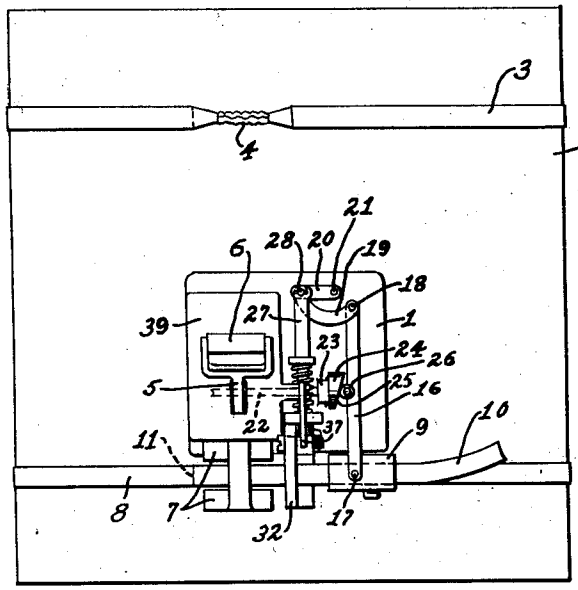
Jan. 20, 1931. L. M. HARVEY 1,789,900

TENSION MECHANISM

Filed Aug. 25, 1928 2 Sheets-Sheet 1

Fig. 1.



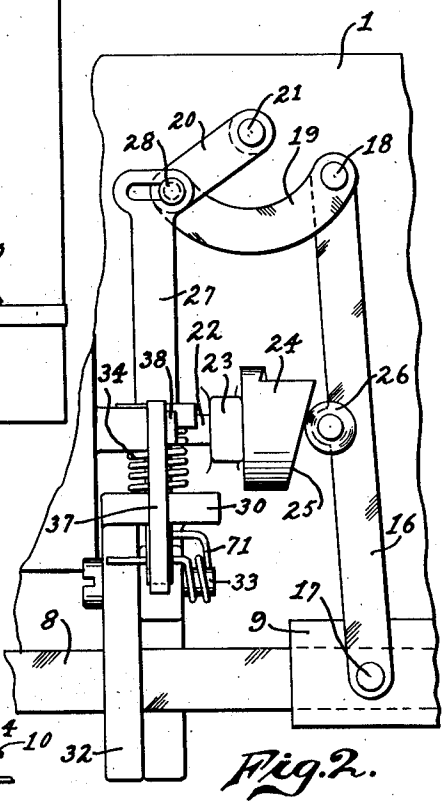
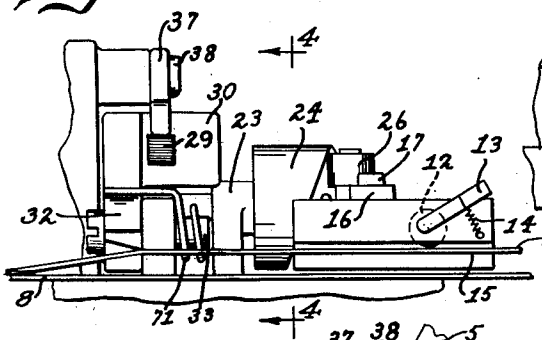


Fig. 2.

Fig. 3.



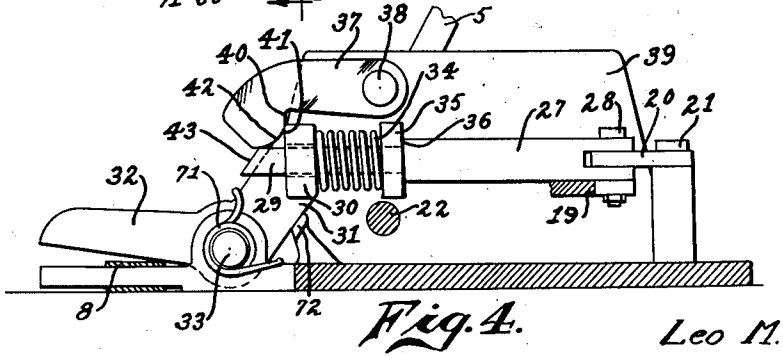


Fig. 4.

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TENSION MECHANISM

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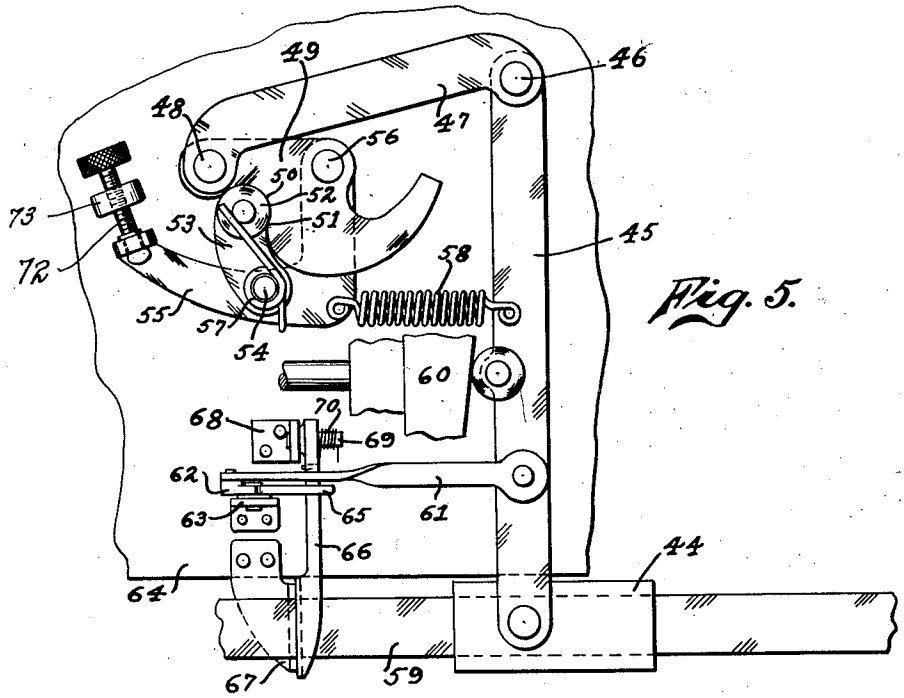


Fig. 5.

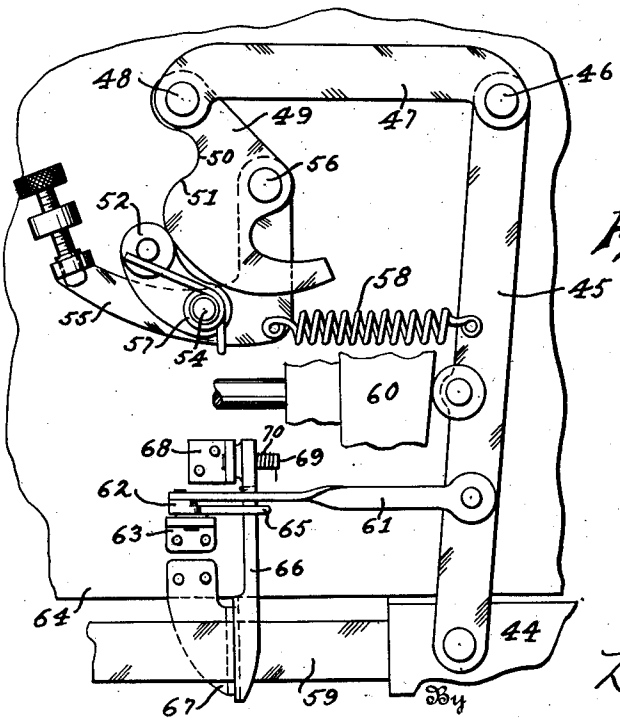


Fig. 6.

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UNITED STATES PATENT OFFICE

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TENSION MECHANISM

Application filed August 25, 1928. Serial No. 302,029.

This invention relates to tension mechanism and while the invention is capable of application in many ways, it is intended to be particularly useful when used in connection with mechanism for forming ties in metal binders, for example straps or bands passed around a box, bale or any other article where the band is to be subjected to tension. In my Patent No. 1,677,522, issued to me July 17, 1928, I disclosed a novel type of tie for connecting the ends of flat box-straps, and while this invention is described in the present specification in connection with mechanism for strapping boxes with flat straps or bands, the invention is equally applicable in connection with mechanism for forming ties in round wire.

In the operation of mechanism for this purpose, the strap or band is passed around the box or other article, and while one end of the strap is held fixed by a part of the mechanism, the loose end is held by a gripper and pulled thereby so as to develop tension in the strap. The degree of tension should depend upon the kind of strap being used, or its material. While the tension is maintained the tie is formed. It is necessary to sever the loose end of the strap so as to enable the strapping operation to be repeated.

The general object of this invention is to provide simple mechanism for developing a predetermined amount of tension and operating to arrest the stretching at this point. Also to provide means which will operate automatically to sever the strap beyond the tie after the tie is formed.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which contribute to produce an efficient tension mechanism.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawing:

Figure 1 is a plan of a box, and illustrating one of my complete tied straps applied to the box; and also illustrating the strapping mechanism embodying my invention, in the operation of forming the tie in another strap. This figure shows the mechanism with its parts in the relation which they have when the box-strapping mechanism commences its operation.

Figure 2 is a fragmentary plan view showing a portion of the strapping mechanism illustrated in Figure 1, but showing the parts in a different relation or phase, such as they have when the tension has been developed in the strap. This figure is upon an enlarged scale.

Figure 3 is a front elevation of the apparatus shown in Figure 1, upon an enlarged scale, certain parts being broken away.

Figure 4 is a section through the device taken about on the line 4—4 of Figure 3.

Figure 5 is a fragmentary plan view upon an enlarged scale, showing another embodiment of the invention and illustrating the parts in the relation which they have when the strapping mechanism commences to operate.

Figure 6 is a view similar to Figure 5, but showing another phase in the operation, namely, the phase when the severing of the strap occurs automatically.

The invention may be embodied in many types of apparatus. In the present embodiment I provide a member that operates to develop tension in a box strap, or other band to be tightened. After the tension has been developed, further movement of the apparatus may effect the severing of the strap beyond the point where the tie has been formed. The severing of the strap is effected automatically.

In Figures 1 to 4, I illustrate an embodiment of the invention. In this embodiment of the invention, I provide a base plate 1, which is adapted to rest upon the top of the box 2, which is to be strapped. In Figure 1, 3 illustrates one of the straps applied to the box, and 4 indicates the type of tie which may be formed by mechanism with which this invention is employed. This tie 4 is fully described in my former patent, referred to above.

On the base plate 1, a lever 5 is mounted, having a handle 6 which when operated actuates two jaws 7 to form the tie in the box-strap 8 while it is held in tension. In order to develop tension in the box-strap and automatically sever the end of the box-strap beyond the tie, I provide a gripper 9, the function of which is to grip the loose end 10 of the metal binder, for example, a box-strap after it has been passed around the box and the end 11 of the strap held fixed by any suitable means, not illustrated.

Although I have referred to the portion 10 of the strap as a "loose end," it should be understood that in practice, if desired, this "loose end" may be connected with a supply roll of the strap material.

The gripper may be of any suitable construction and may include a cam 12 (see Figure 3) having an eccentrically placed lever 13 pulled down by a spring 14 so as to enable the cam 12 to clamp the strap 10 against the flat face or jaw 15 below it and forming a part of the gripper. This gripper is mounted so that it will be moved automatically in a direction to put tension in the band or strap 8 when the lever 5 is actuated. Any suitable means may be used for this purpose.

As illustrated in Figures 1 to 3, I employ for this purpose a floating lever 16, one end of which is attached by a pivot pin 17 to the gripper, and the other end of which is pivotally attached at 18 to a link 19, the end of the said link being pivotally attached to a crank 20 mounted to rock on a fixed pin 21 that attaches it to the upper side of the base plate 1. The lever 5 is attached to a rock shaft 22, said rock shaft being disposed in a horizontal position and rotatably mounted at its outer end in a bearing 23. Beyond the bearing, the shaft 22 carries a drum cam 24 with a cam face 25 that engages a roller 26 attached to one edge of the floating lever 16.

A plunger 27 is provided having a loose connection such as a pin and slot connection 28 with the pin that connects the link 19 to the end of the crank 20. This pin and slot connection enables the pin of the crank 20 to maintain connection with the end of the plunger, although the plunger is guided to slide in a substantially straight line at its forward end. (See Figure 4.) The forward end 29 of the plunger slides freely through a guide opening in a lug 30 that projects laterally from the actuating arm 31 for a knife 32, said knife being mounted to rock on a horizontal rock shaft or pin 33.

The plunger 27 carries a coil spring 34 that is compressed when the plunger is moved forwardly. (See Figure 4.) This spring is compressed between the lug 30 and a collar 35 carried on the plunger and seating against a shoulder 36. By reason of this shoulder 36 the forward end 29 of the plunger is of reduced dimensions.

This part of the mechanism constitutes a trip device which includes in its construction a latch 37 pivotally mounted on a pin 38 on the side of the casing 39 that houses the lever 5 and other mechanism of the apparatus. This latch is formed with a shoulder 40 which, when the trip device is set, engages the face 41 of the lug 30 and enables the lug 30 to resist the compression developed in the spring 34. Beyond the shoulder 40, the end of the latch is formed with a rounded nose 42 that co-operates with an inclined face or cam face 43 which constitutes the end face of the plunger 27.

In the operation of the device the drum 24 exerts a force in a lateral direction against the floating lever 16. The gripper 9 having been applied to the strap 8, this force will exert tension in the band or strap 8 and will exert tension also in the link 19, urging the crank 20 to rotate in an anticlockwise direction so as to shove the plunger 27 toward the strap 8. When this movement commences the shoulder 40 is in engagement with the face 41 of the lug so that the spring 34 will be compressed by the movement of the collar 35. As the tension in the band or strap 8 increases, this spring will become more compressed. As the movement of the plunger 27 progresses, the cam face 43, co-operating with the nose 42, will eventually release this trip device by shoving the latch 37 upwardly. Figure 4 shows the latch just in the act of being released so that the spring 34 is ready to actuate the knife 32 to sever the end of the strap.

Figure 2 shows the relative position of the floating lever and the link 19, and also the plunger when the releasing of the trip device occurs.

In the embodiment of the invention shown in Figure 5, instead of utilizing the energy in a spring to cut the strap, I accomplish this by a further movement of the floating lever after the trip device has been tripped. Figure 5 shows mechanism for this purpose in its set position, that is to say, before the trip device has been actuated; and Figure 6 shows it after actuation. In this embodiment of the invention, a gripper 44 is employed, similar to the gripper 9, and carried on the end of a floating lever 45. The end of this floating lever is attached by a pivot pin 46 to a link 47, said link being attached by a pivot pin 48 to a tripping segment 49. This segment has a deep notch 50 presenting a curved shoulder 51, against which is seated a roller 52 carried on a trigger 53. This trigger is mounted on a pivot pin 54 on a trigger carrier 55, said carrier and said segment 49 having a common fixed pivot pin 56. A coil spring 57 disposed around the pin 54 exerts its force in a direction to hold the end

of the trigger 53 in the notch 50 and determines the tension that will be developed in the strap. A coil spring 58 connecting the floating lever and the trigger carrier 55 returns the parts to their normal position.

With the combination of parts shown in these figures, it will be evident that when the cam 60 exerts a force against the lever 45, tension will be exerted in the link 47 tending to swing the segment 49 in a clockwise direction. The latch or trigger 53 will resist this movement, but if the force exerted is sufficiently high, this trip mechanism will be released and the segment 49 will swing around toward the position shown in Figure 6. In other words, the curved shoulder 51 will force the trigger 53 outwardly so as to free it from the notch 50. This will permit free rotation of the segment after the trigger is released, thereby developing a movement of the end of the lever 45 remote from the gripper 44, in a right-hand direction. This further movement of the lever that occurs after the tripping of the trip device, is utilized to sever the strap 59. Any suitable means may be used for accomplishing this purpose. As illustrated, I provide a link 61 attached to the lever at one end and attached at its other end to a vertical arm 62 of a bell-crank lever pivotally mounted on a bracket 63 on the base plate 64. This bell-crank lever has a horizontal arm 65 that projects across the upper edge of a knife lever 66. This knife lever 66 extends across above the strap 59, and as it is brought down by the arm 65 of the bell-crank lever it co-operates with a fixed knife 67 to sever the strap.

The inner end of the knife lever 66 may be mounted on a bracket 68 by means of a pivot pin 69, and this pin may carry a coil spring 70 that normally holds the knife 66 elevated.

The tripping point for the trigger 53 may be adjusted by means of an adjusting screw 72 threaded in a lug 73 and having a loose swivel connection with the end of the trigger carrier 55.

A coil spring 71, similar to the spring 70, should also be employed in the other embodiment of the invention, said spring operating to hold the actuating arm 31 of the knife against the fixed stop 72. (See Figure 4.)

In the operation of this invention it will be evident that after the lever 5 has developed sufficient tension in the box-strap, further tensioning is arrested. In the embodiments of the invention illustrated, the trip mechanism will become tripped, after which the knife will be automatically operated to sever the strap.

It is understood that the embodiment of the invention described herein is only one of the many embodiments this invention may take, and I do not wish to be limited in the practice of the invention, nor in the claims, to the particular embodiment set forth.

What I claim is:

1. In a tension mechanism, a gripper for holding the loose end of a metal binder, a movable member connected with the gripper to move the same in a direction to develop tension in the binder, means connected with said member for developing tension in the binder and means controlled by the said member for severing the loose end of the binder after the tension has been developed.

2. In a tension mechanism, a gripper for holding the loose end of a strap or band, a movable member connected with the gripper to move the same in a direction to develop tension in the strap, a trip device including a spring for developing tension in the strap and operating to become tripped when the said tension in the strap has been reached, and automatic means operating after the trip device has been actuated, for severing the loose end of the strap.

3. In a tension mechanism, a gripper for holding the loose end of a strap or band, a lever movably connected at one end to the gripper, means for exerting a lateral force on the said lever, a trip device connected with the lever at another point co-operating with the lever to develop tension in the strap, and operating to become tripped after the tension has been developed, and automatic means operating after the trip device has become tripped, to sever the loose end of the strap.

4. In a tension mechanism, a gripper for holding the loose end of a strap or band, a lever pivotally connected at one end to the gripper, means connected with the lever at an intermediate point for exerting a lateral force upon it to move the gripper in a direction to develop tension in the strap, a trip device connected with the other end of the lever co-operating with said last named means to develop tension in the strap, and operating to become tripped after the tension is developed, and automatic means operating after the trip device has become tripped, to sever the loose end of the strap.

5. In a tension mechanism, a gripper for holding the loose end of a strap or band, a movable member connected with the gripper to move the same in a direction to develop tension in the strap, a trip device including a spring co-operating with said member to develop tension in the strap and operating to become tripped by the continued movement of said member after the said tension has been developed, and automatic means operating after the trip device has become tripped, for severing the loose end of the strap.

6. In the art of tightening a metal binder around an object, a gripper for gripping the strap, means for moving the gripper to exert tension in the binder, means cooperating with the last named means to set the same to

release upon the development of a predetermined tension and thereby arrest any further tightening of the binder.

7. In a tension mechanism, a gripper for holding the loose end of a strap or band, a movable member connected with the gripper to move the same in a direction to develop tension in the strap, means connected with the said member for developing tension in the strap, means associated therewith to release the tension if a predetermined tension is exceeded, and means controlled by the said movable member for severing the loose end of the strap after tension has been developed in the same.

Signed at Los Angeles, Calif., this 15th day of August, 1928.

LEO M. HARVEY.