Oct. 13, 1942. H. J. SPENCER 2,298,658

STRAP TENSIONING AND SEALING DEVICE

Filed July 15, 1939 6 Sheets-Sheet 1

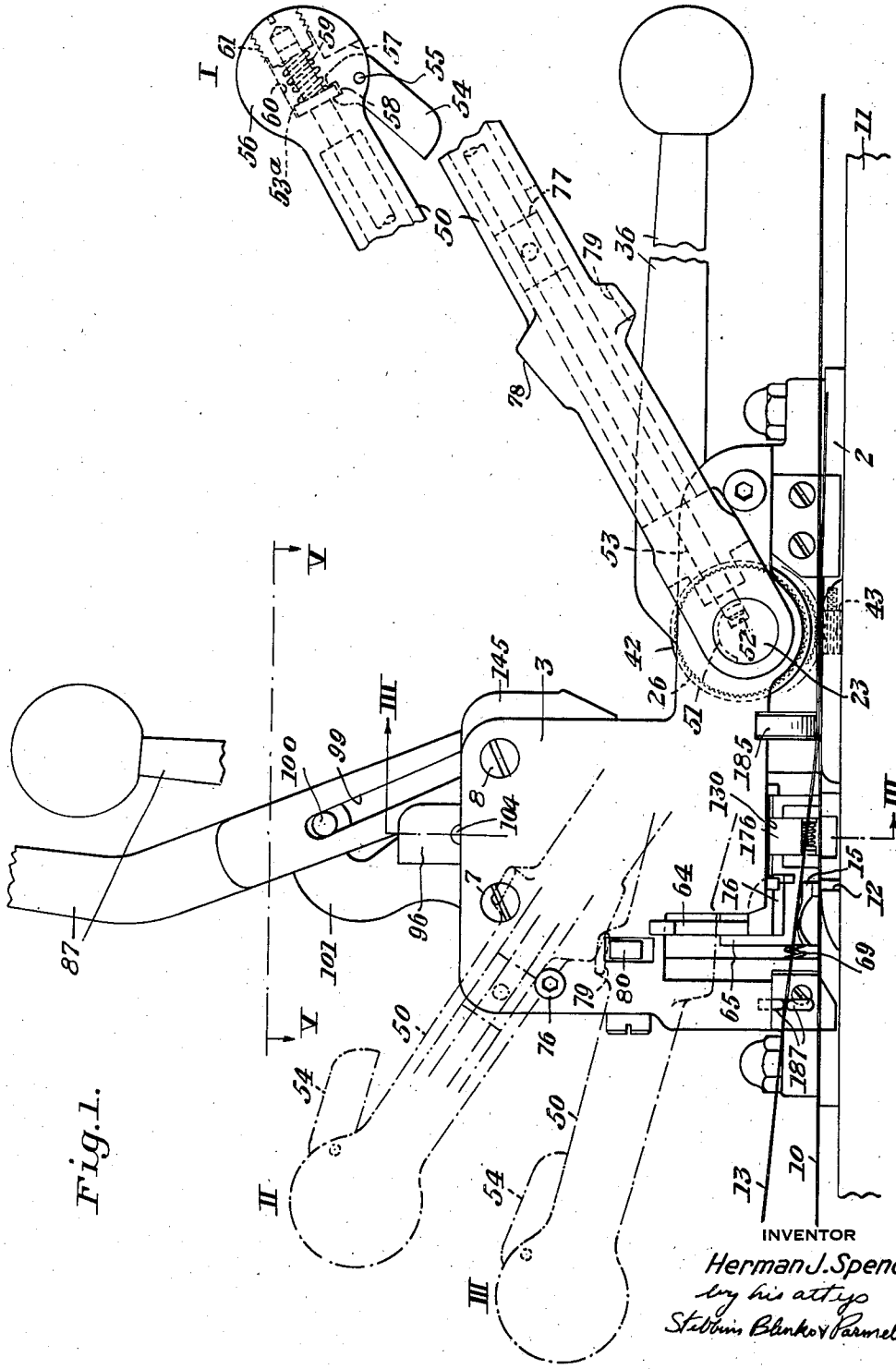

Fig. 1.

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Fig. 18.

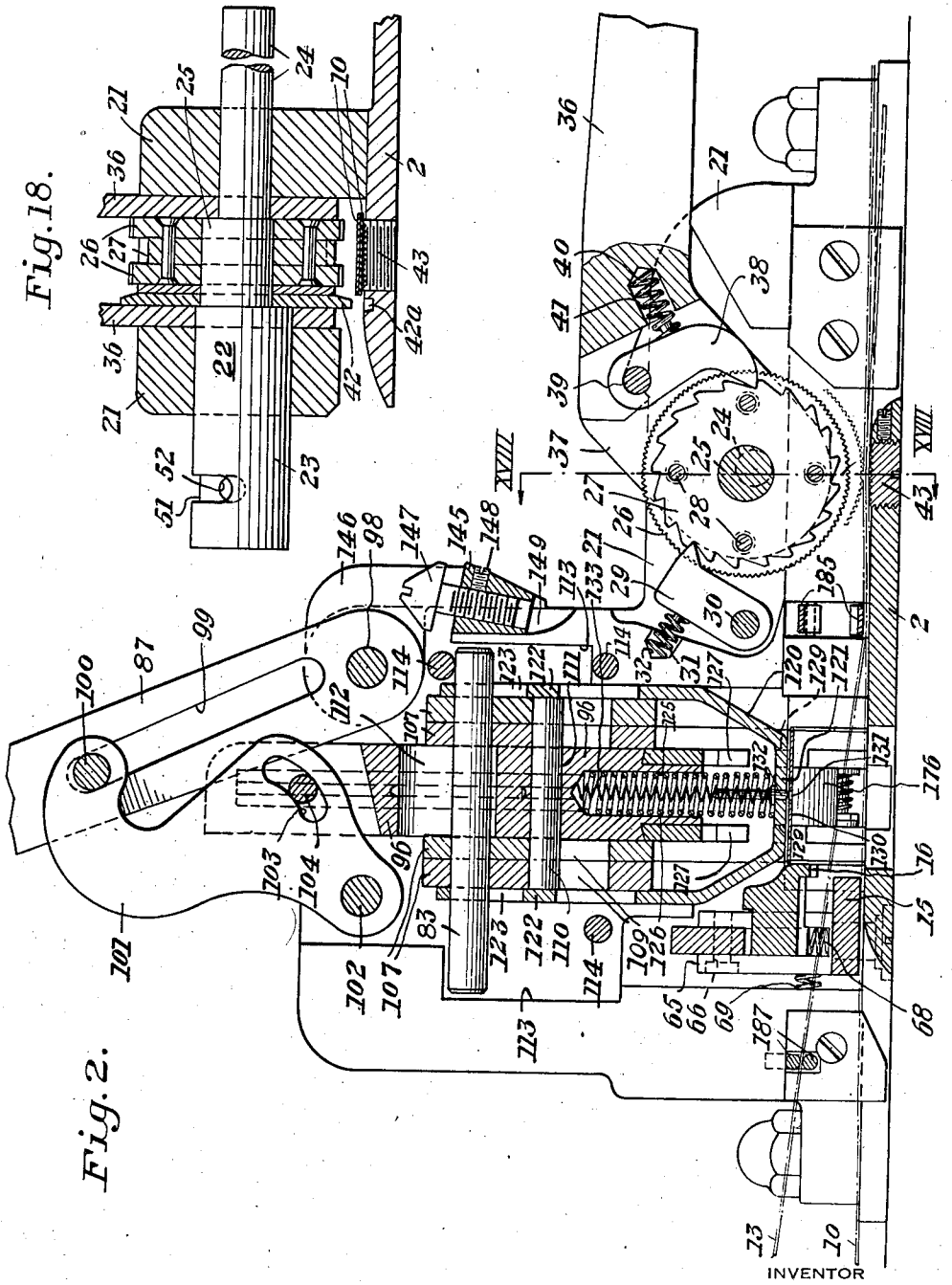

Fig. 2.

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STRAP TENSIONING AND SEALING DEVICE

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Fig. 3.

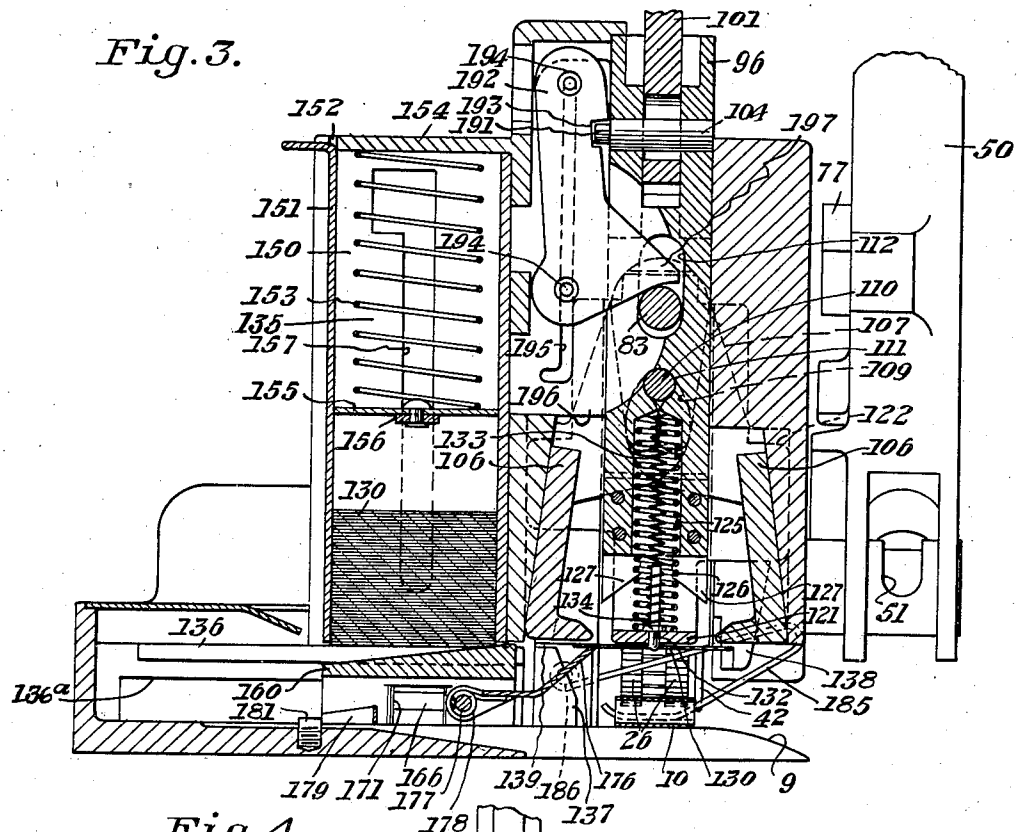
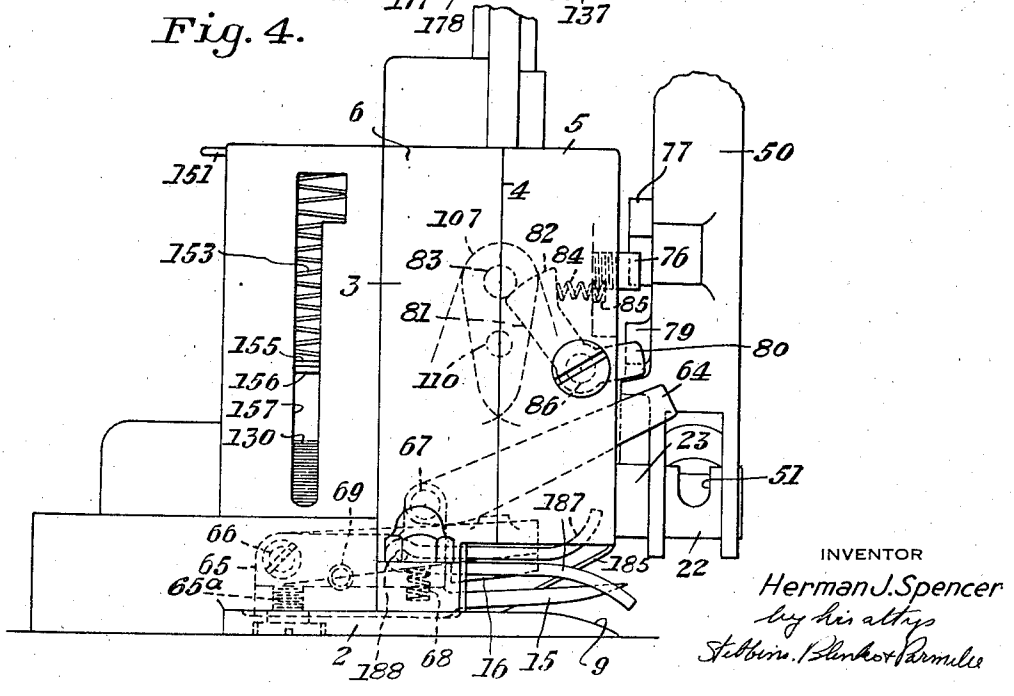


Fig. 4.



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STRAP TENSIONING AND SEALING DEVICE

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Fig. 5.

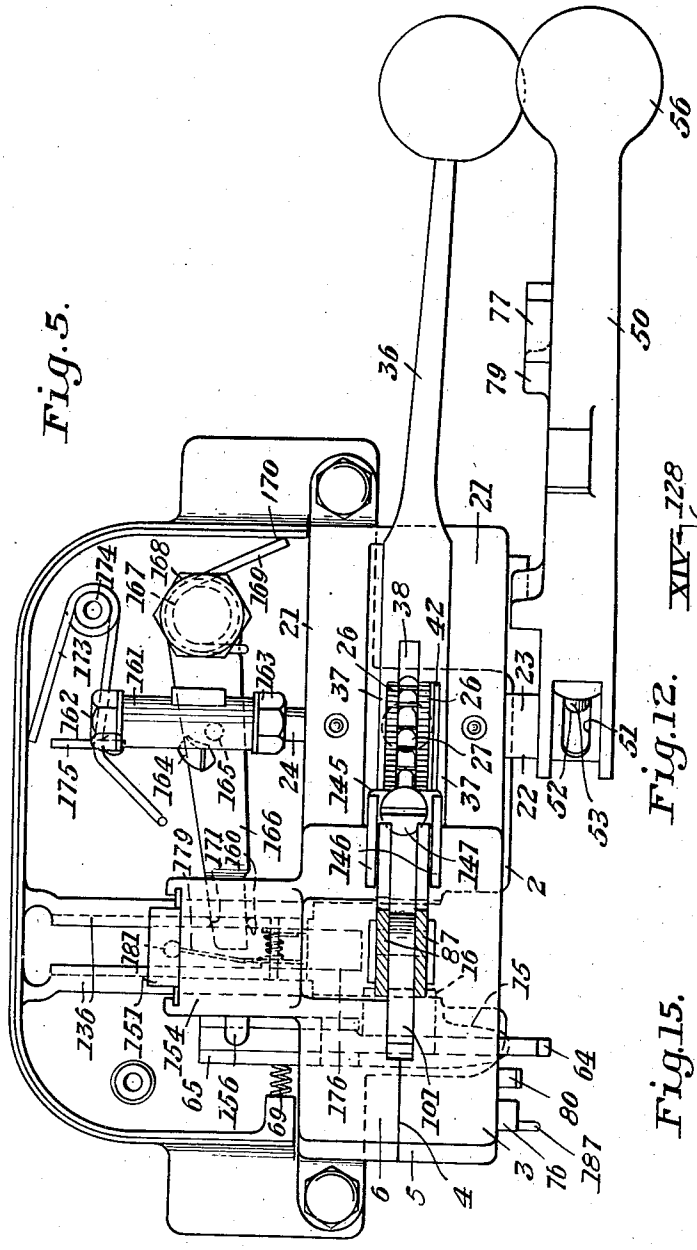


Fig. 14.

Fig. 12.

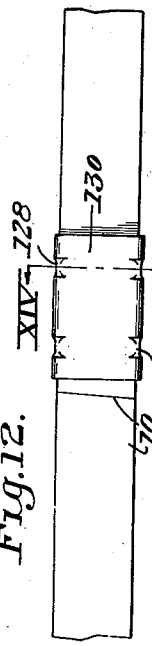
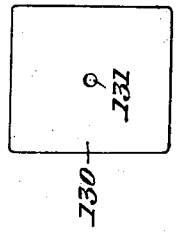


Fig. 13.

Fig. 15.



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Oct. 13, 1942. H. J. SPENCER 2,298,658

STRAP TENSIONING AND SEALING DEVICE

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Fig. 6.

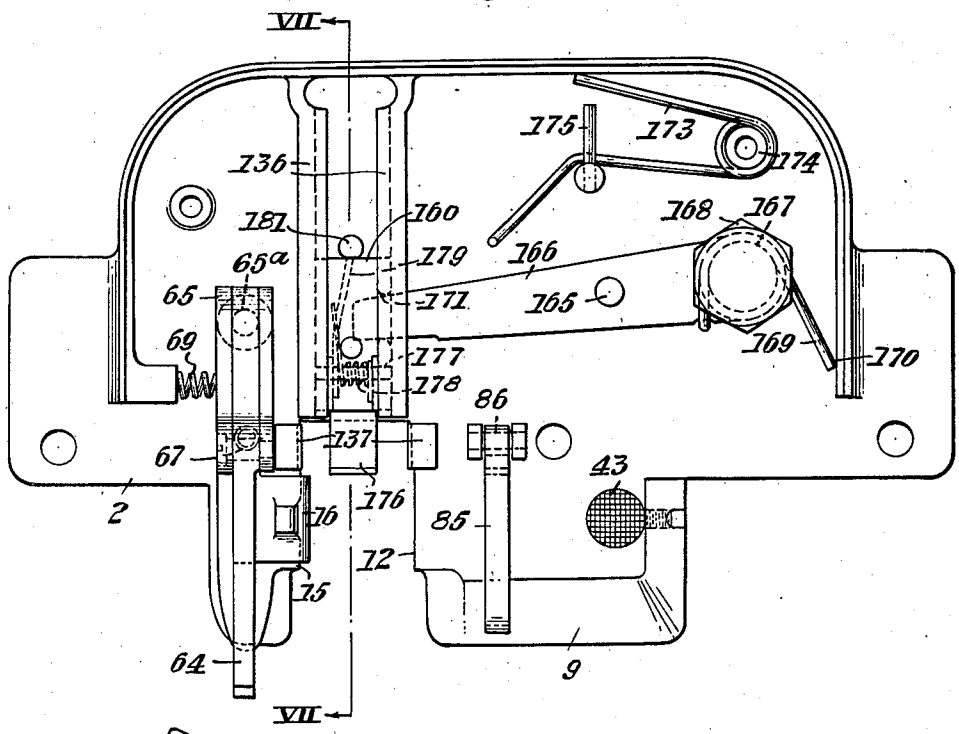


Fig. 7.

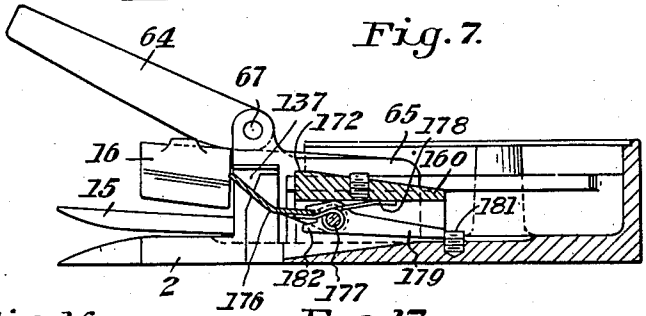


Fig. 16.

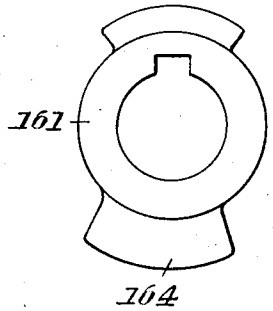
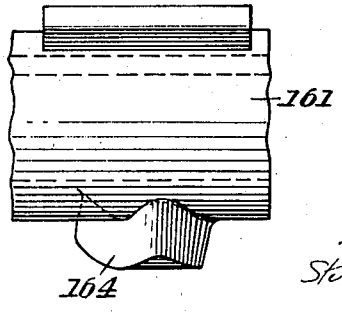


Fig. 17.



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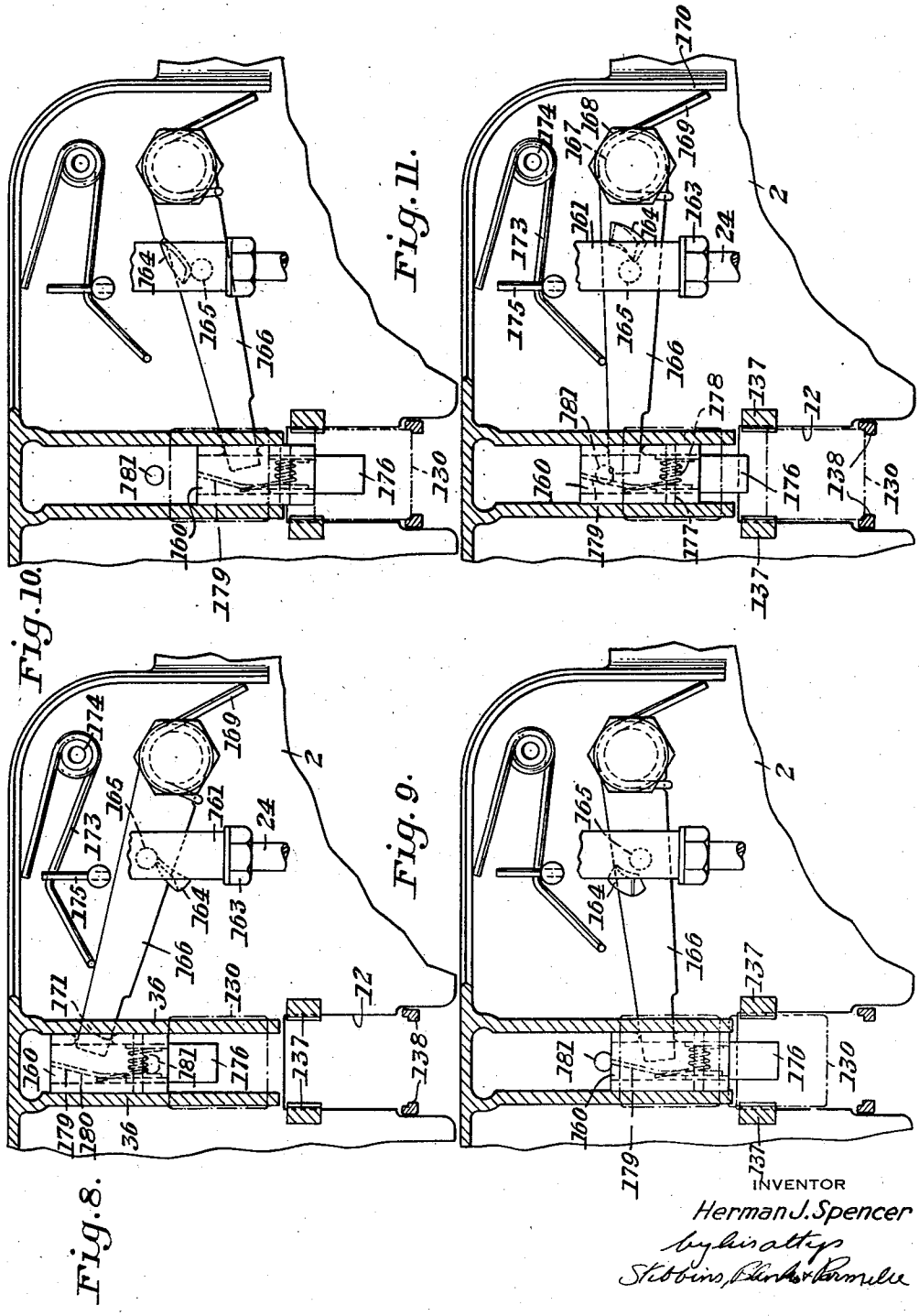
STRAP TENSIONING AND SEALING DEVICE

Filed July 15, 1939 6 Sheets-Sheet 6



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Patented Oct. 13, 1942

2,298,658

UNITED STATES PATENT OFFICE

2,298,658

STRAP TENSIONING AND SEALING DEVICE

Herman J. Spencer, West View, Pa., assignor to Leechgrip Company, Pittsburgh, Pa., a corporation of Pennsylvania

Application July 15, 1939, Serial No. 284,672

14 Claims. (Cl. 81—9.1)

The present invention relates to apparatus for tightening and securing together the ends of a metallic reinforcing band or binding strap which has been passed around a container or package and, more particularly, to certain improvements in devices of the character described in my Patents Nos. 2,101,981 and 2,182,004.

While devices of this general character have been known and used heretofore, those with which I am familiar are characterized by various objectionable features. This is even true of the devices shown and described in my aforementioned patents, although those devices represent substantial improvements over those in general use prior to my invention thereof. It is the purpose of the present invention to produce a strap or band fastening device which is characterized by simplicity, relatively low cost of construction, a high degree of effectiveness in operation, compactness, ruggedness, and an arrangement of parts so cooperating that it is practically impossible for the operator to jam the machine by improper operation thereof. Other important features and advantages of the device which I provide by the present invention will be more specifically pointed out and described in the description of the preferred embodiment of my invention which is illustrated in the appended drawings.

The device which I provide embodies a base and a standard upon which are mounted the various operating parts. The base and standard carry the three operating levers by which all of the various functions are performed. The one lever, which is hereinafter referred to as the main operating lever, actuates the mechanism for feeding a seal into appropriate position over the overlapped strap ends. This main operating lever also lowers the strap tightening mechanism and a portion of the strap guiding mechanism into appropriate position in relation to the overlapped strap ends. This same lever is also arranged in relation to the other operating parts of the device so that when moved to one position it will operate the shear and shear off the coil end of the strap being placed around the package. This same lever also is used for unlocking the forming lever which actuates the mechanism for forming the joint between the overlapped strap ends and the seal. The locking arrangement for locking the forming lever in its normal position is so positioned that the forming lever cannot be operated in the normal operation of the machine until after the seal has been fed into position over the strap ends and the coil end sheared off. In another operation of this main lever the seal feeding mechanism is again operated but the feeding mechanism is so arranged and interconnected with the joint forming or sealing mechanism that the main operating lever will not again operate to feed a seal into position over the strap ends until after the forming lever has been operated through at least a portion of the joint forming stroke.

The second lever, which is herein described as the strap tightening lever, is arranged to operate the strap tightening disks which are carried on the base and standard and which operate in the manner more specifically described hereinafter.

The third lever, which is referred to herein as the forming lever, is used for forming the joint between the seal and the overlapped strap ends. As stated above, provision is made for locking this lever and the parts operated thereby in normal position above the strap ends so that it cannot be operated until after certain other necessary operations are carried out. This lever not only serves to form the joint between the seal and the overlapped strap ends but it also cooperates with the seal feeding mechanism to return it to neutral position and to move the mechanism for holding the clip seal from beneath the forming mechanism as the forming mechanism and the seal are lowered into appropriate position over the overlapped strap ends.

As indicated above, considerable difficulty has been heretofore encountered by reason of the jamming of such devices. They have heretofore been of such character that an operator who was not particularly careful in the operation of the feeding mechanism could readily feed the clip seal throughout only part of the distance from the magazine to the proper position over the strap ends. If he then attempted to rectify the improper feeding by further actuation of the feeding mechanism, the device would jam due to the fact that two seals would have been fed partially into position. Even assuming that the device was of such character that both seals could be fed to proper position it would be extremely difficult, if not impossible, for the operator to operate the machine so as to form the joint between the strap ends and the two seals. In accordance with the present invention I provide an arrangement of the operating mechanism, including the feeding mechanism, which is of such character that the operator cannot jam the device by the feeding of more than one seal into position. The feeding mechanism is

arranged so that the second seal will not be fed until after the first seal has been completely fed into position and the forming lever actuated.

In addition to the difficulties encountered by improper feeding, most prior art devices are objectionable because it is possible for the operator, prior to the time that the appropriate feeding and shearing operations have taken place, to actuate the forming lever. As will be readily appreciated, operation of the forming lever prior to the time that the appropriate preliminary operations have been performed will normally jam the machine and possibly break it, sometimes necessitating minor repairs and in other cases necessitating major repairs before the machine can again be used. In accordance with the present invention I provide mechanism for locking the forming lever and the joint forming mechanism in normal position above the strap ends until after the various operations preliminary to the forming operation are carried out. In the embodiment shown in the drawings, the locking mechanism is not operated until the shearing of the coil end of the strap takes place. No separate operation is required for the unlocking of the forming lever as the unlocking thereof is accomplished by means of the movement of the main operating lever through the shearing stroke.

In accordance with the present invention I also provide means movable into position by the main operating lever for properly alining the overlapped strap ends. As shown in the drawings of the preferred embodiment described hereinafter, this strap alining means is in the form of a disk which is lowered into strap alining position as the tightening disks are lowered into engagement with the strap ends. In addition to strap alining mechanism of this character, I provide a device, which is in the form of a spring in the preferred embodiment shown in the drawings, for holding the strap ends tightly together during the sealing operations.

In the prior art devices considerable difficulty has been experienced in positioning the seals over the overlapped strap ends. Of course where a preformed seal is used, i. e., a seal having a top portion and depending leg portions, the problem of getting the seal in proper position is not as acute as where the seal is a flat clip blank or where the seal is cut from a continuous ribbon of seal material mounted in a magazine carried by the base or the standard mounted thereon. Where such seals are used there is no tendency for them to center themselves and, consequently, provision must be made for guiding them to proper position and for maintaining them in appropriate position after they have been positioned over the strap ends. In my Patent No. 2,182,004, I have shown and described a device embodying seal supports carried by and movable with the presserhead of the device. While seal supports of this character will function properly they add to the cost of manufacture and are otherwise objectionable. Pursuant to the present invention I have eliminated such seal supports and have provided a device in which the seal is fed to a position below the presser head and held there, both before and during the movement of the forming mechanism downwardly onto the strap ends, by means of a tongue or seal support extending inwardly to a position below the forming mechanism and carried by the mechanism for feeding the seal to position.

In addition to providing seal holding mechanism of the character just described, I provide guides which cooperate with the feeding mechanism and the forming mechanism to properly position the seal.

Heretofore difficulty has been experienced with the coil end of the strap after it has been cut off. The strap utilized is relatively heavy and has sharp edges and when the shearing operation is completed the free strap end frequently lashes around and strikes a workman and cuts him. In the device which I have provided by the present invention provision is made to hold the free end of the strap after it has been cut off. In the preferred embodiment this device is in the form of a spring clip.

In the accompanying drawings I have shown for purposes of illustration only a preferred embodiment of a device embodying my invention. In the drawings:

Figure 1 is a side elevation of the device which I provide;

Figure 2 is a vertical longitudinal section through the device shown in Figure 1;

Figure 3 is a section taken along the line III—III of Figure 1;

Figure 4 is an end elevation;

Figure 5 is a section taken along the line V—V of Figure 1 with the cover over the feeding mechanism removed;

Figure 6 is a plan view showing a portion of the feeding mechanism and the shear mechanism, the cover, magazine and forming mechanism being removed;

Figure 7 is a section taken along the line VII—VII of Figure 6;

Figure 8 is a partial horizontal section taken just above the base of the device;

Figure 9 is a view similar to Figure 8 showing the feeding mechanism in partially advanced position;

Figure 10 is a view similar to Figure 9 with the feeding mechanism and a seal in further advanced position;

Figure 11 is a view similar to Figures 8 to 10, inclusive, with the feeding mechanism shown in neutral position, that is, the position to which it returns after a seal has been fed into appropriate position over the overlapped strap ends and the forming mechanism operated;

Figure 12 is a plan view of a completed joint;

Figure 13 is a side elevational view of the completed joint shown in Figure 12;

Figure 14 is a section taken along the line XIV—XIV of Figure 12;

Figure 15 is a plan view of a flat clip seal;

Figure 16 is a section through the feeding shaft and cam for operating the feeding lever;

Figure 17 is a plan view of a portion of the shaft carrying the feeding cam for operating the shuttle lever; and

Figure 18 is a section through a part of the tightening and alining mechanism, taken on line XVIII—XVIII of Fig. 2.

As shown in the drawings, the device which I provide comprises a base **2** and a standard **3** mounted thereon. The standard **3** is split along a substantial central plane, as indicated at **4**, into two portions **5** and **6** which are appropriately secured together by means of screws **7** and **8**. The portion **6** of the standard is secured to and supported on the base **2** whereas the portion **5** of the standard is carried on the other portion thereof in overhanging relation to one edge of the base **2**. The portion of the base positioned below the overhanging portion **5** of the standard is feathered off at **9** to facilitate the entry of

the trap 10 into appropriate position with regard to the forming, shearing and tightening mechanism. As is well understood, the overlapping ends of the strap 10 are first passed around a box or package 11 before being inserted into the sealing device. The feathered or tapered edge of the base is slotted as indicated at 12 to permit the proper functioning of the sealing apparatus.

In use, the strap 10 is drawn from a coil and wrapped around the box 11 and the free end brought back under the portion of the strap indicated by the reference character 13 which passes to the coil. The strapping device is then moved so that the tapered edge of the base 2 enters under the free end of the strap. The coil end of the strap is disposed between a shear block 15 and a shear 16. The shear 16 is normally upraised so as to permit the strap to be positioned between it and the shear block but is reciprocable relative to the shear block 15 so as to permit the shearing of the coil end of the strap. This shearing mechanism will be described more in detail hereinafter.

Before shearing the coil end of the strap from that portion which has been passed around the box 11, it is desirable to tighten the strap and to hold it in tension during the formation of the joint so that a tight strap will be formed about the box. Lateral extensions 21 of the standard provide supports for the mechanism for tightening the strap and for the main operating lever or handle. A shaft 22 having an enlarged outer portion 23 and a reduced inner portion 24 is supported in the lateral extensions 21 of the standard. Between the two lateral extensions 21 the shaft has an eccentric portion 25 on which toothed tightening wheels 26 are rotatably mounted. Between the two toothed wheels 26 is a ratchet wheel 27. The ratchet wheel is secured to the toothed wheels 26 by means of rivets 28 spaced around the face thereof. The ratchet wheel 27 cooperates with a pawl 29 pivoted on the standard by means of a pivot pin 30. The pawl 29 is urged into engagement with the ratchet wheel 27 by means of a spring 31, one end of which bears against the pawl 29 and the other end of which rests in a recess 32 in the standard. A handle 36 for rotating the tightening wheel is rotatably mounted on the portion of the shaft 22 carrying the wheels. The inner end of the tightening handle 36 has forks 37 which straddle the toothed wheels and the pawl wheel 27. A ratchet 38 is pivoted by means of a pin 39 to the handle 36 between the forks 37 and this pawl cooperates with the ratchet wheel 27 to rotate it and the wheels 26. The pawl 29 slides over the teeth of the ratchet wheel 27 when it is rotated in a tightening direction, i. e., a clockwise direction as shown in Figure 2, and prevents the rotation of the ratchet wheel and the toothed wheels in the reverse direction. The pawl 38 is normally urged into engagement with the teeth of the ratchet wheel 27 by a spring 40, one end of which bears against the pawl and the other end of which is positioned in a recess 41 in the tightening handle.

The eccentric portion 25 of the shaft 22 also has mounted thereon between the forks of the tightening handle 36 a disk 42. This disk has a greater diameter than the toothed wheels 26 and when the toothed wheels are brought into engagement with the overlapping strap ends the disk extends into a recess 42—*a* in the feathered extension of the base and holds the overlapped strap ends in position. This disk 42 is positioned on the outside of a serrated insert 43 which is screwed in the feathered portion of the base and which cooperates with the toothed wheels 26 to hold the strap in tightened position.

The enlarged outer portion 23 of the shaft 22 is adapted to receive and support the main operating lever 50. The enlarged portion 23 of the shaft is provided with a peripheral groove 51 and a hole 52 at one end thereof. The hole 52 and the groove 51 are appropriately positioned with respect to that portion of the feeding mechanism carried by the reduced portion 24 of the shaft 22 to be described later, so that when the operating lever 50 is released from the shaft 22 and rotated relative thereto for purposes to be discussed hereinafter, the operating lever 50 will always be reengaged with the shaft and rotatable therewith in proper relation to the feeding mechanism. The operating lever 50 has a longitudinally movable rod 53 which extends into the groove 51 and normally into the hole 52. This rod 53 is movable out of the hole 52 by means of a bell crank lever 54 pivoted at 55 in the knob 56. A slot 57 is provided in the knob and the upper portion of the operating lever 50 to receive the lever 54. When the lever 54 is pressed inwardly toward the axis of the operating handle 50 the rod 53 is moved longitudinally upwardly and disengaged from the hole 52. The upper end of the rod 53 carries a collar 53*a* which extends into a recess 58 in the short arm of the lever 54. A spring 59 is positioned in a recess 60 in the knob 56 of the operating lever and one end of this spring bears against the collar and the other end bears against a screw plug 61 threaded in the recess. This spring 59 normally urges the rod 53 downwardly into the groove 51 and the hole 52.

It will be apparent from what has been stated above that when the rod 53 is in the hole 52 and the main operating lever 50 is rotated in a counterclockwise direction as shown in Figure 1 the shaft 22, including the enlarged portion 23, the eccentric portion 25 and the inner reduced portion 24, will be rotated in a counterclockwise direction and the tightening wheels 26 lowered on the overlapped strap ends. At the same time the alining disk 42 will be lowered into position to hold the overlapped strap ends in position. As will be pointed out more specifically hereinafter in the description of the operation of the machine, back and forth movement of the tightening handle 36 when the parts are in this position will tighten the strap around the box 11.

After the strap has been tightened it is desirable to shear the strap as close as possible to the point where the joint is to be formed. The shearing is accomplished by the shear block 15 which extends laterally beneath the standard and the shear 16. These parts are best shown in Figures 1, 2, 4 and 7. The shear 16 is movable toward the shear block by a shear arm 64 which extends laterally of the machine into a position where it will be engaged by further counterclockwise motion of the main operating lever 50 after it has been rotated to a position to bring the tightening mechanism into operating position. The shear block, the shear and the shear operating arm are carried by a shear frame 65. The shear frame is pivotally mounted on a pin 65*a* in the base of the device so that it can be manually moved out of shearing position. The shear is fulcrumed on the frame by

means of a pin 66 for movement relative to the shear block. The operating lever is pivotally mounted on the frame by a fulcrum pin 67. A spring 68 is provided for normally urging the shear 16 upwardly out of cutting position and a second spring 69 is provided for normally urging the shear frame and the parts described above toward shearing position, one end of the spring 69 cooperating with an abutment on the base 2 and the other end thereof engaging the shear frame. When the arm 64 is engaged by the lever 50 as it moves downwardly, the arm turns clockwise as viewed in Figure 4 and actuates the shear 16 downwardly through a cutting stroke.

A stop 76 is mounted on the front side of the standard so that the main operating lever 50 will not be moved into position for cutting the strap until after the operator has tightened the strap. Of course, if the operator desires to do so he can shear the strap without effecting any tightening operation but the stop is provided for the purpose of preventing accidental shearing prior to tightening. Furthermore, the stop permits the operator to press down on the main operating handle to hold the one end of the machine flat on the box or other object being bound while the strap tightening mechanism is being operated. The rod 53 carries a block 77 which cooperates with the stop 76 for the purpose just described. When it is desired to shear the strap the operator presses the lever 54 to release the rod 53 from the hole 52 in the enlarged portion 23 of the main shaft 22. When the lever 54 is rocked about its pivot and the rod 53 raised the block 77 is also moved upwardly out of engagement with the stop. The main operating lever can then be moved further in a counterclockwise direction without further rotation of the shaft 22. This is desirable because it prevents this further rotation of the main operating lever from rotating the reduced inner portion 24 of the main operating shaft 22 and therefore prevents further movement of the feeding mechanism to be described later. It also prevents any disturbance of the tightening and holding mechanism. This further counterclockwise movement of the main operating lever 50 causes the projection 78 on the operating handle to come into contact with the shear lever. After it comes in contact with the shear lever, further rotation thereof in a counterclockwise direction will operate the shear to sever the strap.

At substantially the same time that the shearing is accomplished the projection 79 on the main operating handle 50 comes in contact with the projecting short arm 80 of the bell crank lever 81 which is utilized to lock the forming mechanism in normal position during the tightening and shearing operations. The other longer arm 82 of the bell crank lever 81 extends inwardly of the device to a position beneath the pin 83 which supports the forming jaws to be described hereinafter. The arm 82 of the bell crank is normally urged into position beneath the pin 83 by a spring 84, one end of which bears against the lever and the other end of which rests in a recess 85 in the standard. When the projection on the main operating lever 50 pushes the arm 80 of the bell crank 81 downwardly the crank rotates about its pivot pin 86 and the arm 82 is pushed to one side of the pin 83. This unlocks the forming mechanism so that the forming lever 87 can be operated to form the joint between the seal and the overlapped strap ends. The bell crank 81 has to be held to one side of the pin 83 until after the forming lever 87 has commenced its stroke.

Assuming that a seal has been fed into position over the overlapped strap ends and assuming that the shearing operation has been completed it is then desirable to rotate the forming lever 87 in a clockwise direction as shown in Figures 1 and 2 in order to form the joint. The forming mechanism is adapted to move the clip seal into position on the strap ends and to bend the edges thereof downwardly and inwardly around the strap ends and to crimp the seal and the strap ends. The forming mechanism includes a ram 96 which is reciprocable in suitable recesses formed in the portions 5 and 6 of the standard 3. The ram is reciprocated in the standard by means of the forming lever 87 which is pivotally mounted at 98 on the standard. The forming lever 87 is provided with a slot 99 cooperating with a pin 100 carried by the ram operating link 101 which is pivotally mounted at 102 on the standard. This operating link is in turn provided with a slot 103 in which a ram pin 104 is positioned. The ram pin 104 extends through openings 105 in the bifurcated upper end of the ram 96 and as pressure is exerted on the ram pin 104 by the forming lever through the link 101, the ram is reciprocated in the standard. The forming mechanism also includes jaws 106 which are adapted to be normally positioned above the seal when it is fed into position over the strap and to be moved downwardly against the projecting ends of the seal and to bend these projecting ends downwardly around the strap ends. Upwardly extending side plates 107 are provided on each end of each of the forming or bending jaws 106. The side plates are provided with alined holes to receive the main operating pin 83. These plates are also provided with overlapping cam slots 109 adapted to receive the operating pin 110 which extends through an opening 111 in the ram. The main operating pin 83 also extends through a longitudinally extending slot 112 in the ram. The main operating pin 83 at each end extends beyond the side plates of the forming jaws and these ends cooperate with guides 113 and a pin 114.

The forming mechanism also includes a presser head 120 which is generally U-shaped, having a bottom portion 121 and side members 122. The side members are provided with slots 123 to receive the main operating pin 83. When the presser head has been moved downwardly to a sufficient extent to be brought into contact with the overlapping strap ends further downward movement thereof will be prevented by the pin 83 coming in contact with the stop pin 114.

The ram is provided with a longitudinally extending recess 125 which is adapted to receive a spring 126, the lower end of which bears against the presser head thereby normally holding the ram in upraised position. At the lower end the ram is provided with hardened tips 127 which, upon lowering of the ram, come in contact with the seal and the overlapping strap ends and crimp the seal and the strap ends as indicated at 128 in Figure 14. The presser head is provided with slots 129 to permit the hardened tips of the ram to pass therethrough and to contact the seal.

It is highly desirable that the seals fed into position below the presser head and above the strap ends shall be accurately positioned. In order to assure the proper positioning of the seals I utilize seals 130 which are provided with a centrally disposed hole 131 which cooperates with

a spring pressed pin 132 extending through the bottom of the presser head. A spring 133 is provided in the recess in the ram for pressing the pin 132 downwardly through the opening in the presser head at all times. A shoulder 134 is provided on the pin for preventing it from passing completely through the opening in the presser head. The holes 131 in the seals also assist in the stacking and shipping of the seals.

In addition to the holes in each seal and the spring pressed pin 132, appropriate guides are provided for assisting in properly positioning the seals. As the seal 130 moves forwardly from a magazine 135 it rests upon shuttle guides 136 and then passes between upwardly extending guides 137 which are formed integral with the base. When the seal reaches the sealing position it comes in contact with centering stops 138 which extend downwardly from the presser head. These stops move downwardly with the presser head until the presser head is in contact with the seal and the seal in contact with the strap ends so that the seal is properly guided through its downward travel. In addition to the proper guiding of the forward end of the seal in its downward movement, the rear end of the seal, that is, the end closer to the magazine, is guided downwardly by the guides 137 formed on the base, these guides containing a shoulder 139 along which the seal rides as it moves downwardly. A portion of each shoulder 139 is at an angle so that as the seal moves downwardly it also moves forwardly to the proper position. The feeding of the seals and the operation of these guides will be more fully described hereinafter in the description of the complete operation of the machine.

An adjustable stop is provided for limiting the downward movement of the forming lever. This stop is in the form of a forked member 145, the forks 146 of which are pivoted on the pivot pin 98 about which the forming lever 87 rotates. The forks 146 are located on the outside of the forming lever so that the forming lever, as it is moved downwardly, will strike the adjustable screw pin 147 which is secured by a set screw 148 in any adjusted position in the stop member. The face of the stop member 145 moves into a recess 149 in the standard and when it rests against the wall of the recess further movement of the forming lever will be stopped.

A supply of the clip seals 130 is maintained in the magazine 135, which is mounted on the standard 3. The magazine 135 comprises a sheet metal channel 150 which is provided with a slidable door 151, the door being movable vertically through slots 152 in the side walls of the channel 150. This slidable door, when it is raised, permits the insertion of seals into the magazine. A spring 153 is provided in the magazine for normally forcing the seals downwardly. The one end of the spring 153 bears against the top plate 154 of the magazine and the other end thereof bears against a movable plate 155 which is mounted above the seals in the magazine. The plate 155 has secured to the base thereof a laterally extending arm 156 which extends out of the magazine on each side through a slot 157. The purpose of the arm 156 is to permit the operator to compress the spring so as to permit the insertion of additional clips in the magazine.

In accordance with the present invention I provide an entirely novel method and apparatus for feeding the seals from the magazine into position over the strap ends. As pointed out above, the arrangement is of such character that the operator cannot jam the machine. The arrangement of the feeding mechanism is also such that the feeding shuttle is moved automatically after the initial movement of the main operating handle to cock the feeding parts. After the cocking takes place the operation of the feeding mechanism is entirely automatic as the other operations progress.

The feeding of the individual seals 130 from the magazine to a point over the strap ends is accomplished by a shuttle 160 which is reciprocable along the tracks or guides 136 mounted on the base. The shuttle is channel shaped with the legs extending downwardly and riding along the base. The shuttle is prevented from escaping from between the guides 136 as the guides extend over the top of the shuttle to a slight extent as shown in Figure 6. The sides of the shuttle slide along the sides of the guides 136. In Figure 11 the shuttle 160 and the operating parts are shown in a neutral position. This is the position which the parts assume immediately after the operation of the forming lever 87 through a part of the joint forming stroke. At this time the main operating lever 50 is in the position marked III on Figure 1. Rotation of the main operating lever 50 in a clockwise direction rotates the shaft 22, including the reduced portion 24, and this operation serves to operate the feeding mechanism through the cocking stroke by virtue of the parts about to be described.

The reduced portion 24 of the shaft 22 carries a sleeve 161 which is secured thereon by nuts 162 and 163. This sleeve 161 is provided with a cam 164, two faces of which are of proper configuration to cooperate with the operating pin or follower 165 carried by a shuttle lever 166. The shuttle lever 166 is pivotally mounted on a screw 167 which is threaded into the base. The screw is provided with a head 168 and between the head and the shuttle lever 166 is a spring 169. One end of the spring abuts a side wall 170 on the base and the other end is bent downwardly around the shuttle lever. This spring 169 normally urges the shuttle lever 166 toward the rear end of the base, although in the position shown in Figure 11 relatively little pressure is exerted on the shuttle lever as the spring 169 is primarily for the purpose of forcing the shuttle lever in a clockwise direction about its pivot point to the position shown in Figure 11. As the shaft 22 and the sleeve 161 are rotated in a clockwise direction by the main operating lever 50, the one face of the cam 164 contacts the pin 165 on the shuttle lever and moves the shuttle lever in a clockwise direction to the position shown in Figure 8. One end of the shuttle lever 166 extends through a slot 136a in the adjacent guide 136 into an opening 171 in the shuttle and positively operates the shuttle so that as the shuttle lever 166 is moved in a clockwise direction it moves the shuttle rearwardly to a position where the raised nose 172 of the shuttle will be in position to contact and move forward the bottom seal in the magazine.

The movement of the shuttle lever 166 from the position shown in Figure 11 to the position shown in Figure 8 compresses a spring 173 which is positioned on the base. One end of the spring 173 abuts the side wall of the base and the other end abuts the shuttle lever. Intermediate its ends the spring 173 is turned around a pin 174 carried by the base. An arm 175 is provided

to hold the end of the spring which abuts the shuttle lever down adjacent the base; that is, the arm 175 prevents the spring from flying out of position when compressed. When the cam 164 slides off the pin 165 the spring 173 forces the shuttle lever 166 and the shuttle forward to approximately the position shown in Figure 9. Normally the shuttle lever 166 will merely be advanced as far as the end of the spring 173 advances but at times, due to the quick movement thereof by the spring, the shuttle lever will move away from the end of the spring as shown in Figure 9. Movement from the position shown in Figure 8 to approximately the position shown in Figure 9 permits the nose 172 of the shuttle to pick up and advance the bottom seal to the position shown in Figure 9. A spring pressed tongue or seal support 176 extends forwardly of the shuttle and this seal support holds the advancing clip seal up against the presser head and the guides.

Rotation of the main operating handle 50 and the shaft 22 in a counterclockwise direction causes the other face of the cam 164 to strike the pin 165 and further advance the shuttle and shuttle lever to the position shown in Figure 10. This operation serves to advance the seal to a position where the forward end is supported by the guides 138. It is then in appropriate position for the formation of the joint. When the cam 164 passes beyond the pin 165 the spring 169 pulls the shuttle back to approximately the position shown in Figures 5 and 9. The seal, however, does not return with the shuttle but remains in the advanced position and is held by the seal support and the guides.

The tongue or seal support 176 is pivotally mounted on a pivot pin 177 carried by the shuttle. The tongue or seal support is rotatably mounted on this pin and is normally held in raised position by a coiled spring 178 which is coiled about the pivot pin. One end of the spring 178 bears against the under face of the shuttle and the other end bears against the under face of the tongue or seal support 176, thereby holding it in upraised position.

After the shuttle has been positively advanced by the cam and by the pin on the shuttle lever 166 to the position as shown in Figure 10, the spring 169, as stated above, pulls the shuttle lever and the shuttle rearwardly to the position shown in Figure 9. This rearward movement is limited so that the tongue or seal support will remain beneath the fed seal until after the forming operation has commenced. The rearward movement of the shuttle is limited by a shuttle latch 179 (see Figs. 6 and 7) which is pivoted on the pin 177 adjacent one side wall of the shuttle. The end of the shuttle latch which is mounted on the pin is held against the side of the shuttle by the coiled spring 178. The other end of the shuttle latch is bent outwardly away from the wall of the shuttle as indicated at 180 for cooperation with a pin 181 extending upwardly from the base between the guides 136 and beneath the path of travel of the shuttle. The short end of the shuttle latch extending forwardly of the pivot pin 177 is forked for cooperation with the seal support or tongue. The forks 182 extend around the inner end of the tongue adjacent the pivot pin and when the tongue is held in upraised position by the spring 178 the forward end of the shuttle latch is raised and the rear end which cooperates with the pin 181 is forced downwardly. During the forward movement of the shuttle the rear end of the latch is displaced laterally by engagement with the pin 181 (see Fig. 11) but when the rear end of the shuttle latch is advanced beyond the pin 181 it returns to its normal position (see Fig. 10) and rearward movement of the shuttle will bring the rear end of the latch 179 into engagement with the pin 181 and the shuttle will be held in the position indicated in Figures 5, 6, 7 and 9 until the latch is released.

As it is desired to maintain the tongue in contact with the bottom face of the seal until it has been lowered onto the strap ends the shuttle latch is not released until during the forming operation. As the forming lever is rotated to lower the ram, the presser head, and the jaws, the tongue or seal support 176 will be forced downwardly against the pressure of the spring 178. As it is moved downwardly the bottom face comes in contact with the lower fork 182 of the shuttle latch 179 and the rear end of the latch 179 is raised to a sufficient extent to permit the rear end thereof to be disengaged from the pin 181. This does not take place until after the forming mechanism has been brought downwardly to a point close to the strap ends. When the latch is raised so that it will slide over the pin 181 the spring 169 pulls the shuttle lever 166, the shuttle and the parts carried by the shuttle, including the tongue and the latch rearwardly to the position shown in Figure 11. In this position the tongue and the shuttle are back beneath the magazine and out from under the forming mechanism so that the forming mechanism can be brought against the strap ends and the joint formed.

After the forming operation takes place, the main operating lever 50 is rotated in a counterclockwise direction and the cycle of operations again repeated for the formation of a further joint.

As stated above, the strap ends are held in alinement to some extent by the alining disk 42 carried on the eccentric shaft 22 which carries the tightening wheels 26. In addition to this alining mechanism I provide a spring 185 for holding the strap ends together. The spring 185 is a flat spring, one end of which is secured to the base by a pin 186. As shown in Figure 3 the spring extends outwardly over the strap ends and the free end is bent downwardly into contact with the base of the machine and the strap is positioned between this end of the spring and the base.

I also provide a spring clip 187 for holding the coil end of the strap being used after it has been sheared from the strap extending around the box or package. This spring clip is positioned to the left of the shear as viewed in Figure 1. It is formed of a doubled wire, one end of which extends into a hole in the standard. Intermediate its ends it is bent around a pin 188 carried by the standard. The other end extends outwardly and downwardly so that the strap can readily be pushed between the parallel parts of the clip.

In operation the main operating lever is moved backward from the position marked III in Figure 1 to the solid line position marked I. This operation serves to cock the feeding mechanism and to partially feed the clip to a position over the strap ends. As is evident from what has been stated above, this movement of the operating lever 50 moves the feeding mechanism from the position shown in Figure 11 through the position shown in Figure 8 to approximately the

position shown in Figure 9. The operator then places the strap around the package and puts the overlapped strap ends beneath the tightening wheels 26 and the spring 185. The end passing around the box extends between the base and the cutting block of the shear and the free end of the strap extends between the shear member and the cutting block and between the parallel legs of the spring clip 187. The operator then rotates the main operating lever 50 in a counterclockwise or forward direction. This operation feeds the seal forward to the position shown in Figure 10 and the shuttle is moved rearwardly from this position to the position shown in Figures 5, 6, 7 and 9 by the spring 169. This operation also serves to lower the tightening mechanism and the alining disk 42 into contact with the strap ends. The operator then moves the tightening handle 36 back and forth to tighten the overlapped strap ends. At this time the main operating handle is in the position marked II in Figure 1. The operator then presses the bell crank lever 54 which moves the rod or pin 53 out of the hole 52 in the enlarged portion 23 of the shaft 22. The block 77 carried by the rod 53 is also moved out of engagement with the stop 76 and the main operating lever is then moved forward to position III shown in Figure 1. In this position the coil end of the strap is sheared and the forming lever released. The operator then grasps the forming lever 87 and moves it clockwise as shown in Figure 1. As the forming mechanism is moved downwardly the shuttle latch is released from the pin 181 and the shuttle and the tongue or seal support carried thereby moved rearwardly by the spring 169.

During initial movement of the forming lever 87 in a clockwise direction as shown in Figure 1 the ram operating link forces the ram pin 104 downwardly. The ram pin is provided with a reduced end portion 191 which cooperates with a forming lever latch 192, the reduced end portion of the ram pin extending into a small recess 193 in the latch. The latch is provided with roller pins 194 which cooperate with a slot 195 in a latch guide 196 secured in the standard 3. The slot at its lower end is turned at a right angle to the main direction of travel of the rollers 194. The latch itself is provided with a protruding nose portion 197 adapted to bear against the main operating pin 83.

During the initial downward movement of the ram pin 104 the forming lever latch by the arrangement just described causes the main operating pin 83 to move downwardly with the ram. When the lower roller 194 of the forming latch lever reaches the lower portion of the slot it moves laterally and the reduced end of the ram pin is disengaged from the forming lever latch. Continued downward movement of the forming lever latch by reason of the operation of the ram pin 104 stops.

During the above-described operation the ram moves downwardly and by virtue of the connection between the ram and the main operating pin 83 through the ram pin and the forming lever latch, the main operating pin and the jaws carried thereby are moved downwardly. The presser head and the guides likewise move downwardly with the main operating pin. The seal is brought into contact with the superposed strap ends and the jaws bend the seal downwardly past the edges of the strap. Further downward movement of the ram causes the operating pin 110 to continue in its downward movement and by reason of the overlapping slots 109 the jaws are brought together and the seal bent inwardly around the strap. Further downward movement of the ram causes the hardened tips of the ram to pass through the openings in the presser head and to crimp the seal and the strap ends in the manner indicated in Figures 12, 13 and 14.

It will be evident from what has been stated above that the device which I provide possesses numerous advantages over the prior art devices. It will also be evident that this device is fool-proof and cannot be jammed by the operator, the feeding operation being substantially automatic after the cocking of the various parts embodied in the feeding mechanism. It will also be evident that the strap tensioning and alining mechanism, the feeding mechanism, the forming mechanism, the shearing mechanism, and the crimping mechanism, are readily operated by merely two handles, namely, the main operating handle or lever and the forming lever.

For a more detailed disclosure of the arrangement and operation of the forming jaws and the presser head, which are not claimed per se herein, reference is hereby made to my Patents Numbers 2,101,981 and 2,182,004.

While I have shown and described a preferred embodiment of my invention it is to be understood that my invention is not limited to this particular structure but may be otherwise embodied within the scope of the appended claims.

I claim:

1. Apparatus for fastening together the ends of a binding strap and a seal comprising a seal magazine, feeding mechanism including a main operating handle for feeding a seal from the magazine to a position over the strap ends, forming mechanism including a forming lever for forming a joint between the strap ends and the seal, and locking means for locking the forming mechanism in inoperative position, said locking means including a lever cooperating with the main operating lever and being arranged to be moved to unlocking position by said main operating lever.

2. Apparatus for fastening together the ends of a binding strap and a seal comprising forming mechanism including a forming lever for forming a joint between the seal and the strap ends, a seal magazine, a movable shuttle for feeding a seal from the magazine to a position over the strap ends, a shuttle lever having movement-transmitting engagement with the shuttle, a rotatable shaft, means for rotating the shaft, means carried by the shaft and cooperating with the shuttle lever for actuating the shuttle and shuttle lever in one direction during rotation of the shaft in one direction and for moving the shuttle in the opposite direction upon rotation of the shaft in the opposite direction to feed a seal into position over the strap ends, and resilient means cooperating with the shuttle lever for moving it and the shuttle through a portion of the return stroke independently of said rotatable shaft.

3. Apparatus for fastening together the ends of a binding strap and a seal comprising forming mechanism including a forming lever for forming a joint between the seal and the strap ends, a seal magazine, a movable shuttle for feeding a seal from the magazine to a position over the strap ends, a rotatable shaft, means for rotating the shaft, a shuttle lever having movement-transmitting engagement with the shuttle, means carried by the shaft and cooperating with

the shuttle lever to move the shuttle through a portion of the feeding stroke upon rotation of the shaft in one direction, resilient means cooperating with the shuttle lever to move the shuttle in the reverse direction through a portion of the feeding stroke independently of the rotatable shaft, the aforesaid means carried by the rotatable shaft being arranged to again actuate the shuttle lever and shuttle through an additional portion of the feeding stroke upon rotation of the shaft in the reverse direction, a second resilient means cooperating with the shuttle lever for moving the shuttle and the shuttle lever through a return stroke, and means carried by the shuttle for preventing said last mentioned resilient means from moving the shuttle entirely through its return stroke until actuation of the joint forming mechanism.

4. Apparatus for fastening together the ends of a binding strap and a seal comprising a seal magazine, forming mechanism for forming a joint between the seal and the strap ends, feeding mechanism including a movable shuttle for feeding a seal from the magazine to a position beneath the forming mechanism and above the strap ends, means for moving the shuttle, and means including guides movable with said forming mechanism and a seal support displaceably carried on said shuttle for supporting and guiding the seal to appropriate position over the strap ends.

5. Apparatus for fastening together the ends of a binding strap and a seal comprising a seal magazine, forming mechanism including a forming lever for forming a joint between the strap ends and the seal, feeding apparatus including a main operating handle for feeding a seal from the magazine to a position over the strap ends, tightening mechanism for moving the strap ends relative to each other for tightening the strap, means for lowering the tightening mechanism into contact with and for raising it above the strap ends upon rotation of said main operating lever, and a strap alining member associated with said tightening mechanism and adapted to be lowered into strap alining position by movement of said main operating lever to lower the tightening mechanism onto the strap ends.

6. Apparatus for fastening together the ends of a binding strap and a seal comprising a seal magazine, forming mechanism for forming a joint between the strap ends and the seal, feeding mechanism for feeding a seal from the magazine to a position beneath the forming mechanism and above the strap ends, centering stops carried by the forming mechanism for holding the seal in proper fed position over the strap ends, a base carrying said forming and feeding mechanism, and guides carried by said base for guiding the seal to proper position over the overlapped strap ends, said last mentioned guides cooperating with the said stops in holding the seal in proper position.

7. Apparatus for fastening together the ends of a binding strap and a seal comprising a base, a seal magazine mounted on the base, forming mechanism for forming a joint between a seal and the overlapping strap ends, feeding apparatus for feeding a seal from the magazine to a position over the strap ends beneath the forming mechanism, tightening mechanism for tightening the overlapped strap ends, shearing mechanism for shearing the strap, a main operating lever and connections between it and the shearing, feeding and tightening mechanisms for actuating the shearing mechanism and the feeding mechanism and for moving the tightening mechanism onto the strap, and means carried by the base for holding the sheared strap end after the shearing operation takes place.

8. Apparatus for fastening together the ends of a binding strap and a seal comprising a seal magazine, means including a main operating handle and a shuttle for feeding a seal from the magazine to a position over the strap ends, forming mechanism including a forming lever for forming a joint between the strap ends and the seal, and means for moving the feeding shuttle through a portion of its return stroke including a retracting spring adapted to be stressed and a latch adapted to be set by movement of the operating handle in its working stroke and means actuated by the forming lever for tripping said latch.

9. Apparatus for fastening together the ends of a binding strap and a seal comprising a seal magazine, feeding mechanism including a main operating handle for feeding a seal from the magazine to a position over the strap ends, forming mechanism including a forming lever for forming a joint between the strap ends and the seal, and releasable locking means normally engaging the forming mechanism to hold it in inoperative position, and means disposed in the path of the main operating lever whereby the locking means is released by movement of said main operating lever.

10. Apparatus for fastening together the ends of a binding strap and a seal comprising a seal magazine, a movable shuttle for feeding a seal from the magazine to a position over the strap ends, forming mechanism including a forming lever for forming a joint between the seal and the strap ends, a main operating lever, and shuttle-operating mechanism including a shuttle lever engaging the shuttle, a spring positioned to be engaged by the shuttle lever and effective when stressed to swing the shuttle lever through a portion of its feeding stroke, a follower on the shuttle lever and cam means actuated by movement of the main lever in one direction for engaging said follower to cock the shuttle lever against the force of said spring, said cam means also being operative on movement of the main lever in the opposite direction to actuate the shuttle lever through the balance of the feeding stroke.

11. Apparatus for fastening together the ends of a binding strap and a seal comprising forming mechanism including a forming lever for forming a joint between the seal and the strap ends, a seal magazine, a movable shuttle for feeding a seal to a position over the strap ends, a rotatable shaft, means for rotating the shaft, a shuttle lever having a movement-transmitting engagement with the shuttle, means carried by the shaft and cooperating with the shuttle lever to move the shuttle through a portion of the feeding cycle upon rotation of the shaft in one direction, said means being adapted then to disengage the shuttle lever, resilient means cooperating with the shuttle lever to move the shuttle in the reverse direction through a portion of the feeding stroke independently of the rotatable shaft, the aforesaid means carried by the rotatable shaft being arranged to again engage and actuate the shuttle lever and shuttle through an additional portion of the feeding stroke upon rotation of the shaft in the reverse direction, and a second resilient means cooperating with the

shuttle lever for returning the shuttle and the shuttle lever through the return stroke.

12. Apparatus for fastening together the ends of a binding strap and a seal comprising forming mechanism including a forming lever for forming a joint between the seal and the strap ends, a seal magazine, a movable shuttle for feeding a seal from the magazine to a position over the strap ends, a shuttle lever having a movement-transmitting engagement with the shuttle, a rotatable shaft, means for rotating the shaft, means carried by said rotatable shaft and cooperating with the shuttle lever for moving it and the shuttle through a portion of the feeding stroke, and separate springs cooperating with the shuttle lever for moving it and the shuttle through the balance of the feeding stroke and through a portion of the return stroke.

13. Apparatus for fastening together the ends of a binding strap and a seal comprising forming mechanism including a forming lever for forming a joint between the seal and the strap ends, a seal magazine, a movable shuttle for feeding a seal from the magazine to a position over the strap ends, a shuttle lever having a movement-transmitting engagement with the shuttle, a rotatable shaft, means for rotating the shaft, means carried by said rotatable shaft and cooperating with the shuttle lever for moving it and the shuttle through a portion of the feeding stroke, separate springs cooperating with the shuttle lever for moving it and the shuttle through the balance of the feeding stroke and through a portion of the return stroke, and a seal support carried by said shuttle for supporting the seal beneath the forming mechanism and above the overlapping strap ends.

14. Apparatus as defined by claim 10 characterized by a spring for initially retracting the shuttle lever, a latch normally holding the shuttle against retraction, and means actuated by the forming mechanism to release said latch.

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