Oct. 28, 1952 H. HOPKES, JR 2,615,478

MACHINE FOR FORMING SPRINGS HAVING CLOSED ENDS

Filed Sept. 9, 1948 2 SHEETS—SHEET 1

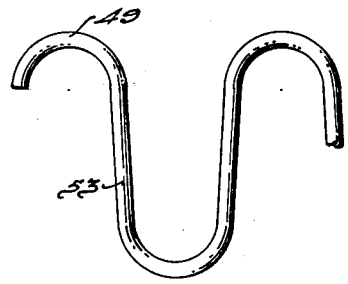


Fig. 1.

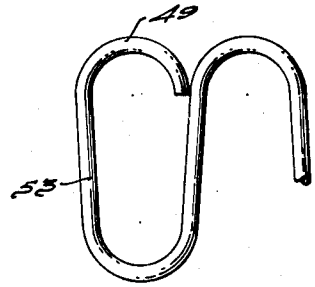
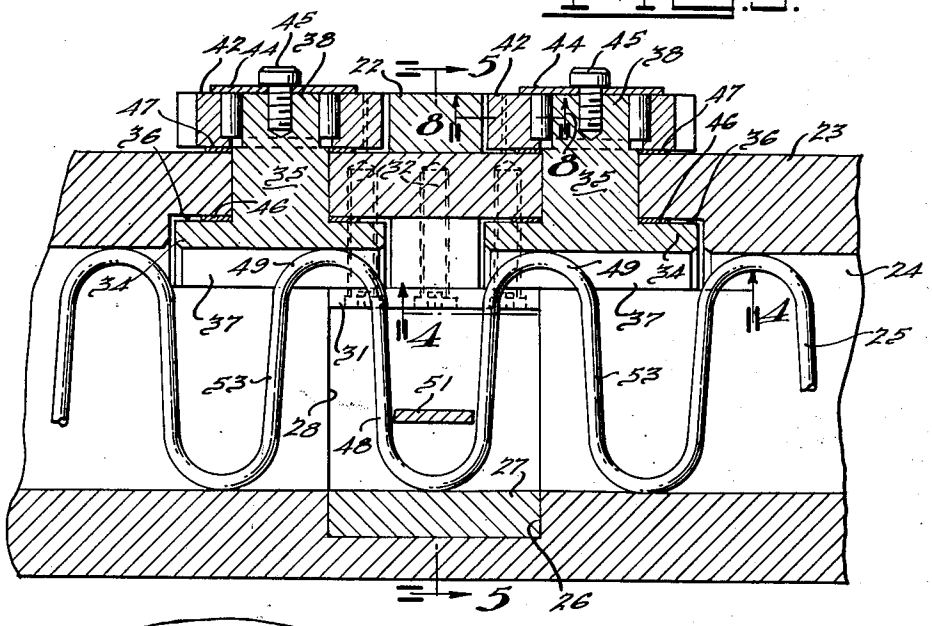


Fig. 2.

Fig. 3.



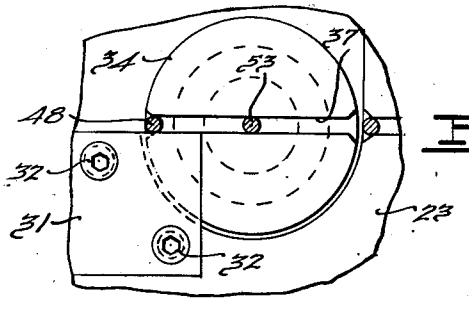


Fig. 4.

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MACHINE FOR FORMING SPRINGS HAVING CLOSED ENDS

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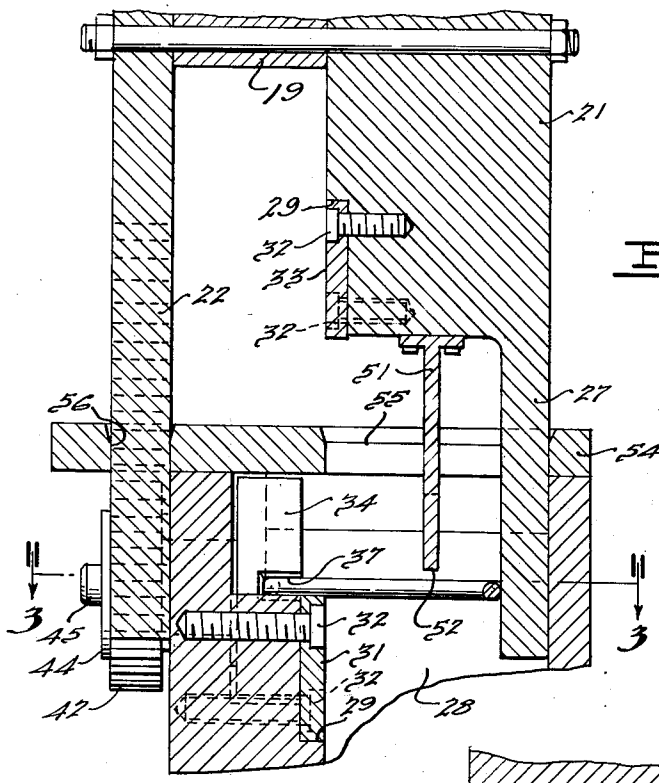


FIG. 5.

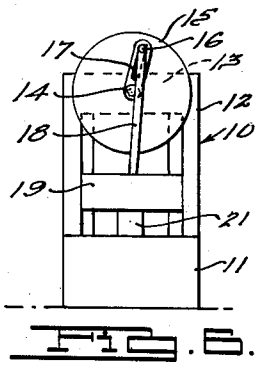


FIG. 6.

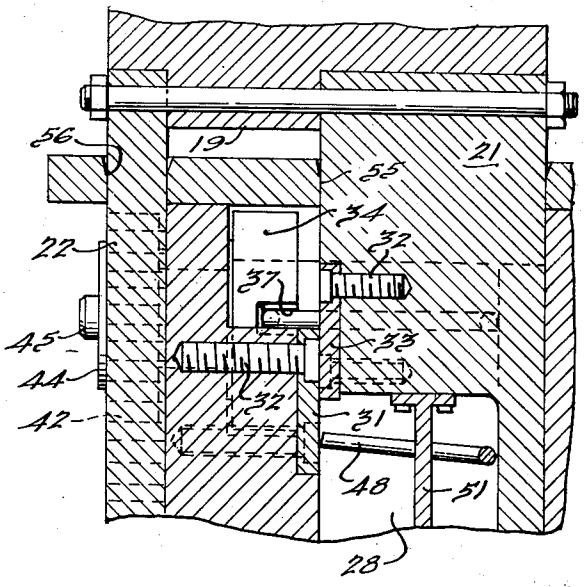


FIG. 7.

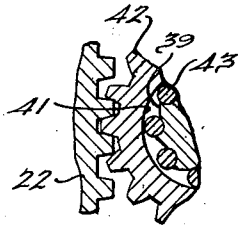


FIG. 8.

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MACHINE FOR FORMING SPRINGS HAVING CLOSED ENDS

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4 Claims. (Cl. 140—102)

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This invention relates to a machine for severing a sinuous spring stock into strips and forming closed ends thereon in the same operation.

Heretofore in the art it has been the practice to construct spring strips from wire bent back and forth to provide oppositely disposed open loops joined by straight portions and to sever lengths therefrom by cutting off the end of a loop and bending the severed ends of the strips at an angle. The strips were supported by the end strap portions and the bent ends prevented the straight portions from slipping from the elements in which they were anchored.

The present invention pertains to a machine for cutting a loop and the adjacent straight portions from the spring strips and twisting the loops on the adjacent severed ends through 180° to form a closed loop at each supporting end of the spring strip. The machine embodies a crank for operating a slide in reciprocation, the downward movement of which cuts the straight portion and loop from the strip, the upward movement of which twists the ends in opposite directions to form closed loops at the adjacent spring strip ends. A guideway is provided through which the spring strip stock is fed and when a sufficient number of loops have passed the cutting head, the crank is operated to move the cutting head and a rack downwardly. This downward movement carries an element along therewith to position the loop to be cut relative to the cutting head and the opposite loops relative to a pair of twisting heads. The straight portions on loops to be twisted are disposed on the axes of the heads so that when the heads are rotated the loops will be twisted along the axis of the straight portion beyond 180° so that when released the spring back in the wire will position the loops in the plane of the strip. Upon the upward stroke of the slide, the rack functions to twist the heads in opposite directions an amount controlled by the length of the crank arm which is adjustable. The crank arm is stopped slightly beyond its uppermost position so as to provide sufficient downward movement to the rack to permit the heads to return to the initial position, with the loop receiving slots therein aligned horizontally with the guideways.

Accordingly, the main object of the invention is to provide a machine for cutting a loop and adjacent straight portions from sinuous spring stock during the downward movement of a cutter head and for twisting the adjacent unsevered loops in opposite directions into engagement with the adjacent spring portions to form closed end

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portions by which strips are supported; and, in general, to provide a machine for severing spring stock and closing the loop ends, which is simple in construction, positive in operation and economical of manufacture.

Other objects and features of novelty of the invention will be specifically pointed out or will become apparent when referring, for a better understanding of the invention, to the following description taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a broken plan view of a spring strip having a severed end before the twisting operation;

Fig. 2 is a view of the structure illustrated in Fig. 1 after the end has been twisted into engagement with the adjacent loop of the strip;

Fig. 3 is a sectional view of the machine illustrated in Fig. 5, taken on the line 3—3 thereof, with a spring strip moved into cutting position;

Fig. 4 is a sectional view of the structure illustrated in Fig. 3, taken on the line 4—4 thereof;

Fig. 5 is a sectional view of the structure illustrated in Fig. 3, taken on the line 5—5 thereof;

Fig. 6 is a reduced view in elevation of a machine for severing and bending the end loops of the spring strips;

Fig. 7 is a view of the machine illustrated in Fig. 5 after the cutting head has moved down beyond cutting position, and

Fig. 8 is a sectional view of the structure illustrated in Fig. 3, taken on the line 8—8 thereof.

Referring to the figures, a cutting machine 10, as illustrated in Fig. 6, comprises a base 11 having guide standards 12 and a crosshead 13. A shaft 14 is supported in the crosshead having a flywheel 15 mounted thereon to which a crank pin 16 is adjustably supported in a slot 17. A crank arm 18 is secured to the crank pin 16 and to a slide 19 which operates in the guideways of the standards 12. The slide 19 supports a cutter head 21 on one side and a rack 22 on the opposite side. The base of the machine supports a guide bar 23 having a guideway 24 therein for the sinuous spring stock 25 which is fed therethrough. The guide bar contains a notch 26 for receiving the guide portion 27 of the cutter head 21, the inner face of which is disposed in continuation of the adjacent inner face of the guideway 24.

The base of the guide block 23 adjacent the notch 26 is provided with an aperture 28 through which the portions of the spring strips severed by the cutter head may fall. The wall of the notch 28 opposite to that containing the notch 26 is provided with a shouldered recess 29 in

which a cutting blade 31 is secured in a suitable manner, herein illustrated as by screws 32. A similar recess 29 is provided in the face of the cutter block 21 having a blade 33 secured therein by suitable means, herein illustrated as by screws 32. The cutter blade 33 is aligned with the cutter blade 31 in such manner as to cut through the spring strip when the cutter head is moved downwardly therebeyond, as illustrated in Fig. 7. The guide block 23 supports a pair of spaced twisting heads 34, the stub shaft portion 35 of which is journaled through the wall of the guide block opposite to that containing the notch 26. The heads 34 are recessed in apertures 36 in the inner wall of the block to have slots 37 in the inner faces thereof aligned with the adjacent wall of the guideway. The ends 38 of the twisting heads beyond the shaft portion 35 are shaped to provide a plurality of teeth 39 which function as a clutch element when associated with the inner surface 41 of pinions 42 and interconnected by a plurality of rollers 43. The pinion is retained in position by a washer 44 secured to the ends 38 of the heads 34 by screws 45.

Thrust washers 46 are provided between the inner faces of the twisting heads 34 and the bottom of the recesses 36 and similar thrust washers 47 are provided between the pinions 42 and the adjacent outer face of the guide block 23. The rack bar 22 projects downwardly between the pinions 42 and when moved downwardly therebetween rotate the pinions 42 in opposite directions to release the rollers 43 from the teeth 39 so that no rotation of the twisting heads 34 occurs during such downward movement. During such downward movement, the loop portion 48 of the spring is severed and on the return movement of the slide 19 the rack 22 rotates the gears in a clutching direction so as to rotate the heads 34 therewith.

The amount of rotation is controlled by adjusting the crank pin 16 in the slot 17 of the flywheel 15, which adjustment is such as to twist the end loops 49 of each section beyond 180° so that the spring back in the ends, when released, will place the loop in a position parallel with the body of the spring strip. When passing over center in this manner, the slot 37 will be out of alignment with the slot 24, and to permit the tension of the twisted end to return the slot to aligned position the machine is stopped with the crank pin 16 moved beyond top position so that the rack will move down slightly permitting the heads to move backwardly to align the slots 37 with the guideways.

The cutter head 21 also carries a positioning element 51 which tapers to a point at the end 52 so that when the head moves downwardly the end will project within the loop 48 to be cut and shift the loop into a position at which the straight portions 53, which will be the end supporting portions of the resulting strips, are substantially aligned with the axes of the twisting heads 34. When the end loops 49 are twisted, the twist will then occur along the axis of the straight portion 53 of each end of the severed strips. A guide plate 54 may be provided on the top of the guide block 23 having an aperture 55 therein through which the cutting head 21 is guided and an aperture 56 for guiding the rack 22.

The operation of the machine occurs as follows. The spring stock 25 is intermittently fed through the guideway 24, the feeding being interrupted during the downward movement of the slide 19. During such downward movement, the loop portion 48 of the strip which is to be severed is positioned accurately relative to the cutting blades and twisting head by the positioning element 51 which is carried by the slide. The cutting head is guided by the portion 27 operating within the notch 26 in the guide bar 23. During this downward movement, the pinions 42 are rotated by the rack 22 in a non-clutching direction so that the twisting heads 34 are not rotated during the downward movement of the slide. Sufficient overrun of the blade 33 relative to the blade 31 is provided to the machine so that adjustment may be made to the crank pin 16 to control the degree of rotation of the twisting heads without interfering with the cutting operation. During the upward movement of the slide 19, the rack 22 rotates the pinion in a clutching direction to cause both of the heads 34 to rotate in opposite directions and twist the loop portions 49 about the straight end portions 53 which are aligned with the axis of the heads.

The crank pin 16 is preferably adjusted to rotate the heads 34 beyond 180° to sufficiently twist the ends 49 so that when they are released they will spring back to be in the plane of the strip. The machine is stopped with the crank arm moved beyond top position so that the slide 19 and rack 22 have moved down slightly to release the rollers 43 from the clutch teeth 19 and permit the tension in the ends 53 to move the heads 34 backwardly sufficient to have the slots 37 aligned with the guideway 24. Immediately upon the completion of the upward movement of the slide 19, the spring strip 25 is again fed into the guideways 24, advancing the severed spring strip, ahead thereof, and out of the guideway of the machine. Control means are provided for interrupting the advancement of spring stock 25 when a proper length has been fed therethrough. Such mechanism is not herein illustrated as any conventional stop mechanism known to be suitable in the art may be employed for measuring the length of the spring strip to be severed in this manner.

What is claimed is:

1. In a machine for severing strips of sinuous spring stock into predetermined lengths comprising a cutter, a positioning means for locating a loop of the sinuous strip adjacent to the cutter, rotatable heads having slots in which the loops adjacent to the located loop are disposed and from which the loop is severed, and means for rotating the heads simultaneously approximately 180° for twisting the adjacent loops into the plane of the strip to form a closed supporting end therefor.

2. In a machine for severing lengths of sinuous spring stock made of wire bent back and forth having open oppositely disposed loops joined by straight portions, means having a guideway for the stock, a cutter head having thereon a positioning element, a cutting blade and a rack, a crank element for moving the cutter head and rack downwardly for locating and severing a loop and adjacent straight portions from the stock, and means actuated by the rack upon the further operation of the crank element for twisting the end loops through 180° into contact with the adjacent loop portions of the stock to form closed supporting ends thereon.

3. In a machine for severing lengths of sinuous spring stock made of wire bent back and forth having open oppositely disposed loops joined by straight portions, means having a guideway for the stock, a cutter head having thereon a positioning element and a cutitng blade, a crank ele-

ment for moving the cutter head downwardly for locating and severing a loop and adjacent straight portions from the stock, twisting heads engaging the loops adjacent to the severed straight portions, pinions operating through overrunning clutches for actuating said twisting heads for rotating the loops approximately 180° into the plane of the strip to form closed supporting ends therefor, and a rack actuated by said cutter head for operating said pinions in opposite directions.

4. In a machine for severing length of sinuous spring stock made of wire bent back and forth having open oppositely disposed loops joined by straight portions, means having a guideway for the stock, a cutter head having thereon a positioning element and a cutting blade, a crank element for moving the cutter head downwardly for locating and severing a loop and adjacent straight portions from the stock, twisting heads engaging the loops adjacent to the severed straight portions, pinions operating through overrunning clutches for actuating said twisting heads for rotating the loops approximately 180° into the plane of the strip to form closed supporting ends therefor, a rack actuated by said cutter head for operating said pinions in opposite directions, means for adjusting the crank element for controlling the degree of rotation of the heads beyond 180° to permit the twisted loops to spring back into the plane of the strip, and means for stopping the machine when the crank element is beyond its uppermost position to permit the rack to move downwardly an amount sufficient to permit the spring back in the loops to rotate the heads therein to initially aligned position with the guideway.

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