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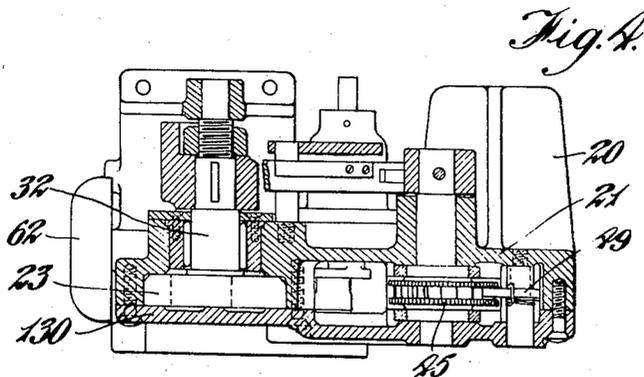
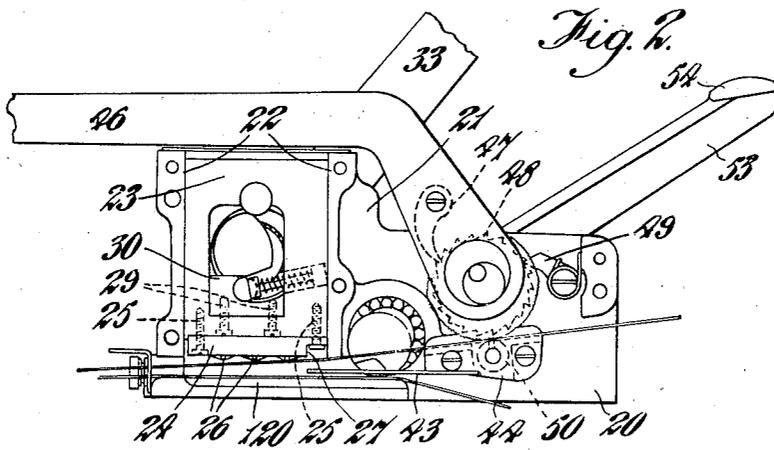
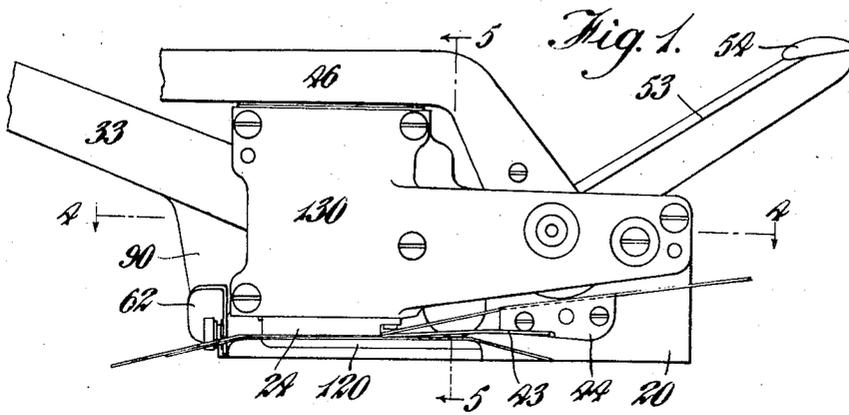
G. J. SUTTON

2,210,510

BAND STRAPPING MACHINE

Filed June 23, 1938

4 Sheets-Sheet 1



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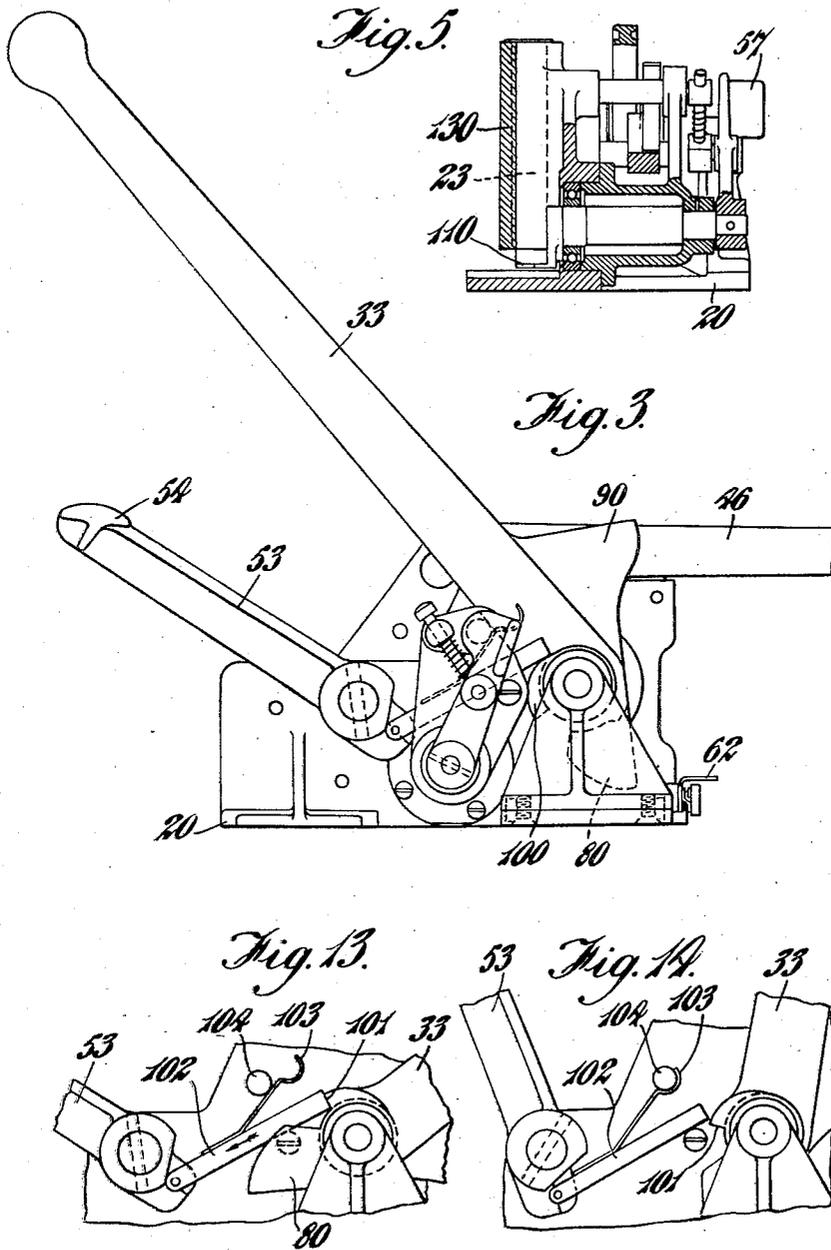
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BAND STRAPPING MACHINE

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Fig. 6.

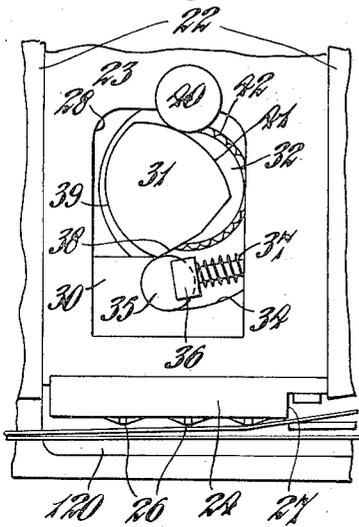


Fig. 7.

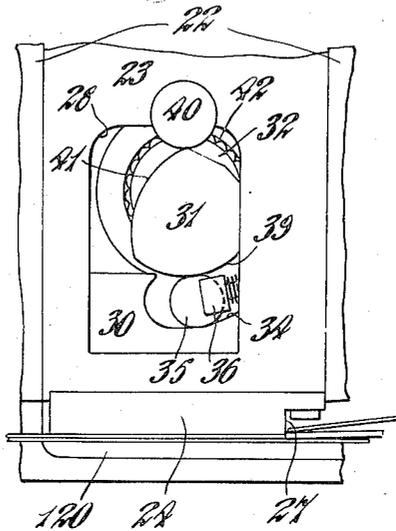


Fig. 8.

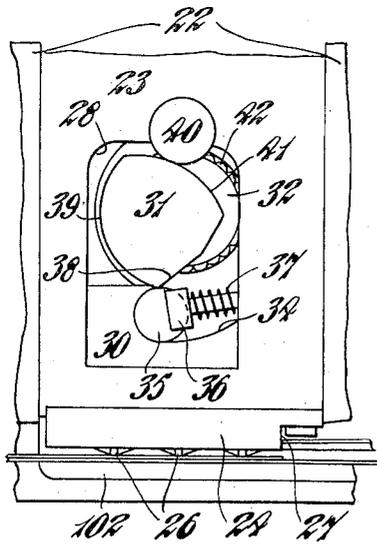
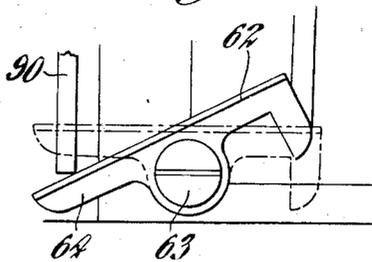


Fig. 17.



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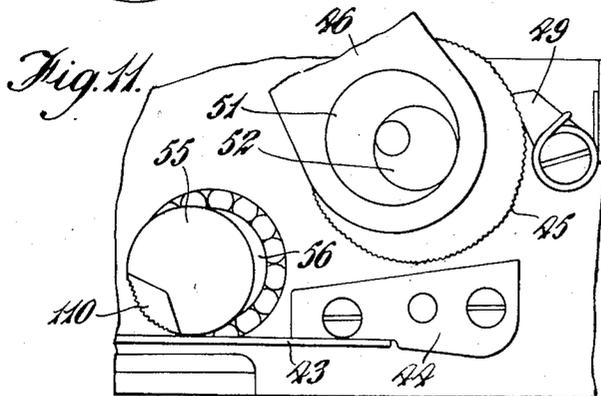
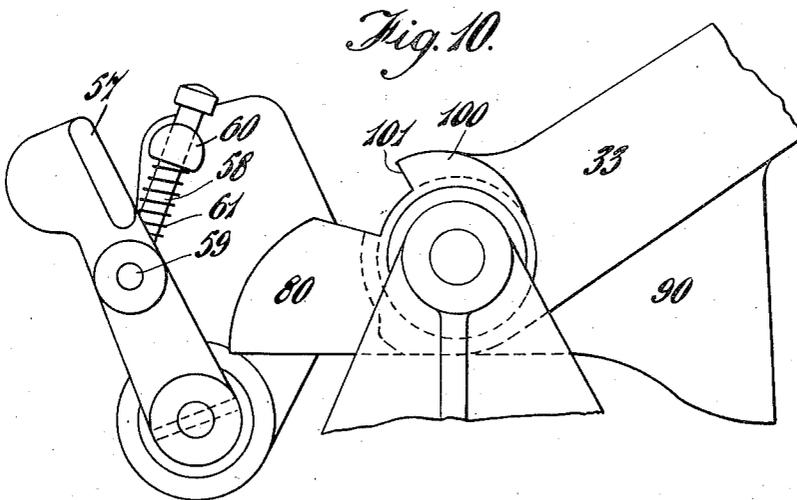
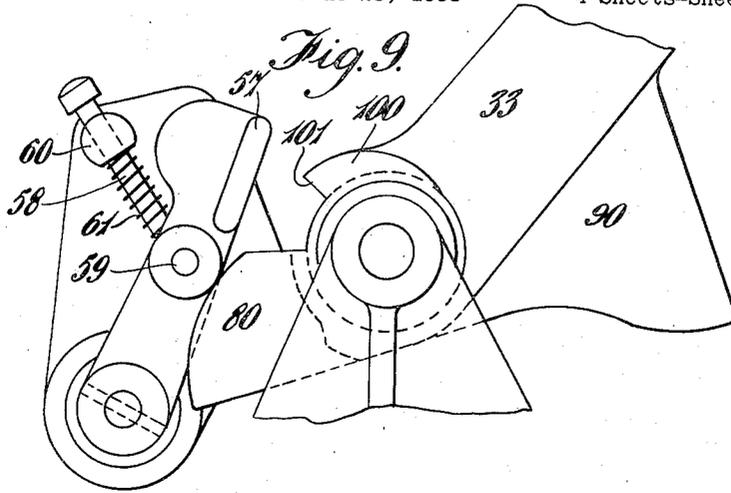
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BAND STRAPPING MACHINE

Filed June 23, 1938

4 Sheets-Sheet 4



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# UNITED STATES PATENT OFFICE

2,210,510

## BAND STRAPPING MACHINE

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New Britain, Conn., a corporation of Connecticut

Application June 23, 1938, Serial No. 215,351  
In Great Britain February 22, 1938

5 Claims. (Cl. 81—9.1)

This invention relates to improvements in band strapping machines such as are used for tensioning a metal strip about a case or the like and for uniting the overlapping ends thereof.

It will be readily appreciated that in all band strapping machines in which the seal is effected by punching out tongues, strips or other elements from the overlapped ends of the band by means of a die part actuated by a cam, the maximum strain occurs only at the time of shearing of the strip. The force necessary to move the die-carrying slide down into engagement with the overlapped ends of the band is negligible compared to the force necessary to shear the metal. According to the principal feature of the present invention, therefore, the cam controlling the movement of the slide is so shaped and arranged that during the first part of the movement of the sealing handle the slide is moved quickly downward to bring the die close to the band, whereafter continued movement of the sealing handle results only in slow movement of the die-carrying slide during the shearing operation. By this means the maximum strain may be spread over a greater part of movement of the sealing lever so that less energy is required to operate the machine.

In order still further to ease the actuation of the machine, means are preferably provided for reducing the friction between the cam and the slide to a minimum at least during that part of the operation which corresponds to the shearing action. Such means are conveniently arranged as hereinafter described.

According to a further feature of the present invention the sealing lever is adapted to release the band from all gripping, tensioning and like devices at the end of its movement thereby freeing the machine from the band. The preferred means whereby this complete releasing of the band is effected will be fully described hereinafter and claimed in the appended claims.

Certain other novel and advantageous features are provided by the present invention, these being described hereinafter.

In order that this invention may be the more clearly understood and readily carried into effect, I will proceed to describe the same with reference to the accompanying drawings, which illustrate by way of example and not of limitation the preferred embodiment of this invention, and in which:

Figure 1 is a front elevation of the complete machine showing the parts thereof in the posi-

tion they assume at the end of the shearing stroke.

Figure 2 is a similar front elevation of the machine with the front cover plate of the machine removed, the parts being shown, however, in the positions they assume prior to the commencement of the shearing stroke but after the free end of the band has been gripped and prior to the band being tensioned.

Figure 3 is a rear elevation of the machine with the parts in the position shown in Figure 2.

Figure 4 is a sectional plan view, the section being taken on line 4—4 of Figure 1.

Figure 5 is a local section on line 5—5 of Figure 1.

Figure 6 is a local elevational view of the sealing part of the machine showing the parts in the positions they assume at the end of the quick downward movement of the die member.

Figure 7 is a view similar to Figure 6 showing the parts in the positions they assume at the end of the punching and strip shearing operation, and

Figure 8 is also a similar view illustrating the return of the die member to its normal inoperative position.

Figure 9 is a local view from the rear of the strip gripping mechanism showing the same just prior to its release by operation of the main operating lever, and

Figure 10 is a similar view showing the same in the position it assumes when the strip is released due to continued operation of the main operating lever.

Figure 11 is a local front elevation showing the strip tensioning and strip gripping devices in the released position.

Figure 12 is a local end elevation from the left hand end of the machine, as shown in Figures 1 and 2, illustrating the two positions of the latch device for the strip.

Figure 13 is a rear view showing the band tensioning device about to be released by the return movement of the sealing lever, and

Figure 14 is a similar view showing the tensioning device fully released and the sealing lever returned to its original position.

Referring now to the drawings, the machine therein illustrated is broadly of the usual construction and comprises a base 20 which is placed on the case or the like to be strapped, means for gripping the free end of the band, means for tensioning the band and means for punching out strips or similar sealing elements from the overlapped ends of the band and for severing the

band from the stock coil. The particular constructions of these last-mentioned means provided by the present invention and their interaction are fully described hereinafter.

5 The machine illustrated in the accompanying drawings is adapted to seal the overlapped ends of the band by the method described in co-pending Patent application Serial No. 189,634 filed February 9, 1938 (I. W. Cirvan), although it will be readily appreciated that by appropriately 10 shaping the die parts it may equally well be adapted to seal the overlapped parts of the band by any other known method.

15 As above stated, the band strap sealing machine illustrated in the accompanying drawings comprises a base 20 which is provided with an upstanding wall 21 on which the mechanism is mounted. Towards one end the wall 21 is provided with guides 22 in which is slidably mounted 20 a die member 23. The die plate 24 is screwed to the bottom edge of this die member by means of the screws 25 so that it may be readily renewed in the event of the dies 26 becoming worn. At one end this die plate 24 is stepped as at 27 to function as one part of the cutter, as herein- 25 after described.

The die member or "slide" 23 is provided with a substantially rectangular aperture 28, at the bottom of which is secured, for example by means 30 of screws 29, a hardened steel bearing plate 30 which co-operates with a cam 31 on a shaft 32 which is mounted in the wall 21 and to which the main operating handle 33 of the machine is secured at the rear of the wall 21. This construction will enable the machine to be more 35 cheaply constructed since it is no longer necessary to make the whole of the slide 23 of hardened steel.

40 The upper edge of the bearing plate 30 is provided with an inclined recess 34, the lowest part of which is located at or about the centre of the bearing plate (see more particularly Figures 2, 6 and 7). Within this recess 34, which opens to the upper edge of the bearing plate at one end, is 45 located a roller 35 which is pressed towards the lowest part of the recess 34 by means of a plunger 36 controlled by a light spring 37.

The effective surface of the cam 31 comprises a flat portion 38 which in the normal position 50 (Figure 2) lies along the top of the bearing plate 30. Beyond this flat portion 38 the cam is provided with a curved part 39 which gradually recedes from the axis of rotation of the cam.

55 By means of this arrangement of the cam and bearing plate, on the first part of the movement of the sealing lever (from the position shown in Figure 2 to the position illustrated in Figure 6), the flat portion 38 of the cam 31 engages with the bearing plate 30 to move the die plate 24 60 quickly down to the overlapped parts of the band. When the die plate 24 reaches the overlapped parts of the band the curved part 39 of the cam 31 comes into engagement with the bearing plate 30 so that further movement of 65 the sealing handle only results in a slow movement of the slide 23. It is during this movement from the position shown in Figure 6 to the position shown in Figure 7 that the shearing of the strip takes place and hence the necessary 70 force to punch out the sealing strips and also to cut the strip is spread over a long movement of the sealing lever 33 and the machine may be easily operated. The curved part 39 of the cam 31, however, contacts with the roller 35, as shown, 75 as it becomes effective on the bearing plate and

continued movement causes the roller 35 to be rolled up the recess 34 against the action of the spring 37 (see Figure 7). By this means the friction between the cam 31 and the bearing plate 30 is reduced to a minimum and the operation 5 of the machine is rendered extremely easy.

A ball or roller 40 is provided at the upper part of the recess 28 in the slide, the further curved part 41 of the cam 31 co-operating with this ball or roller on the return movement of 10 the sealing lever 33 to raise the slide 23 to its normal position ready for the next operation of the machine (see Figure 8). In order still further to ease the operation of the machine, the shaft 32 is conveniently mounted in a roller bearing 42 15 in the wall 21.

The other member of the cutter which co-operates with the step 27 on the die plate 25 at the end of the sealing stroke to sever the strip from the stack coil comprises a strip 43 which 20 lies longitudinally along the front of the machine and is secured at its remote end to a block 44 secured to the wall 21. The free end of the strip 43 lies close to the step 27, and it will be seen that this arrangement of the strip 43 not only 25 provides the desirable resiliency in the cutter but, in addition, the strip 43 is effectively adapted to take up the end strain set up at the cutting operation.

The tensioning device in the machine com- 30 prises a knurled or like disc 45 which is operated by means of the tensioning lever 46 through a ratchet and pawl device 47, 48. A back-stop pawl 49 is provided to prevent reverse rotation of the disc 45. This knurled disc 45 co-operates with 35 a hardened steel roller 50 which is let into a recess in the block 44. The whole disc 45 is, however, mounted on an eccentric 51, the shaft 52 of which is concentrically mounted in the wall 21 and has secured to it at the rear a lever 53 40 which is provided at its free end with a hand rest 54 on which one hand of the operator may be placed to keep the tensioning device in position. The use of this eccentric mounting of the tensioning device roller will be described herein- 45 after.

The gripping device for the free end of the band is similarly eccentrically mounted and com- 50 prises a disc 55 cut eccentric with respect to its shaft 56 in the wall 21 so that rotation of the shaft 56 will cause the free end of the band to be gripped or released as the case may be. At- 55 tached to the shaft 56 at the back of the machine is a thumb lever 57 by means of which the gripping device may be manually operated. A "dead-centre" device is provided for this gripper so that it is automatically thrown from one position to the other. Said dead-centre device com- 60 prises a rod 58 which is pivoted at 59 to the lever 57 and passing freely through a fixed bearing 60 in the machine. A compression spring 61 is ar- 65 ranged between the pivot 59 and the bearing 60.

In order to hold the overlapped parts of the band correctly positioned between the dies, a latch device 62 is provided at the end of the 65 machine, said latch device being pivoted at 63 and being provided with a thumb plate 64 by means of which it may be manually operated.

As above stated, operation of the sealing lever 33, in addition to punching out the sealing strips 70 from the overlapped parts of the band and severing the band from the stock coil, is also adapted to release the band from the machine. For this purpose the sealing lever 33 is provided, firstly, with a cam 80 which extends on the opposite 75

side of the shaft 32 to the sealing lever 33, secondly, with a projection 90 which extends out from one side of the sealing lever and, thirdly, with a cam 100. The cam 80 is adapted to effect the release of the strip gripping device, the projection 90 is employed to effect release of the latch device 62 and the cam 100 is effective to cause release of the tensioning device.

The manner in which the cam 80 effects release of the strip gripping device is illustrated in Figures 9 and 10 of the accompanying drawings. After the strip has been placed in position the operator places one hand on the hand rest 54 and operates the tensioning lever 46. Thereafter, with this hand still pressing down the rest 54, he grasps the sealing lever 33 and swings the same fully over to seal the band. The movement of the sealing handle 33 is effective to seal the band and to sever the band from the coil, as will be readily understood. During the latter part of this movement the sealing lever 33 reaches the position shown in Figure 9 in which the thumb lever 57 is shown in the position to which it is moved to grip the free end of the band. When the sealing lever on its forward movement reaches the position shown in Figure 8 the cam 80 engages with the pivot block 59 so that continued movement of the sealing lever swings the thumb lever 57 and its shaft until finally when the sealing lever has reached the position shown in Figure 10 the cam 80 has pressed the lever 57 so far over that the dead-centre device above described comes into play and the thumb lever 57 snaps over to its release position shown in Figure 10, in which the free end of the strip is released due to the eccentric disposition of the disc 55 relative to the shaft 56. The released positions of the strip gripping device and the tensioning device is shown more clearly in front elevation in Figure 11. It should be noted that the shear plate 43 is cut away in the neighbourhood of the grip face 110 so that the free end of the strip is nipped between the grip face and the extended surface of the lower die plate 120, as indicated in Figure 2.

Continued forward movement of the sealing lever brings the projection 90 into engagement with the latch device 62 to the rear of its pivot, thereby raising its forward effective end to release the strip, as shown in Figure 12.

The sealing lever has now reached the full extent of its forward movement and has to be returned in order to release the tensioning device. The cam 10 is effective to this end. When the sealing lever 33 reaches the position shown in Figure 13 on its return movement, the front 101 of the cam engages with the end of a link 102 which is pivoted to an extension on the lever 53 so that continued return movement of the sealing lever 33 towards the position shown in Figure 14 drives the link in the direction of the arrow shown in Figure 13 and tends to swing the lever 53 in the direction indicated. When the lever 53 is swung in the direction shown, the eccentric mounting of the tensioning disc 45 comes into play to raise the disc from the roller 59 and so free the machine from the band. Figure 14 shows the position of the parts when the complete movement has been effected. The lever 53 has been moved to the position shown and is held in this position by means of the hooked spring 103 on the link 102 engaging with a pin 104. The front of the cam slips past the end of the link 102 and the machine is ready for its next operation.

It will thus be appreciated that the complete stroke of the sealing lever 33, in addition to sealing or uniting the overlapped ends of the band also entirely frees the strapped band and the stock coil from the machine which may thus be easily removed to leave the band tensioned and jointed.

According to a further feature of the present invention, the gripping disc 55 for the free end of the band is adapted to contact only with the forward half of the band. As shown at 110, Figure 5, the effective part of the disc comprising this outstanding foot is the only part to contact with the band. This has been found to be most effective in keeping the free end of the band correctly positioned under the dies.

The lower die part 120 is also preferably not provided with bridge pieces. The dies are adapted to punch some at least of the sealing elements down, whereby the band is drawn up with the slide and stripped therefrom by the slide guides.

The whole of the front of the machine is covered by a cover plate 130 shown in Figures 1 and 4.

I claim:

1. A band strapping machine having a frame, a die slidable in said frame, said die being provided with an aperture terminating at its bottom part in an inclined recess, a rotatable cam disposed in said aperture for lowering and raising said die, a rotary element disposed displaceably in said inclined recess, and resilient means urging said rotary element towards the lowermost part of said recess, said rotary element being adapted to be engaged and displaced by said cam against the action of said resilient means when the cam is rotated to lower the die.

2. A band strapping machine comprising a frame, reciprocable means for gripping the free end of the band, an operator controlled lever for actuating said gripping means, means for tensioning the stock coil end of the band, a die reciprocable in said frame for severing the band from the stock coil and sealing the superposed band ends together, an operator controlled sealing lever for actuating said die, and means connected to and movable with said sealing lever to engage said first mentioned lever and to shift the same to released position by the movement of said sealing lever after completion of the sealing operation.

3. A band strapping machine, as claimed in claim 2, comprising a dead center device disposed between said frame and said first mentioned lever for urging said gripping means into its operative and inoperative end positions.

4. A band strapping machine comprising a frame, means for gripping the free end of the band including a rotatable shaft and a gripping element eccentrically mounted on said shaft, a lever connected to said shaft and adapted to be actuated by the operator to bring said gripping element into operative position, tensioning means for the stock coil end of the band, a die reciprocable in said frame for severing the band from the stock coil and sealing the superposed band ends together, an operator controlled sealing lever for actuating said die, and a cam mounted on said sealing lever, said cam being adapted to engage said lever controlling the gripping element and to restore the latter to its inoperative position upon movement of said sealing lever after completion of the sealing operation.

5. A band strapping machine comprising a frame means for gripping the free end of the

band, means for tensioning the stock coil end of the band, said tensioning means including a shaft, an eccentric collar on said shaft, and a tensioning roller supported in said collar, an operator controlled lever for rotating said shaft and bringing said collar and tensioning roller into operative position, a reciprocable die in said frame for severing the band from the stock coil and sealing the superposed band ends together,

an operator controlled sealing lever for actuating said die, a release lever carried by the shaft of said tensioning means, and a shoulder mounted on said sealing lever for cooperation with said release lever to automatically restore said tensioning means to its inoperative position during the return movement of the sealing lever after completion of the sealing operation.

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