part of shaft 21 that lies within the housing has a dog 24 fixed thereon which has its extremity notched or cut away so as to form a shoulder 25 represented in dotted lines in Figs. 5 and 6. A coil spring 26 surrounds shaft 21 and has one end fixed in the shaft and the other end bearing against the housing, as clearly shown in Figs. 5 and 6, in order normally to urge said shaft in a clockwise direction as the parts are represented in Figs. 5 and 6, and in a counterclockwise direction as the parts are represented in Fig. 1, so as to tend to bring the extremity of foot 22 in cooperative relationship to plug 23 for the purpose of gripping the strap or band during the tensioning operation, as will be set forth.

Another shaft 27 is journaled in the main body 1 of the housing and in side plate 4, near the end of the housing opposite to the location of shaft 21. One end of shaft 27 protrudes laterally from the housing on the same side as the protruding end of shaft 21, and it has fixed thereto a foot 28 which preferably has its lower end serrated for cooperation with a hardened serrated plug 29 that is set into the adjacent lateral extension of housing bottom 3. The portion of shaft 27 that is within the housing has a finger 30 pinned thereto, and a coil spring 31 surrounds said shaft, having one end fast to the pin that secures finger 30 thereon and the other end bearing against housing 1 so as normally to urge shaft 27 in a counterclockwise direction as the parts are represented in Figs. 5 and 6, and in a clockwise direction as the parts are represented in Fig. 1, for the purpose of tending to establish cooperative relationship between foot 28 and plug 29.

A guide 32 for directing the movement of the strap or band to the sealing mechanism projects laterally from the housing to a position in line with foot 22 and foot 28. It is carried and projects laterally from a rod 33 that is mounted in the main body portion 1 of the housing and extends longitudinally thereof for a short distance between the shaft 21 and the sealing mechanism. The said guide has a tail piece 34 that is bifurcated, as shown in Fig. 6, and engages a pin 35 that is carried in the lower slotted end of a plunger 36 which is slidably mounted in a bracket 37 and a boss 38 that are formed integral with the web 9 of the housing. A latch 39 is fixed near the upper end of plunger 36, and an expansion coil spring 40 is located between the said latch and bracket 37 so as normally to urge the plunger in an upward direction.

A flat member 41 is freely mounted on sleeve 8 adjacent housing side plate 4, and has an inwardly

projecting stud 42 that is fitted for engagement with the radial shoulders 43, 44 of a disk 45 that is fast to sleeve 8 and is journaled in housing web 9. As a result of this construction, the sleeve 8 may turn with shaft 6 under the influence of handle 10 for about 180° without having any effect upon member 41 but, as soon as either shoulder 43 or 44 contacts stud 42, further movement of handle 10 in either direction will move member 41 in the same direction.

The said member 41 is formed with a nose 46 that is designed to abut the extremity of finger 30, and a retractile coil spring 47, which has one end secured to finger 30 and the other end secured to a stud 48 that is fixed to the housing, normally urges finger 30 into engagement with nose 46.

Member 41 also has a lug 49 projecting from the side thereof opposite to nose 46, which lug rests upon latch 39 and is normally held in abutment therewith by the expansive force of spring 40.

The lower part of member 41 is formed with a notch 50 that straddles an upward extension 51 on a slide 52 that rides on the top of housing bottom 3 adjacent side plate 4 to serve as an operative connection between member 41 and dog 24 and is held in place by clips 53 and 54, the former of which is fastened to the top of housing bottom 3, while the latter projects from housing web 9 and has a face that serves to guide the inner side of slide 52, just as side plate 4 guides the outer side of said slide. The end of the slide 52 opposite to that carrying the extension 51 is provided with an enlargement 55 that has slanting and horizontal surfaces, and the spring 26 on shaft 21 normally holds dog 24 in contact with said enlargement 55 on slide 52.

As a result of the arrangement just described, it will be seen that, when handle 10 is moved sufficiently to the right, as indicated by the difference between the dot-dash lines and the full lines in Fig. 1, the member 41 will move the slide 52 to the right in Figs. 5 and 6 until the dog 24 rides up the slanting surface of enlargement 55 and rests upon the horizontal surface thereof while, simultaneously, the nose 46 will swing finger 30 to the right so as to rotate shaft 27; and also, concurrently therewith, lug 49 will depress plunger 36. The movements just described are illustrated by the difference between the positions of the parts in Fig. 6 and Fig. 5, and the riding up of dog 24 onto the horizontal surface of enlargement 55 will swing foot 22 in a clockwise direction, as the parts are represented in Fig. 1, so as to move it out of cooperative relation with plug 23; the movement of finger 30 by nose 46 will swing foot 28 in a counterclockwise direction, so as to move it out of cooperative relation with plug 29; while depressing of plunger 36 will rock rod 33 so as to lift band guide 32 out of cooperative relation with the band support 56 that is formed on the housing bottom 3 immediately below the guide 32. Thus it will be seen that this movement separates or opens the said three pairs of cooperating elements so as to permit the band or strap that is to be tensioned and sealed to be inserted therebetween in the operation of the tool or device, as will be hereinafter described.

Means is provided for temporarily locking certain parts in open position, which means consists of a double latch having an upward extension 57 and a downward extension 58 and a hub 59 that is loosely mounted on a shaft 60 which is journaled in the main body 1 of the housing and

in-side plate 4, adjacent shaft 21. A coil spring 61 surrounds the hub 59 of the double latch and has one end fixed thereto while the other end bears against a projection on the inside of the main body 1 of the housing, as clearly shown in Figs. 5 and 6, so as normally to urge the latch and shaft 60 on which it is mounted in a clockwise direction as the parts are shown in said figures. When the handle 10 is actuated so as to move the parts from the position shown in Fig. 6 to the position shown in Fig. 5, as above explained, the depressing of plunger 36 will bring latch 39 into register with notch 52 in upward extension 57 of the double latch, whereupon spring 51 will immediately rotate the double latch in a clockwise direction so as to cause the extension 51 to catch the latch 39, as indicated in Fig. 5. This same motion will cause the lower extension 58 to catch shoulder 25 that is on dog 24 so as to hold the latter in the position represented in Fig. 5; with the result that the foot 22 and guide 32 are held in the elevated position shown in Fig. 1.

As soon as the double catch has thus operated, and the handle 10 is manually released, the tension of spring 47 forcing finger 39 against nose 46 will automatically return the member 41 and slide 52 to the position shown in Fig. 6. The tool then is ready to be brought into operative relation with the band or strap by moving it laterally so that the band enters between foot 22 and plug 23 and guide 32 and support 55; and the foot 28 may, at this moment, be separated from its cooperating plug 29 by again manually moving handle 10 to the right, as the parts are shown in Fig. 1 so as to cause nose 46 to swing finger 39 a slight distance in a clockwise direction. To facilitate this movement of the handle 10, a thumb piece 63 is formed thereon at a convenient location for the operative.

After the tool and band or strap have been brought into the relationship just described, the parts 22 and 32 should be released from their elevated positions so as to take their cooperative positions with respect to plug 23 and support 56 respectively. This is accomplished by manipulating a handle 64 that is keyed to shaft 60 and fixed in position thereon by a nut 65. On the said shaft 60, at the side of the double catch away from handle 64, there is pinned a collar 66 which has a shoulder 67 fitted for cooperation with an adjacent shoulder 68 on the hub 59 of the double catch when the shaft 60 is rotated in a counterclockwise direction. See Fig. 7. A spring 69 has one end fixed to the collar 66 and another end bearing against the housing 1 so as normally to urge the collar, and hence the shaft 60, in a clockwise direction. With this arrangement of parts, manipulation of the handle 64 so as to rotate shaft 60 a slight distance in a counterclockwise direction, will bring shoulder 67 in contact with shoulder 68, and thereby turn the double catch in the same direction so as to release its upper extension 59 from the latch 39, and its lower extension 58 from the shoulder 25 on dog 24. The moment this release is accomplished, spring 40 will elevate plunger 36 so as to bring it again into contact with lug 49 on member 41, as shown in Fig. 6. As already indicated, this releasing of the double catch will permit foot 22 and guide 32 to be moved downwardly into operative position by the springs which control them.

The end of shaft 60 which is exterior to the housing 1 and in line with foot 22 has fixed there-to a disk 70 (Fig. 1) that is provided with a gear

tooth 71 for engagement with a bifurcated clamp 72 that has an inwardly projecting eccentric stud 73 which is rotatably mounted in a block 74 that is slidably mounted on rod 33 and has a laterally and outwardly projecting lip 75 that rides on housing bottom 3 in line with foot 22 and guide 32. The inner end of the stud 73 is surrounded by a coil spring 76 (Fig. 5) that is secured to the stud and bears against the housing bottom in such a way as normally to urge the stud in a counterclockwise direction, as the parts are shown in Fig. 1, for the purpose of bringing the left-hand edge of clamp 72 into operative relationship with lip 75.

Manipulation of the handle 64 will, by imparting rotative movement to the shaft 60, slide block 74 and clamp 72 carried thereby because of the interengagement of gear tooth 71 with the said clamp and, therefore, oscillation of the said handle 64 will reciprocate the said block and clamp, which motion is made use of in the tensioning of the strap or band, as will be explained.

The device also includes an anvil or counter block for cooperation with the punches 18 to 20 inclusive of the sealing mechanism, which anvil is denoted by 77 (Figs. 1, 9 and 10) and is formed integral with a piece 78 that is suitably fastened in the housing. The arrangement is such that the anvil proper 77 sets into a gap in the lateral extension of the housing bottom 3 so as to be in line with the plugs 23 and 29, support 56, and lip 75 that cooperate with the foot 22, foot 28, guide 32 and clamp 72. See Fig. 1. The upper surface of the anvil is provided with six recesses, four of which are shown and marked 79 (Figs. 9 and 10), fitted to receive the extremities of the punches as the latter pass through the band or strap for the sealing operation.

For the purpose of severing the free and unused end of the strap or band, the head 13 carries a knife 80 (Fig. 1) that cooperates with a correspondingly shaped cutter which has a round shank 81 journaled in an upper half-bearing 82 (Figs. 5 and 6) that is cast integral with the housing 1 and cooperates with a lower support 83 which is carried by a pair of screws 84, 85 threaded into housing bottom 3. Said support 83 lies in a transverse slot formed in shank 81 and it will be seen that, by elevating one of the screws 84, 85 and depressing the other, the said shank may be rotated and the cutter thereby adjusted with respect to the knife 80 in order to compensate for wear or other cause that may disturb the proper relationship of said parts.

Before it is severed, the free end of the strap is supported on a grooved shoulder 86 (Figs. 1 and 4) formed on the foot 28 and is frictionally held in place thereon by the inturred lower edge of a curved clamping spring 87 that is fixed by a screw 88 on the end of shaft 27.

While the operation of the parts has been described in some detail in connection with the foregoing mechanical explanation, it may be advantageous here to summarize the same by noting that, in operation, the strap or band denoted by 89 (Fig. 1) is placed around the bundle, container or other article to be bound with its free ends on the top thereof. The tool is then set in place adjacent the strap or band and the handle 10 moved to the position shown in full lines in Fig. 1 so as to swing foot 22 and guide 32 and latch them out of cooperative relationship with plug 23 and support 56, to permit the entrance of the band or strap therebetween. After the foot 22 and guide 32 are thus latched out of operative posi-

tion, the handle 10 is automatically returned by spring 47 to the position shown in dot and dash lines in Fig. 1. The operative again moves the handle 10 from the said dot and dash line position toward the full line position by pressing upon thumb piece 63 so as to raise foot 28 from cooperative relationship with plug 29. He simultaneously pulls handle 64 a slight distance to the left from its full line position as shown in Fig. 1, thereby rocking clamp 72 on its stud 73 so as to move it out of contact with lip 75. With the parts in this position, the tool is moved laterally with respect to the strap or band, or the band is moved with respect to the tool, so as to bring the ends of the band into the position shown in Fig. 1 wherein the ends are overlapped on the anvil 77 and the upper end that is to be severed lies over cutter 81 and is frictionally clamped on shoulder 86 of foot 28 by spring 87.

The operative now moves handle 64 a slight distance to the right from the full line position shown in Fig. 1 to permit clamp 72 to be restored by its spring to cooperative position with respect to lip 75 and to release double catch 57, 58, 59, as previously described, and permit foot 22 and guide 32 to be returned by their springs so as to clamp the strap or band upon the plug 23 and hold it on the support 56. He also releases pressure upon the thumb piece 63 of handle 10 to permit foot 28 to be returned by its spring into cooperative relationship with plug 29.

It will be seen that the underneath end of the strap or band is now firmly clamped by foot 28, and the parts are in condition for tensioning the band by pulling upon the other end, which is accomplished by oscillating handle 64 between the full line position and the dot and dash line position. As the handle 64 is swung to the right from its full line position, the clamp 72 and lip 75 will slide to the left in Fig. 1, and thereby pull the end of the band clamped therebetween in the same direction, which motion is permitted by foot 22 because it will swing to the left under the influence of the movement imparted to the band. On the return stroke of the clamp and slide, the foot 22 will instantly grip the band between it and plug 23 thereby preventing any return movement of the band, whereas the band will slide between clamp 72 and lip 75 because the former is free to swing slightly in a counterclockwise direction during this movement. Repetition of the operation just described will tension the band bit by bit until it is as taut as desired; and it will be understood that, during this procedure, spring 87 will permit the upper free end of the band to slide on shoulder 86 of foot 28 because of the angular relationship of the said parts and the fact that the spring merely has a frictional grip upon the band.

Thereupon it is in order to seal the band and sever the excess free end, which is accomplished by swinging the handle 10 from its full line position shown in Fig. 1 far over to the left, thereby depressing the head 13 which carries the punches 18 to 20 inclusive and the blade 80 in a downward direction until, through cooperation with the anvil 77 and the cutter 81, the overlapping portions of the strap or band are sealed and the free end severed.

After the strap or band has been sealed and severed, the handle 10 is returned to the full line position represented in Fig. 1, and it and handle 64 are manipulated so as to release the band from gripping contact by foot 22, clamp 72, guide 32 and foot 28; whereupon the tool is moved later-

ally away from the sealed band, and is ready for action upon another strap or band.

In order to brace the block 74 against inward movement when pressure is exerted upon lip 75, the block is backed by a wall 90 (Fig. 8) that is formed integral with housing bottom 3, and which also serves to stiffen the latter.

It should be noted that the coacting parts are preferably composed of hardened material, such as suitable steel, and that the construction is such as to permit takeup for wear and ready replacement in case of excessive wear or breakage.

It will be understood that various changes may be resorted to in the form, construction, arrangement and material of the several parts without departing from the spirit and scope of our invention, and hence we do not intend to be limited to the details herein shown and described except as they may be included in the claims.

What we claim is:

1. A device of the character described comprising, means for holding one end of a strap, and means for tensioning the strap by progressively pulling on the other end, said tensioning means including a mechanism for gripping the strap to permit forward movement but prevent rearward movement, reciprocable sliding mechanism which grips the strap while moving in a forward direction and releases the strap while moving in a rearward direction, and manual means having a gear tooth connection with said reciprocable mechanism for reciprocating it and for separating its strap gripping elements to permit the strap to be brought into and out of functional relationship therewith prior to and subsequent to the tensioning of the strap.

2. A device of the character described comprising, means for holding one end of a strap, and means for tensioning the strap by progressively pulling on the other end, said tensioning means including, a mechanism for gripping the strap to permit forward movement but prevent rearward movement, a mechanism for guiding the strap during tensioning, means for moving said gripping mechanism and guiding mechanism into inoperative position, and means for latching said mechanisms in inoperative position.

3. A device of the character described comprising, means for holding one end of a strap, and means for tensioning the strap by progressively pulling on the other end, said tensioning means including, a mechanism for gripping the strap to permit forward movement but prevent rearward movement, a mechanism for guiding the strap during tensioning, means for moving said gripping mechanism and guiding mechanism into inoperative position, means for latching said mechanisms in inoperative position, and a single means for releasing said latched mechanisms and for actuating the tensioning means.

4. A device of the character described comprising, means for holding one end of a strap, and means for tensioning the strap by progressively pulling on the other end, said tensioning means including, a mechanism for gripping the strap to permit forward movement but prevent rearward movement, a mechanism for guiding the strap during tensioning, means for moving said gripping mechanism and guiding mechanism into inoperative position, means for latching said last named mechanisms in inoperative position, a reciprocable sliding mechanism which grips the strap while moving in a forward direction and releases the strap while moving in a rearward direction, and a single means for releasing said

latched mechanisms and for reciprocating said sliding mechanism.

5. A device of the character described comprising, means for holding one end of a strap, and means for tensioning the strap by progressively pulling on the other end, said tensioning means including, a mechanism for gripping the strap to permit forward movement but prevent rearward movement, a mechanism for guiding the strap during tensioning, means for moving said gripping mechanism and guiding mechanism into inoperative position, means for latching said last named mechanisms in inoperative position, a reciprocable sliding mechanism which grips the strap while moving in a forward direction and releases the strap while moving in a rearward direction, and a single means for releasing said latched mechanisms, for reciprocating said sliding mechanism, and for separating its strap gripping elements to permit the strap to be brought into and out of functional relationship therewith prior to and subsequent to the tensioning of the strap.

6. A device of the character described comprising, means for holding the overlapped portions of a strap in position for tensioning, sealing and severing, said means including four mechanisms for engaging the strap, two of said mechanisms

being strap gripping mechanisms, one being strap guiding mechanism, and one being strap tensioning mechanism, means for temporarily latching one of said gripping mechanisms and said guiding mechanism in inoperative position, and manually operable means for holding the other two of said four mechanisms in inoperative position to permit the device and strap to be brought into and out of functional relationship.

7. A device of the character described comprising, means for holding the overlapped portions of a strap in position for tensioning, sealing and severing, said means including four mechanisms for engaging the strap, two of said mechanisms being strap gripping mechanisms, one being strap guiding mechanism, and one being strap tensioning mechanism, means for temporarily latching one of said gripping mechanisms and said guiding mechanism in inoperative position, manually operable means for holding the other two of said four mechanisms in inoperative position to permit the device and strap to be brought into and out of functional relationship, and manually operable means for releasing said latched mechanisms and actuating said tensioning mechanism.

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