July 2, 1957 H. W. MARANO 2,797,752

STAPLE STRIP FORMING MECHANISM

Filed Jan. 3, 1955

Fig. 2.

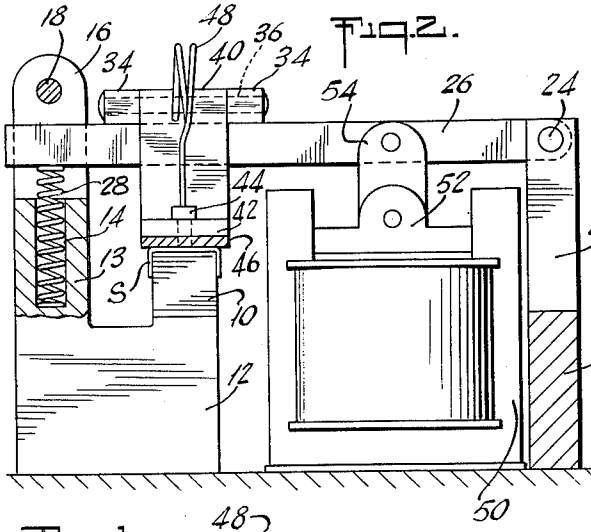
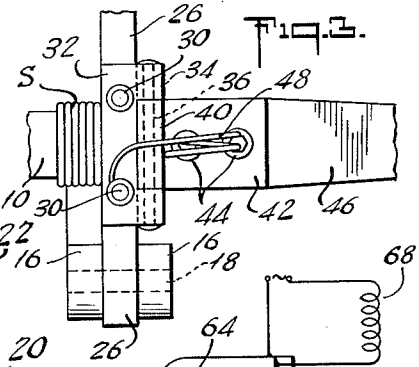


Fig. 3.



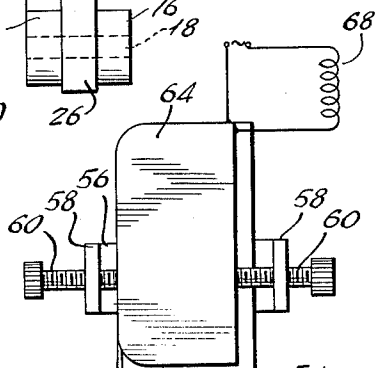


Fig. 1.

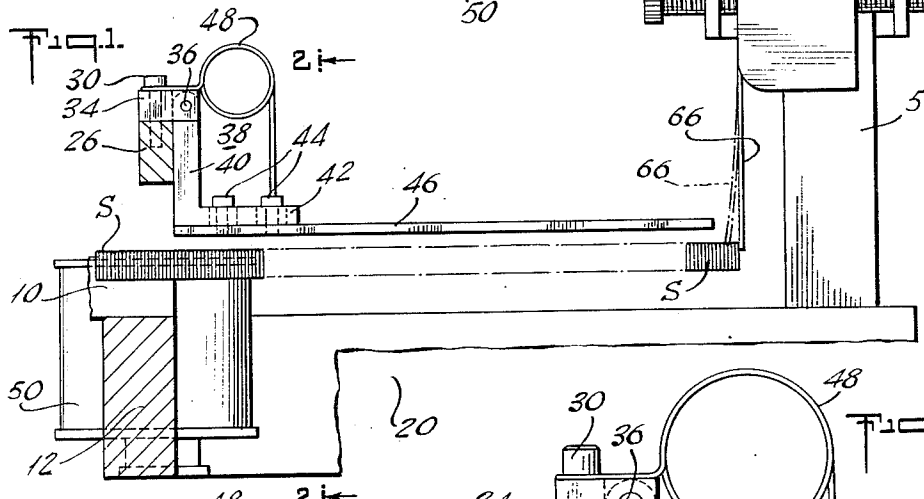


Fig. 4.

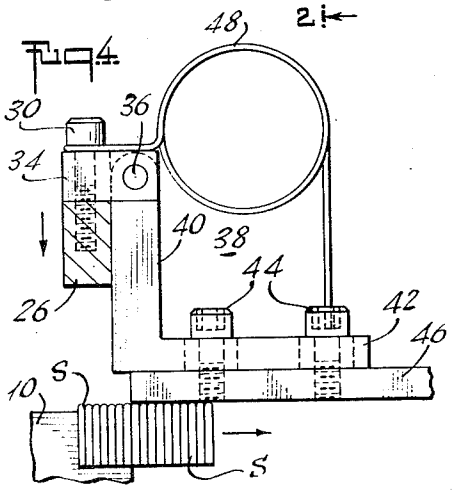
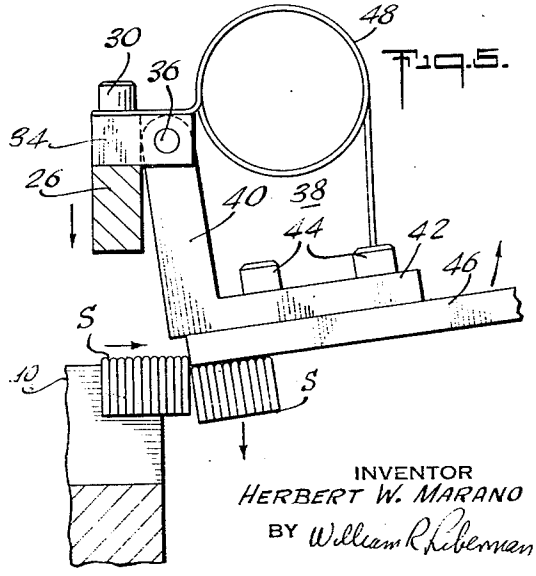


Fig. 5.



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STAPLE STRIP FORMING MECHANISM

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Application January 3, 1955, Serial No. 479,295

10 Claims. (Cl. 164—41)

The present invention relates to an improved mechanism for the production of strips of predetermined lengths of cohered staples, and it relates more particularly to an improved mechanism for cutting a continuously rapidly advancing strip of cohered staples into strips of predetermined length. The present application is a continuation-in-part over my co-pending application Serial No. 422,732, filed April 13, 1954.

In the manufacture of wire staples, particularly those employed in magazine-type stapling machines, the staples are assembled in stacked relationship, cohered and cut into strips of predetermined lengths. The staples are packaged, dispensed and handled in such strip arrangement since not only does it permit the simple loading of the stapling machine magazine but also the convenient packaging of the staples. With conventional staple producing machines, the cutting of the continuous strip of cohered staples into lengths of predetermined sizes presents little or no problem since the production rate of these machines is low and the advance of the cohered strips of staples is relatively slow. However, with the advent of high production rate staple producing equipment, particularly of the type illustrated and described in my Patent No. 2,679,723, issued June 1, 1954, it becomes more difficult accurately and effectively to sever the staple strip into predetermined lengths. While the staple strip cutting mechanism described, illustrated and claimed in my co-pending patent application is highly satisfactory at moderately high speeds, when the output of the staple forming machine is increased to very high speeds, for example of the order of 5,000 staples per minute, the aforesaid strip cutting mechanism possesses numerous drawbacks and disadvantages.

It is thus a principal object of the present invention to provide an improved mechanism for the production of strips of predetermined length of adhered staples.

Another object of the present invention is to provide an improved mechanism for cutting a continuously rapidly advancing strip of cohered staples into predetermined lengths.

Still another object of the present invention is to provide an improved mechanism for cutting a constantly rapidly advancing continuous strip of cohered staples into predetermined uniform lengths without injury to the individual staples.

A further object of the present invention is to provide an improved high speed staple strip cutting mechanism characterized by its simple and rugged structure and ease of operation.

Still a further object of the present invention is to provide an improved high speed staple strip cutting mechanism capable of simple adjustment in order to vary the lengths of the cut strips.

The above, other and further objects of the present invention will become apparent from a reading of the following description taken in conjunction with the accompanying drawing wherein:

Figure 1 is a side elevational view of an improved staple strip cutting mechanism embodying the present invention, shown partially broken away and partially

schematic, the cutting element being illustrated in a raised position;

Figure 2 is a sectional view taken along line 2—2 in Figure 1;

Figure 3 is a top fragmentary detailed view;

Figure 4 is an enlarged fragmentary detailed side elevational view illustrating the cutting element during its downward stroke; and

Figure 5 is a view similar to Figure 4 illustrating the cutting element at the bottom of its stroke.

Reference is now made to the drawings, which illustrate a preferred embodiment of the present invention, wherein the numeral **10** generally designates a longitudinal bar of substantially square cross section defining a track member, the trailing end of the bar being continuously fed a cohered strip of staples S from a high speed staple-forming machine such as of the type described in U. S. Patent No. 2,679,723.

The track **10** is horizontal and carried upon a pedestal **12**, the pedestal **12** having an upright leg **13** which is laterally spaced from the track **10** in the vicinity of its leading end, the leg **13** having a well **14** formed therein and terminating in a pair of longitudinally spaced upwardly directed arms **16** joined adjacent their upper ends by a pin **18** defining a stop member. Also laterally spaced from the leading end of the track **10**, on a side opposite to the leg **13**, is another upright leg **20** having a pair of longitudinally spaced upwardly directed arms **22** which carry between them a pin **24**. The pin **24** rotatably engages one end of a transversely extending lever **26**, the opposite end of which is slidably confined between the arms **16**. The lever **26** is disposed above the track **10** immediately rearwardly of the leading end thereof and is supported in a horizontal position by a helical compression spring **28** registering with the well **14** and engaging the underface of the lever **26**, the upper movement of the free end of the lever **26** being limited by the stop member **18**.

Mounted on the top face of the lever **26** in vertical alignment with the track **10** and secured thereto by means of screws **30** is a hingle plate **32** having a pair of laterally spaced forwardly projecting knuckles **34** supporting between them a hinge pin **36**. An L-shaped bracket **38** has a vertical arm **40**, the upper end of which is provided with a transverse bore rotatably engaging the hinge pin **36** and so disposed that the leg **40** normally assumes a vertical position, the upper inner edge of the leg **40** being rounded so as to permit the swinging of the bracket **38**. Projecting forwardly of the bottom of the bracket leg **40** is a horizontal arm **42** which releasably carries on its underface by means of a pair of socket screws **44** a bar **46** of rectangular cross section slightly wider than the track **10**, the bar **46** defining a shearing element. The bar **46** extends longitudinally in the direction of the track **10**, its trailing end being normally disposed above the leading end of the track **10** slightly forward thereof, and it assumes a normally horizontal position when the lever **26** is in its normally elevated position. A torsion spring **48** has one of its legs engaged by a screw **30** and its other leg bearing upon a screw **44** to urge the bracket **40** to its clockwise position as viewed in Figure 1 of the drawings, whereby the free end of the shearing element **46** is swung downwardly.

An electromagnetic solenoid **50** of conventional construction is disposed between the pedestal **12** and the leg **20** and has associated therewith a vertically movable armature **52** formed of a magnetic material and located below the lever **26**. A link **54** connects the armature **52** with the lever **26**, the link being pin connected at its opposite ends to the armature **52** and the lever **26** respectively, the armature **52** being in an elevated position relative to the solenoid **50** when the lever **26** is in raised position by

virtue of the compression spring **28**. It should be noted that the stroke of the armature **52** is such as to carry the bottom trailing edge of the shearing element **46** below the upper face of the track **10** when the solenoid **50** is actuated.

An upright arm **54** is located forward of the leading end of the shearing element **46** and carries on its upper portion a bracket **56** having a pair of longitudinally spaced transversely projecting arms **58** provided with longitudinally aligned tapped apertures which engage corresponding thumb screws **60**. A normally opened electric switch **64** is carried by the bracket **56** and is engaged between the confronting inner ends of the thumb screws **60** so as to permit the longitudinal adjustment of the switch **64**. Depending from the switch **64** is an actuating arm **66**, the lower end of which is forward of the leading end of the shearing element **46** and is disposed below the longitudinal extension of the upper surface of the track **10**. The switch **64** is connected electrically in series with the coil **68** of the solenoid **50** and a suitable source of current whereby upon flexing of the actuating arm **66** and the closing of the switch **64** the coil **68** is energized.

Considering now the operation of the improved staple strip severing mechanism described above, during the interval between successive severing strokes the lever **26** is supported by the compression spring **28** in its elevated position whereby the shearing element **46** is supported slightly above the path of the staples S and parallel thereto, as illustrated in Figure 1 of the drawings. By virtue of the weight of the shearing element **46** and the urging of the torsion spring **48**, the shearing element **46** is in its clockwisemost position limited by the abutting of the confronting faces of the bracket leg **40** and the lever **26**. The strip of cohered staples S is advanced along the track **10** and beyond the leading end thereof in a cantilevered fashion at a speed determined by the rate of production of the associated staple-forming equipment. As the staple strip reaches the lower end of the switch actuating arm **66**, it bears against this arm and effects the closing of the switch **64**. As a result of the closing of the switch **64**, the circuit of the solenoid **68** is completed energizing the coil **68** and actuating the solenoid **50** to attract the armature **52**, drawing it downwardly together with the lever **26** against the action of the compression spring **28**. With the downward movement of the lever **26**, the bracket **40** and the supported severing element **46** are rapidly carried downwardly until the severing element **46** contacts the upper surface of the staple strip S.

Upon further depression of the severing element **46**, a shearing is effected between successive staples of the advancing strip in the immediate vicinity of the leading end of the track **10**. As the severing element **46** is further lowered, the leading staple of the unsevered portion of the advancing strip of staples abuts the trailing end of the severing element **46**, as illustrated in Figure 5 of the drawings. The assembly of the bracket **40** and the severing strip **46** is swung toward the end of its downward stroke in a counterclockwise direction about the pivot pin **36**, as seen in Figure 5 of the drawings, initially by reason of the frictional engagement between the upper face of the staple strip and the underface of the severing element **46** and thence by reason of the abutment between the lead staple of the unsevered strip and the trailing end of the severing element **46**. The illustration in Figure 5 of the drawing is somewhat exaggerated since during actual operation the various elements are so adjusted that the leading end of the severing element **46** moves very little as a result of which the leading end of the staple strip has little to move before the actuating arm **66** permits the opening of the switch **64**. It should be noted that the leading end of the severing element **46** does not contact the switch actuating arm **66**.

Immediately after the opening of the switch **64**, the solenoid coil **68** is de-energized whereby the solenoid **50** releases the armature **52** and the spring **50** urges the lever **26** to its horizontal position, carrying the bracket **40** and the severing element **46** therewith. The spring **48** and the weight of the element **46** returns the latter to its horizontal position and the aforesaid cycle is periodically repeated. It should be pointed out that the length of the severed staple strip may be adjusted by adjusting the position of the switch actuating arm **66** relative to the leading end of the track **10** by means of the thumb screws **60**.

While there has been described and illustrated a preferred embodiment of the present invention, it is apparent that numerous alterations and omissions may be made without departing from the spirit thereof.

I claim:

1. A staple strip severing mechanism comprising a cut-off member having a stationary leading end over which is advanced a strip of cohered staples in a cantilevered fashion along a predetermined path beyond said leading end, a shearing element normally supported above the path of said staple strip forward of said cut-off member leading end and freely movable in the direction of the path of said staple strip and normally unrestrictedly urged to a retracted position adjacent to said cut-off member leading end, said shearing element having an underface confronting said staple strip and extending in the direction of advance of said staples the distance of a plurality of said staples, and means for depressing said elongated shearing element below the level of said cut-off member.

2. A staple strip severing mechanism in accordance with claim 1, wherein said cut-off member defines the front end of a track along which said staple strip is advanced.

3. A staple strip severing mechanism in accordance with claim 1, including means responsive to the position of the leading end of said advancing strip of staples for actuating said shearing element depressing means.

4. A staple strip severing mechanism in accordance with claim 1, wherein said shearing element depressing means comprises an armature connected to said shearing element and a solenoid cooperatively associated with said armature and including normally open electric switch means connecting said solenoid to a source of current and a switch actuating arm having a section thereof disposed in the path of said staple strip.

5. A staple strip severing mechanism in accordance with claim 1, including a depending arm pivotally supported above its lower end to permit the swinging thereof in the direction of advance of said staple strip and supporting said severing element adjacent its lower end.

6. A staple strip severing mechanism in accordance with claim 5, including spring means urging said severing element toward a substantially horizontal position.

7. A staple strip severing mechanism comprising a track member having a leading end and adapted to guide a strip of cohered staples in a cantilevered fashion along a predetermined path beyond said leading end, a movable member located above said track and movable between a raised and depressed position, a bracket member swingably depending from said movable member along the direction of said staple path, a severing member mounted on said bracket and extending along the path of said staple strip forward of said track leading end for a distance corresponding to a plurality of said staples, the underface of said severing member being disposed above the top face of said track member when said movable member is in its elevated position and below said top face when said movable member is in its depressed position.

8. A staple strip severing mechanism in accordance

with claim 7, including a solenoid having an associated armature connected to said movable member.

9. A staple strip severing mechanism in accordance with claim 8, including a normally open switch connecting said solenoid to a source of current, said switch being provided with an actuating arm disposed in said staple strip predetermined path.

10. A staple strip severing mechanism in accordance with claim 7, including spring means urging said movable member to its elevated position.

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