April 25, 1933. H. C. PORTER 1,905,052

STRETCHING TOOL

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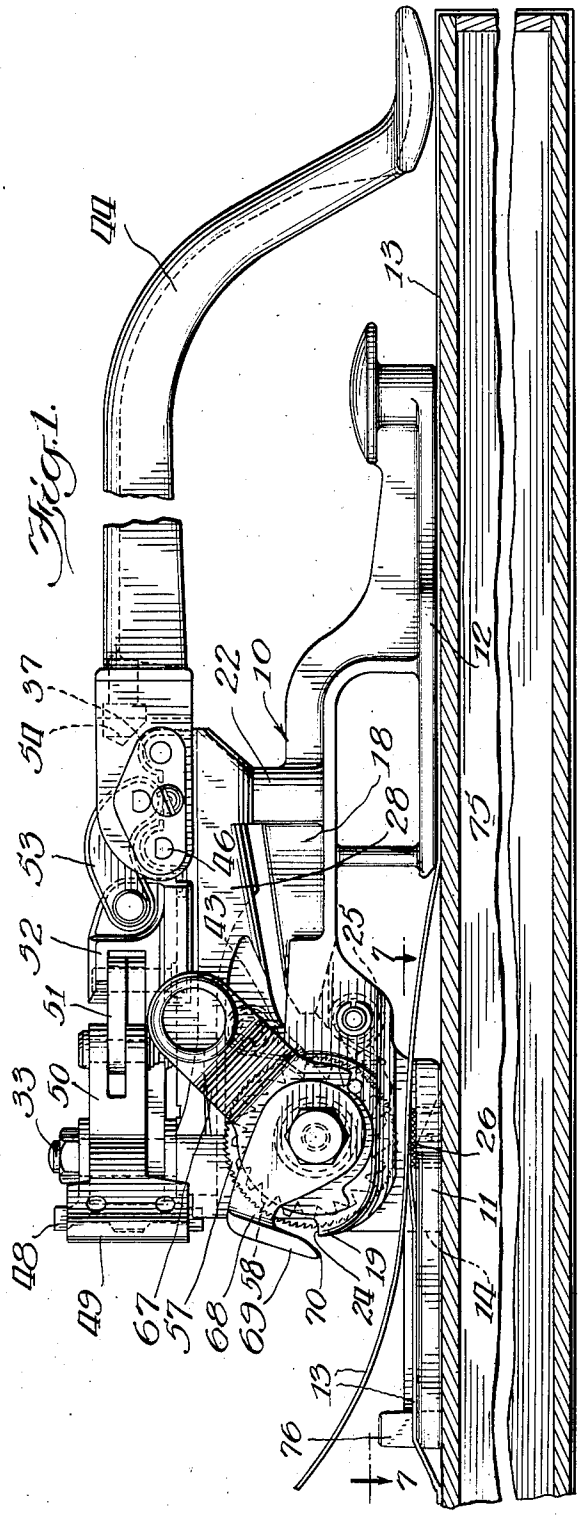


Fig. 1.

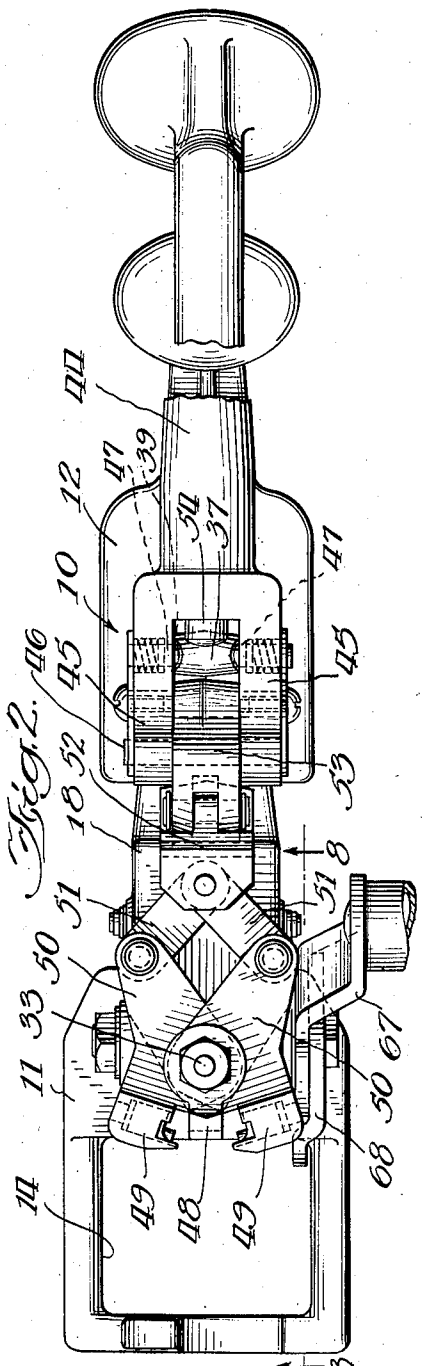


Fig. 2.

Inventor:
Howard C. Porter
By Williams, Bradbury,
McCaleb & Hinkle
Attys.

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Fig. 3.

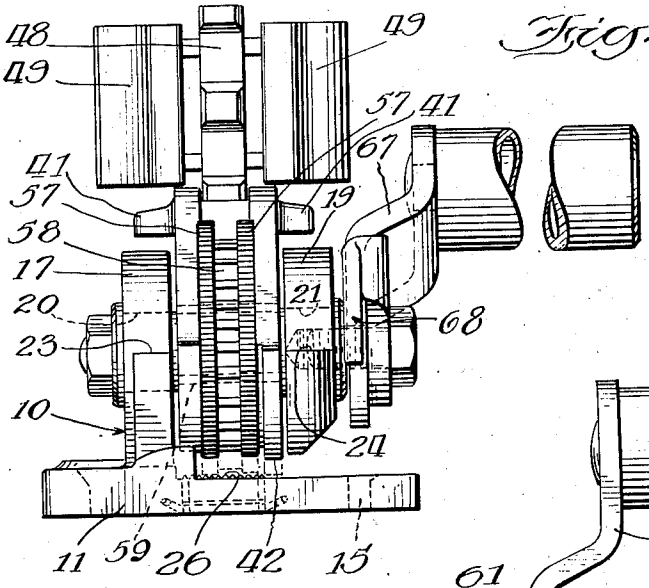


Fig. 6.

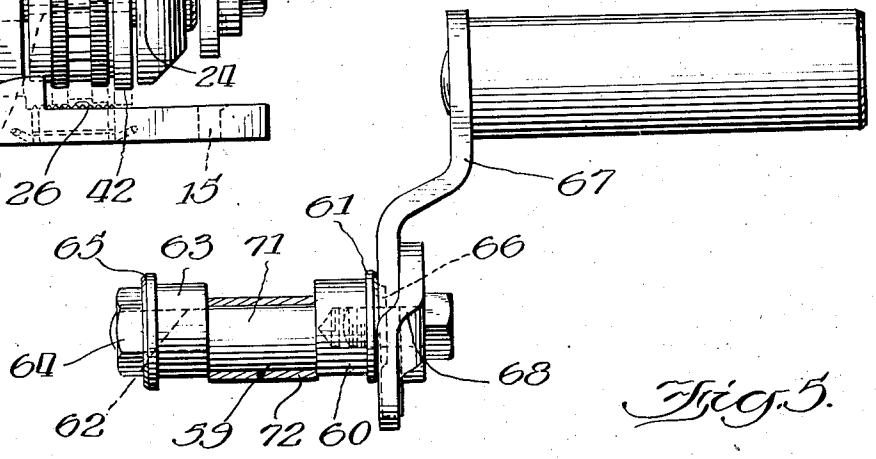


Fig. 5.

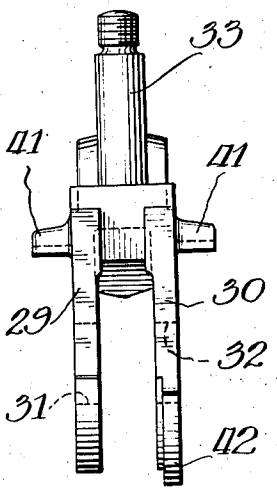
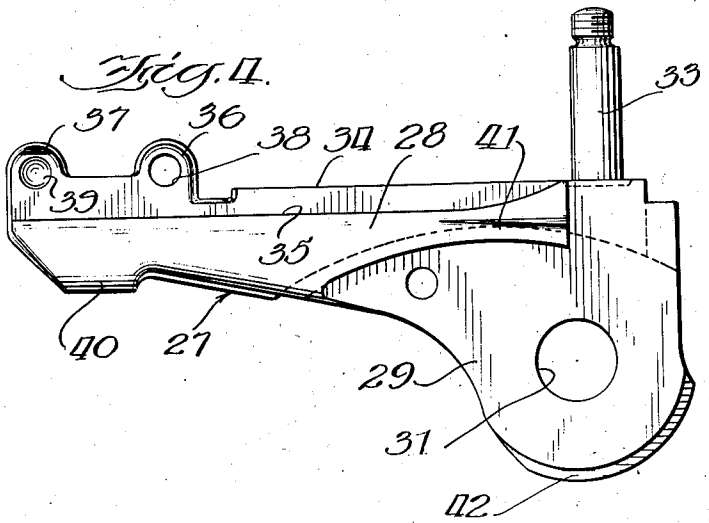


Fig. 4.



Inventor:
Howard C. Porter
By Williams, Bradbury,
McCaleb & Hinkle Attys.

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Fig. 7.

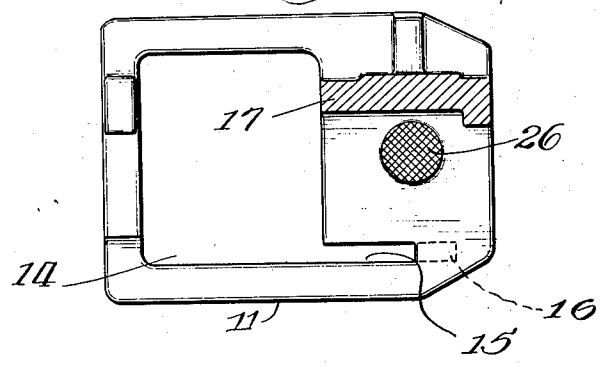


Fig. 8.

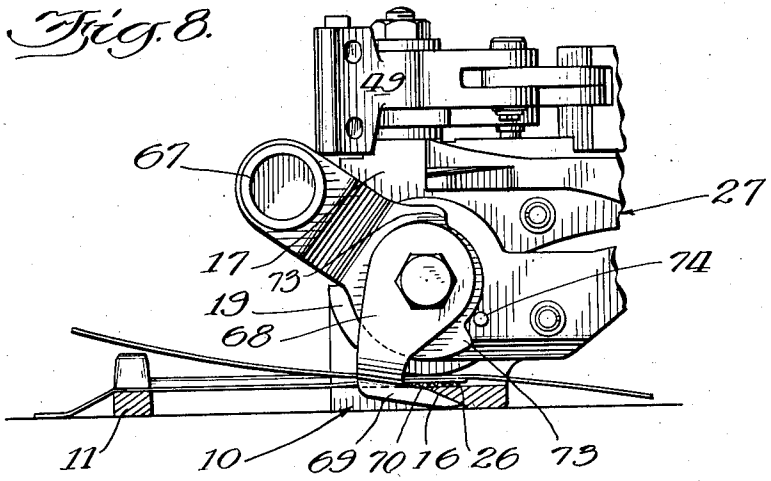
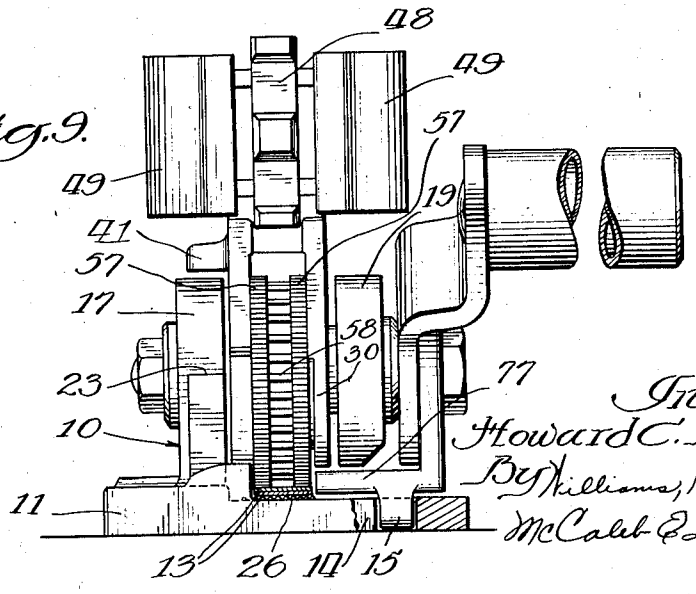


Fig. 9.



Inventor:
Howard C. Porter
By Williams, Bradbury,
McCaleb & Hinkle
Attys.

Patented Apr. 25, 1933 1,905,052

UNITED STATES PATENT OFFICE

HOWARD C. PORTER, OF LA GRANGE PARK, ILLINOIS, ASSIGNOR TO SIGNODE STEEL STRAPPING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE

STRETCHING TOOL

Application filed March 18, 1932. Serial No. 599,694.

My invention relates to stretching or tensioning tools and more particularly to such tools which are adapted for stretching or tensioning a metal strap around a package as assembly of packages to serve as a binder therefor.

In the normal use of tools of this type a steel strap is passed around the package or assembly of packages and portions are brought into superposed relation, forming a closed loop about the package or assembly. The overlapped portions are then moved relatively past each other to stretch or tension the looped strap about the package or assembly; and are then secured together by a suitable joint or seal to make the loop permanent. Difficulties have heretofore been experienced in the employment of such tools, particularly when the same are used to apply continuous high tension as when expansible bales are being bound. These tools necessarily have an open side for the removal of the tool laterally from the binder after the completion of the sealing operation. The tool to which my invention is particularly applicable comprises, in general, a foot against which one portion of the strap is anchored and a toothed feed wheel which engages a superposed portion of strap and, upon rotation, moves the same relative to the anchored portion to effect the tensioning operation. Necessarily the feed wheel overhangs the foot and, because of the necessity for an open side the foot, feed wheel and supporting frame form essentially a U lying on its side, the foot and feed wheel constituting the two parallel sides.

In order to insure that the grip of the toothed feed wheel upon the upper strap portion is sufficient to move the same upon the lower strap portion and that the pressure exerted thereby will effectively anchor the lower portion to the foot, it is very necessary that the feed wheel be pressed down upon the upper strap portion with considerable force. The pressure required when relatively high tension is desired results in a slight bending or warping of the frame so that the surfaces of the feed wheel and the underlying foot are, at least, temporarily, forced out of the normal condition of parallelism. The result is that the inner sides of the feed wheel and underlying foot (i. e. the sides closest to the supporting frame of the tool) are brought closer together than are the outer sides (i. e. the sides furthest from the supporting frame) and the strap is more tightly gripped adjacent its inner edge than it is adjacent its outer edge. This unequal distribution of pressure and grip causes the inner edge of the strap to be stretched relatively more than the outer edge of the strap and, as the upper strap portion is fed through the tool during the tensioning operation, this upper portion is curved or cambered laterally outwardly, such curvature or cambering being cumulative as the feeding proceeds. Furthermore, the strap is weakened. The curving of the upper strap portion laterally relative to the lower portion is objectionable, particularly with tools of the so-called "combination type" wherein the joint or seal-forming mechanism bears a fixed relation to the strap position, because the upper and lower strap portions do not remain in sufficiently good alinement to permit the joint or seal-forming mechanism properly to engage them. And where the joints or seals are formed with the assistance of encircling sleeves the failure of the overlapping strap portions properly to aline is objectionable because of the difficulty of applying the sleeve thereto.

In accordance with my present invention, I avoid the foregoing objections and difficulties by providing a tie or connection which is adapted to prevent the feed wheel and underlying foot from even temporarily losing their proper parallelism. Preferably this tie or connection is associated with the

mechanism which moves the feed wheel into and out of strap engaging position so that it may be automatically moved out of the way to permit the proper positioning and removing of the strap and into effective position after the strap has been properly located in the tool.

The invention will readily be understood from the following description of a combination stretcher and sealer of the feed-wheel type. It will be understood, however, that the invention is not intended to be limited to this particular type of tool since it is equally applicable to any type of open-side stretcher.

In the drawings,

Fig. 1 is a side elevational view of a combined stretcher and sealer showing a strap applied to a package and introduced into the tool for stretching;

Fig. 2 is a plan view of the tool;

Fig. 3 is a front elevation of the tool;

Fig. 4 is a side elevation of the oscillating frame of the tool.

Fig. 5 is a front elevation thereof;

Fig. 6 is a detail view of the spindle which carries the oscillating frame, and the handle for rotating same;

Fig. 7 is a fragmentary sectional plan of the frame, taken on the line 7—7 of Fig. 1;

Fig. 8 is a fragmentary sectional elevation taken on the line 8—8 of Fig. 2, showing the hook entering into engagement with the base; and

Fig. 9 is an end view partly in section, showing a modification in which the hook is adapted to serve as an outer guide for the strap.

Referring to Figs. 1 to 8 of the drawings, the tool comprises a main frame 10 which is provided with a pair of bases or feet 11 and 12 which are adapted to rest on the surface of the package as shown in Fig. 1. The forward foot 11, over which the overlapping portions of the strap 13 extend, is provided with an opening 14 so as to enable the sealing jaws to engage said portions

A slot 15 extends rearwardly from the outer side of the opening 14, the rear portion being undercut to provide a slanting surface 16, as shown in Fig. 8. The rear foot 12 is adapted to be placed upon the rear portion of the strap 13 which rises between the feet in the manner shown in Fig. 1.

On one side of the strap position the foot 11 gives into a vertical web 17 which extends rearwardly and merges with the main body 18 of the main frame 10. This main body 18 carries a forwardly extending web 19 which is located on the opposite side of the strap position. The webs 17 and 19 are provided with openings 20 and 21 which provide bearings for the oscillating frame spindle. The main body 18 is provided with an abutment 22 and the webs 17 and 19 are provided with abutments 23 and 24 which limit the oscillatory movements of the oscillating frame. A spring pressed pawl 25 is pivotally mounted between the webs 17 and 19, the function of which will be described hereinafter.

Below the openings 20 and 21 and in the strap position, the foot 11 is provided with a hardened plug 26, the upper surface of which is provided with serrations and projects above the upper surface of the foot in order to engage the lower of the superposed portions of the strap.

The oscillating frame 27 comprises a body 28 which is provided at its forward end with spaced parallel downwardly extending webs 29 and 30 which are provided with aligned openings 31 and 32. Above the webs 29 and 30 the body 28 of the oscillating frame 27 is provided with an upwardly projecting stud 33, the upper end of which is reduced and threaded as shown in Figs. 4 and 5.

Rearwardly of the stud 33 the upper surface of the body 28 is machined to provide a slide 34 and a pair of longitudinal shoulders 35. Adjacent its rear end the body 28 is provided with upwardly directed bosses 36 and 37. The boss 36 is provided with a transverse opening 38. The rearmost boss 37 is provided on either side with conical openings 39. On its underside the body 28 is provided with an abutment 40 which is adapted to engage the abutment 22 on the main frame, and above the openings 31 and 32 it is provided on each side with lateral shoulders or abutments 41 which are adapted to engage the abutments 23 and 24 on the webs 17 and 19.

The lowermost portions of the webs 29 and 30 are concentric with the openings 31 and 32, and the web 30 may be provided with a concentric flange 42 which is of somewhat greater radius than the edge of the web 29, as clearly shown in Figs. 4 and 5. No claim is made herein to the provision of the flange 42, the same being described and claimed in the copending application of Arthur T. Bergstrom, Serial No. 591,609, filed February 8, 1932. A spring pressed pawl 43 is pivotally supported by a pin between the webs 29 and 30 rearwardly of the openings 31 and 32. This pawl is located in vertical alignment with respect to the pawl 25 and its function will be hereinafter described.

A handle 44, provided at its forward end with furcations 45, is pivotally connected to the oscillating frame 27 by means of a pin 46 which extends through openings in said furcations and through the opening 38 in the boss 36. The furcations 45 are provided with spring pressed plungers 47 which are adapted to enter the recesses 39 in the boss 37 to maintain the oscillating frame 27 and the handle 44 in rigid relationship during

the normal stretching or tensioning operation, as will hereinafter be described.

A forwardly directed anvil 48 is rigidly mounted on the stud 33, which also provides a pivot for the sealing jaws 49 which are located on each side of the anvil. The jaws 49 carry outwardly and rearwardly extending arms 50 which are pivotally connected to links 51, which, in turn, are pivotally connected to a block 52 which slides on the slide 34. A link 53 is pivotally connected to the block 52 and to the furcations 45 of the handle 44 rearwardly of the pin 46. In order to clear the boss 36, the link 53 is arched as shown in Fig. 1. The handle 44 is provided between the furcations 45 with a stud 54 which is adapted to engage the crown of the arched link 53 to limit the movement of the handle relative to the oscillating frame, in the counter-clockwise direction as viewed in Fig. 1. The rear end of the link 53 is adapted to engage the oscillating frame 27 to limit relative movement in the opposite direction.

Two feed wheels 57 having serrated peripheries are mounted between the webs 29 and 30. These wheels are separated by a ratchet wheel 58 and the wheels 57 and 58 are rigidly secured together so as to act as a unit. They are provided with aligned central openings by means of which they are rotatably mounted upon the spindle 59. The spindle 59 has a cylindrical head 60 at one end which has a rotating fit in the opening 21 of the outer web 19. At its outer end the head 60 is provided with a flange 61 which engages the outer face of the web 19. At its other end the spindle 59 is provided with a reduced portion 62 which is adapted to receive a collar 63 similar to the head 60, this collar being secured to the spindle by means of a nut 64 screwed on the threaded end of the reduced portion 62. The collar 63 is adapted to have a rotating fit in the opening 20 of the web 17 and has a flange 65 which is adapted to bear against the outer face of said web.

The head 60 is provided with a non-round projection 66 which is adapted to enter a corresponding recess in the hub of a handle 67. This handle is secured to the spindle by a bolt and engagement between the projection 66 and the recess in the handle insures the rigid mounting of the handle on the spindle.

A hook 68 is rigidly mounted on the hub of the handle 67, for example, by riveting or welding. The outer hook portion 69 thereof is adapted to enter into the slot 15 when the handle 67 is rotated to lower the feed wheels. The inner side of the outer hook portion is provided with a surface 70 to engage the sloping surface 16 at the inner end of the slot 15 so as to provide an outer support between the spindle 60 and the foot 11, whereby the objections hereinbefore pointed out, arising from the spreading of the frame, are avoided.

Between the head 60 and the reduced portion 62, the spindle 59 is provided with an eccentric portion 71 upon which the oscillating frame 27 and the feed wheel assembly are mounted, a bushing 72 being mounted on the eccentric portion 71 to serve as a bearing for the oscillating frame and the feed wheel assembly. The hub of the handle 67 is provided with shoulders 73 which are adapted to engage a pin 74 on the web 19 to limit the movement of the handle in either direction.

To assemble the tool, the feed wheel assembly is located between the webs 29 and 30 of the oscillating frame 27 so as to bring the central openings of the assembly into alignment with the openings 31 and 32, pawl 43 being brought into cooperating relationship with the ratchet wheel 58, as shown in dotted lines in Fig. 1. The bushing 72 is then passed through the aligned openings. The webs 29 and 30 of the oscillating frame 27 are then passed between the webs 17 and 19 so as to bring the bushing 72 into substantial alignment with the openings 31 and 32 with pawl 25 in cooperating relationship with ratchet wheel 58.

The collar 63 is removed from the spindle 59 which is then inserted through the opening 32 to enter the eccentric portion 71 into the bushing 72 and the head 60 into the opening 32. The collar 63 is then applied to the reduced end of the spindle in the opening 31 and the nut 64 is applied to the outer threaded portion thereof.

The operation of the tool is as follows:

Strap 13 is pulled out from a source of supply and is passed in a clockwise direction, as viewed in Fig. 1, around a box 75 or other package or assembly of packages which is or are to be bound. The free end of the strap is passed over the front of the foot 11 in contact with a guide 76 formed thereon, so as to lie upon the stud 26. The foot 12 is placed over the strap which is manipulated to position it over the free end thereof. In order to permit the positioning of the strap the handle 67 is first moved into the position shown in Fig. 1, in which condition the feed wheels are elevated. When the strap is positioned the handle 67 is rotated in counter-clockwise direction so as to lower the oscillating frame 27 and feed wheels 57, bringing the latter into engagement with the upper surface of the strap. It is to be noted that this movement does not bring the feed wheels into their lowermost possible position but does cause the eccentric mounting for the feed wheels to be rotated far enough so that tension applied to the strap will tend to continue the counter-clockwise rotation of the eccentric, thereby in-

creasing the pressure of the feed wheels upon the strap to tighten thereon the grip of the feed wheels and the clutch plug, as the tension in the strap is increased, and also more firmly engaging hook 68 under foot 11 to prevent its accidental disengagement.

The counter-clockwise movement of the handle 67 causes the engagement of the foot 11 by the hook 68 in the manner described above, and causes the flange 42 to project below the superposed strap portions so as to provide an outer guide therefor.

The superposed strap portions being thus engaged between the feed wheels 57 and the stud 26, the handle 44 is oscillated forwards and backwards. In the forward movement the pawl 25 holds the feed wheels stationary and the pawl 43 slips over the ratchet wheel 58, and the load is so light that the plungers 49 hold the handle rigid. In the backward movement the handle 44 applies tension to the strap through the pawl 43 and the feed wheels 57, the pawl 25 slipping over the teeth of the ratchet wheel 58. The upper portion of the strap is consequently moved to the left as viewed in Fig. 1, slipping over the lower portion of the strap which is held immovable by the stud 26. The load upon the handle 44 during the backward movement is considerable and during this movement the rear end of the link 53 bears upon the oscillating frame 27 and communicates the force thereto.

When sufficient tension is applied to the strap a sleeve of known type is applied to the superposed portions of the strap above the opening 14 in the foot 11 or to the anvil 48, and the handle 44 is moved forwardly into its extreme forward position, bringing the shoulders 41 of the oscillating frame 27 into abutting relation with the shoulders 23 and 24 on the webs 17 and 19, at which time the sealing jaws 51 are located on either side of the superposed strap portions. Continued forward movement of the handle 44 causes the plungers 47 to withdraw from the conical recesses 39 and the handle 44 moves relatively to the oscillating frame about its pivot 46. This relative movement between the handle 44 and the oscillating frame causes the block 52 to move upon the slide 34 and close the jaws 49 to make the seal or joint between the overlapping strap portions.

To remove the tool handle 44 is moved rearwardly to open the jaws and release the sealed strap therefrom. Then handle 67 is rotated in a clockwise direction, as viewed in Fig. 1. This movement of handle 67 raises the feed wheels and retaining flange 42 and also, simultaneously, rotates hook 68 to disengage it from and lift it clear of foot 11, as shown in Fig. 1. The tool is now open at the side and may be moved laterally from the strap and the strap is severed between the seal and the source of supply in any suitable manner.

If the operator is careless in initially positioning the strap in the tool, the flange 42 is brought into contact with the strap when the handle is rotated to lower the feed wheels. When the handle 44 is actuated to tension the strap the friction between the flange and the strap causes the handle to "break" or pivot on the oscillating frame and the attention of the operator is drawn to the necessity for correcting the strap adjustment.

In the modification of the invention illustrated in Fig. 9 retaining flange 42 is omitted from the web 30 of the oscillating frame 27 and the hook 68 is provided with an inwardly directed extension 77, the inner end of which lies adjacent the outer edges of the superposed straps when the hook is swung into coupling position. The extension 77 is located on the hook 68 in such a manner that it is elevated from its position adjacent the strap 13 when the handle 67 is rotated to disengage the feed wheels from the strap. When the handle 67 is rotated to bring the feed wheels 57 into strap engaging position and the hook 68 into engagement with the foot 11, the extension 77 is lowered into the position shown in Fig. 9, in which position it serves as an outer guide for the superposed straps 13. In this modification the shoulder corresponding to shoulder 24 in the other form of tool is omitted in order not to interfere with the movements of hook extension 77. If the operator is careless in respect to the location of the superposed straps and fails to get them into their proper position, the extensions 77 will hit against the misplaced strap and prevent the feed wheels 57 making feeding contact therewith. The failure of the feed wheels to engage the strap will immediately draw the operator's attention to the necessity of immediate adjustment.

Although the invention has been described in connection with the specific details of preferred embodiments thereof, it must be understood that such details are not intended to be limitative of the invention except in so far as set forth in the accompanying claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a stretching tool, in combination a frame having a foot to underlie a binder, a rotatable tensioning device overhanging the foot, manually operable means for actuating the tensioning device, and a tie actuated by said means for securing the outer ends of said foot and tensioning device against spreading.

2. In a stretching tool, in combination, a frame, a movable gripper, means on one side

of the frame providing an overhanging mounting for the gripper, the adjacent side of the frame being open to permit the insertion of a binder, and movable means adapted to bridge said open side and prevent spreading of the frame.

3. In a stretching tool, in combination, a frame having an open side adapted to permit the lateral insertion of a binder, a gripper having an overhanging mounting on said open side, manual means for actuating the gripper, and a tie actuated by said manual means for securing said open side against spreading.

4. In a stretching tool, in combination, a frame having an open side adapted to permit the lateral insertion of a binder, a feed wheel having an overhanging mounting on said open side, manual means for moving said wheel to binder engaging position, and a tie actuated thereby to prevent the open side of the frame from spreading.

5. In a stretching tool, in combination, a frame having an open side, a feed wheel mounted thereon on the open side, a reciprocable lever adapted to actuate said feed wheel, a handle for raising and lowering said feed wheel, and a hook carried by said handle adapted to engage the frame and prevent spreading thereof.

6. In a stretching tool, in combination, a frame having an open side adapted to permit the lateral insertion of a binder, a gripper having an overhanging mounting on said open side, a handle for raising and lowering said gripper, and a hook carried by said handle adapted to engage the frame and prevent spreading thereof.

7. In a stretching tool, in combination, a frame having an open side adapted to permit the lateral insertion of a binder, a gripper having an overhanging mounting on said open side, manual means for actuating the gripper, a tie actuated by said manual means for securing said open side against spreading, and a guide for the binder carried by said tie.

8. In a stretching tool, in combination, a frame having an open side, a feed wheel mounted thereon on the open side, a reciprocable lever adapted to actuate said feed wheel, a handle for raising and lowering said feed wheel, a hook carried by said handle adapted to engage the frame and prevent spreading thereof, and an upwardly projecting extension of said hook adapted to serve as an outer guide for the binder.

9. In a stretching tool, in combination, a foot for underlying a binder, a movable gripper mounted to overhang the foot to clamp a binder thereagainst, the space between the foot and gripper being open at one side to permit lateral application of the binder therebetween, means for actuating the gripper, and a tie movable with said means to connect together the foot and gripper at the open side thereof to limit the separation thereof.

10. In a stretching tool, in combination, a frame having a foot for underlying a binder, a binder feed wheel carried by the frame to overhang the foot from one side to provide an opening for the insertion from the other side of a binder between the feed wheel and foot, manually operated means for actuating the feed wheel, and a tie actuated by said means into two positions, in one position bridging the opening between the foot and feed wheel and preventing them from separating and in the other position freeing the opening between foot and feed wheel to permit insertion of a binder therebetween.

11. In a stretching tool, in combination, a foot for underlying a binder, a movable gripper mounted to overhang the foot to clamp the binder thereagainst, the space between the foot and gripper being open at one side to permit lateral application of the binder therebetween, and a tie movable to a position freeing the space so that a binder may be applied laterally and to a position bridging the space and preventing separation of the foot and gripper, the tension in the binder tending to retain the tie in its bridging and separation preventing position.

12. In a stretching tool the combination of a frame having a foot to underlie two overlapping strap portions and to act as an anchor to prevent movement of the lower of the two strap portions when the same is pressed thereagainst, a strap-feed wheel rotatably supported by the frame to overhang the foot, said frame providing a laterally open gap through which the overlapping strap portions are insertible to position between the feed wheel and foot, means for rotating the feed wheel, means for moving the feed wheel toward and away from the foot to cause the same to clamp the overlapping strap portions between itself and the foot, and a rigid link actuated by said last named means to bridge the gap through which the strap is insertible and secure the overhung feed wheel and foot from relative separation and thereby maintain the feed wheel and foot parallel to each other.

13. A stretching tool comprising a frame having a foot to underlie two overlapping strap portions, the foot acting as an anchor to prevent movement of the under strap portions pressed thereagainst, an eccentric shaft carried by the frame in rigid relation to the foot at one end only, the other end of the shaft being free of the foot to afford an opening for lateral application of the strap to a position overlying the foot, a feed wheel rotatably carried by the shaft, means for rotating the feed wheel to feed the upper strap portion engaged

thereby, means for rotating the eccentric shaft to move the feed wheel toward the foot to grip the overlapping strap portions inserted therebetween, and a rigid tie actuated by the rotation of the eccentric shaft into engagement with the foot to retain the free end of said shaft in fixed spaced relation to the foot, the eccentricity of said feed wheel shaft causing the strap tension to insure the engagement of the tie with the foot.

In witness whereof, I hereunto subscribe my name, this 1st day of March, 1932.

HOWARD C. PORTER.