

SPECIFICATION

Apparatus for forming end stop blanks and attaching the same to a fastener chain

Description

5 This invention relates generally to the production or assemblage of sliding clasp fasteners, and particularly to apparatus for forming top or bottom stop blanks from a continuous strip of metal or the like and applying the blanks to a fastener chain in successive predetermined positions thereon. More particularly, the invention pertains to an improved mechanism for intermittently feeding the continuous strip in such apparatus.

15 Apparatus of the above defined type is described and claimed in Japanese Patent Publication No. 42—16835 published on September 8, 1967. An objection to this prior art apparatus concerns its mechanism for intermittently feeding a continuous metal strip to a blank forming and applying station, where successive unit lengths of the metal strip are severed, bent into end stop blanks, and then attached to a fastener chain to form top or bottom stops for limiting the movement of a slider.

25 According to the feed mechanism incorporated in the noted prior art apparatus, the reciprocation of a ram carrying a cutting and bending punch is utilized to oscillate a feed lever. The stroke of the ram is such, however, that the continuous metal strip is fed a comparatively short distance by each oscillation of the feed lever of a given working length. Since the metal strip is thus served and formed into comparatively short end stop blanks, the prior art apparatus is not suitable for use in the manufacture of large-sized sliding clasp fasteners.

35 According to this invention there is provided apparatus for forming end stop blanks from a continuous strip of metal or the like and attaching the end stop blanks to a fastener chain in successive predetermined positions thereon, comprising: a frame; a drive shaft rotatably mounted on said frame; a feed mechanism for intermittently feeding the continuous strip along a predetermined path in order to deliver successive unit lengths of the continuous strip to a blank forming and applying station, said feed mechanism comprising: a feed lever pivotally mounted at one end of said frame and having the other end disposed for reciprocation along said predetermined path of the continuous strip; means for causing oscillation of said feed lever in step with the rotation of said drive shaft; and means on said other end of said feed lever for engaging the continuous strip during the pivotal motion of said feed lever toward said blank forming and applying station and for substantially disengaging the continuous strip during the pivotal motion of said feed lever away from said blank forming and applying station; means disposed at said blank forming and applying station for severing the successive unit lengths of the continuous strip delivered by said feed mechanism and for forming the severed unit lengths of the strip into end stop

65 blanks; means disposed at said blank forming and applying station for attaching said end stops blanks to the fastener chain in successive predetermined positions thereon; and a dual crank mechanism operatively connecting said drive shaft to said severing and forming means and said applying means for actuating the same, said dual crank mechanism comprising a gear-toothed crank disc formed on said drive shaft, said oscillation causing means comprising a camshaft rotatably mounted on said frame, a cam on said camshaft and a driven gear formed on said camshaft and meshing with said gear-toothed crank disc.

The invention will now be described by way of example with reference to the accompanying drawings, wherein:—

80 Figure 1 is a front elevational view, partly broken away for clarity, of a preferred form of the apparatus constructed in accordance with this invention;

85 Figure 2 is a right hand side elevational view, also partly broken away and shown in a vertical section for clarity, of the apparatus of Figure 1;

90 Figure 3 is a horizontal sectional view taken along the line III—III of Figure 1;

95 Figure 4 is an enlarged perspective view showing a cutting and bending punch, part of a stop applying punch, and a bending die integral with a die carrier, in their relative positions in the apparatus of Figures 1 and 2;

Figure 5 is a schematic representation explanatory of the operation of a dual crank mechanism in the apparatus of Figures 1 and 2;

100 Figures 6A, 6B and 6C are partial elevational views showing the sequential steps of operation of a feed mechanism in the apparatus of Figures 1 and 2; and

105 Figure 7 is a partial perspective view of a fastener chain and a bottom stop blank being attached thereto by the apparatus of Figures 1 and 2.

In the accompanying drawings this invention is shown adapted for forming bottom stop blanks from a continuous strip of suitable material such as metal and for applying the bottom stop blanks to a fastener chain, at the bottom ends of the successive spaced groups of interlocked scoops or fastener elements thereon. As will be seen from Figures 1 and 2, the exemplified apparatus includes a standard 10 having a base pedestal 11 and supporting a mounting from 12 on its top.

115 Generally designated at 13 in Figure 1 is a feed mechanism for intermittently feeding the continuous strip 14 to a blank forming and applying station S. At this station the successive unit lengths of the continuous strip 14 thus delivered by the feed mechanism 13 are cut off, bent into bottom stop blanks, and applied to a fastener chain indicated at 15 in Figure 2. Various means for thus forming the bottom stop blanks and applying them to the fastener chain 15 are largely of the type disclosed in the aforementioned Japanese Patent Publication No. 42—16835. Such means will first be described, followed by

the description of the feed mechanism 13.

The reference numeral 16 in Figure 2 refers to a drive shaft rotatably supported in horizontal disposition within the frame 12 as by bushings one of which is seen at 17. The rear end of the drive shaft 16, shown directed to the right in Figure 2, is coupled to a motor drive unit (not shown) or the like via a V-belt drive including a pulley 18. This pulley 18 is mounted on the drive shaft 16 via a one-revolution clutch 19 of prior art design which when engaged, as by actuation of a switch, permits the drive shaft to rotate with the pulley only during a single complete revolution.

At its front or left hand end the drive shaft 16 terminates in a crank disc 20 which is included in a dual crank mechanism 21. The crank disc 20 is formed to include a set of gear teeth 22 on its periphery for driving the feed mechanism 21 and further comprises a crankpin 23 secured eccentrically to the toothed crank disc 20, two crank webs 24 and 24 pivotally mounted each at one end on the crankpin 23, and two other crankpins 26 and 28 pivotally mounted on the other ends of the respective crank webs 24 and 25.

The crank web 24 extends upwardly from the crankpin 23, and the crankpin 26 pivoted on the upper end of this crank web is slidably received in a vertical guide slot 88 formed in an elongated, upstanding ram 27. A compression spring is provided at 89 for biasing the crankpin 26 upwardly and normally holding the same urged against the top wall of a guide slot 88. The other crank web 25 extends downwardly from the crankpin 23 and is pivotally connected to a second ram 29 via the crankpin 28.

As will be seen also from Figure 3, the first recited ram 27 is slidably received in a guide groove 30 defined by a guide member 31 suitably fastened to the frame 12. The second ram 29 is also slidably received in a guide groove 32 formed in the back of the first ram 27. The first 27 and second 29 rams are therefore slidable up and down relative to each other and to the frame 12. It is thus seen that the rotation of the drive shaft 16 is translated into independent up-and-down motion of the two rams 27 and 29 by the dual crank mechanism 21.

A cutting and bending punch 33 is fixedly mounted on the bottom end of the first ram 27, as by a plurality of countersunk screws 34, and is disposed at the blank forming and applying station S. As shown on an enlarged scale in Figure 4, the cutting and bending punch 33 has an arcuate bottom surface 35. The left hand side, as viewed in Figure 1, of this arcuate bottom surface of the punch 33 is formed into a cutting edge 36 best seen in Figure 2.

The cutting and bending punch 33 has formed in its back a guide groove 37 in which there is slidably received a stop applying punch 38 in vertical register with the second ram 29. The stop applying punch 38 has a portion 39 projecting upwardly of the cutting and bending punch 33. As will be noted upon close observation of Figure 1,

this projecting portion 39 of the stop applying punch 38 is formed to include a pair of overhangs 40 projecting laterally beyond the confronting side walls of the guide groove 37 in the cutting and bending punch 33, for resting on the top of the latter. It will also be noted that, normally, a slight spacing exists between the bottom of the second ram 29 and the top of the stop applying punch 38.

Seen at 41 in Figure 1 is a cutting die suitably affixed to the frame 12 and disposed on one side of the vertical path of the cutting and bending punch 33. The cutting die 41 has formed therein a horizontal guideway 42 through which the continuous strip 14 is fed intermittently to the blank forming and applying station S. During each downward stroke of the cutting and bending punch 33, its cutting edge 36 travels past the cutting die 41 and coacts therewith to sever each unit length of the continuous strip 14.

A retractable bending die 43 is disposed under the cutting and bending punch 33 or, more precisely, under the stop applying punch 38 received in its guide groove 37. As will be seen from Figures 1, 2 and 4, the bending die 43 is formed integral with a die carrier 44 which is slidably supported under the frame 12 by a guide member 45 for movement in the front-to-rear direction of the apparatus, as indicated by the double headed arrow in Figure 2.

The die carrier 44 is formed to include a stop 46 at its rear end which is movable onto and out of engagement with an abutment 47 on the frame 12. A compression spring is mounted at 48 between the die carrier 44 and abutment 47, biasing the die carrier stop 46 into engagement with the abutment 47. Normally, therefore, the die carrier 44 is held in the position of Figure 2, with the bending die 43 disposed in its working position for bending each severed length of the continuous strip 14 into a bottom stop blank in coaction with the cutting and bending punch 33.

Also formed integral with the die carrier 44 is another stop 49 which projects forwardly therefrom and disposed on the side of the bending die 43 opposite to the cutting die 41. Emerging from the guideway 42 in the cutting die 41, the continuous strip 14 is to be fed into abutting engagement with the stop 49.

The top of the stop 49 on the die carrier 44 is formed into a sloping cam follower surface 50. Acting on this cam follower surface 50 is a sloping cam surface 51, Figure 4, at the bottom end of a lug 52 projecting laterally from the cutting and bending punch 33. Thus, upon descent of this cutting and bending punch 33, its cam surface 51 moves into sliding engagement with the cam follower surface 50 of the die carrier 44 after the unit length of the continuous strip 14 is severed and bent into a bottom stop blank. The die carrier 44 is thus cammed to move rearwardly against the bias of the compression spring 48, with the consequent retraction of the bending die 43 from under the stop applying punch 38.

In Figures 1 and 2 is further shown a stop applying die 53 secured to the standard 10 and

disposed under the punches 33 and 38. A guide structure 54 is suitably fastened to the stop applying die 53 to provide a horizontal guideway for the fastener chain 15 extending normal to the path of the continuous strip 14. On the top of the stop applying die 53 there is provided a retractable fastener chain stop 55 which, as has been known heretofore, is pivotally movable relative to the die, serving to arrest the movement of the fastener chain 15 preparatory to the application thereto of the bottom stop blank in each of the successive predetermined positions thereon.

What follows is the description of the feed mechanism 13 for intermittently feeding the continuous strip 14 a unit distance toward the blank forming and applying station S. A suitable supply of the continuous strip 14 is wound on a payoff spool 56 rotatably supported by a stirrup 57 on the base pedestal 11. Unwound from this payoff spool 56, the continuous strip 14 is to be fed along the predetermined path defined by a guide roll 58 and the guideway 42 in the cutting die 41.

The feed mechanism 13 comprises a feed lever 59 pivoted at one end on the frame 12 by a pin 60. The other end of the feed lever 59 is disposed for reciprocation along the noted path of the continuous strip 14 from payoff spool 56 to blank forming and applying station S. For oscillating the feed lever 59, a rotary cam 61 is fixedly mounted on a camshaft 62 and has its contoured edge in contact with a cam follower roll 63 rotatably mounted on the feed lever intermediate its ends, as seen in both Figures 1 and 3.

The camshaft 62 is rotatably mounted on the frame 12, as by bushings 64, in parallel spaced relationship to the drive shaft 16. Also mounted on this camshaft 62 is a driven gear 65 which is shown to be formed integral with the cam 61. The teeth of the driven gear 65 mesh with the gear teeth 22 on the crank disc 20, so that the rotation of the drive shaft 16 is transmitted through this gearing to the cam 61, and is thereby translated into the oscillation of the feed lever 59.

It is thus seen that the tooth crank disc 20 functions as a drive gear as far as the feed mechanism 13 is concerned. The drive 20 and driven 65 gears are of the same diameter, so that the feed lever 59 completes a single reciprocation with each complete revolution of the drive shaft 16.

Extending between frame 12 and feed lever 59 a tension spring 66 biases the feed lever in the counterclockwise direction, so that the cam follower roll 63 thereon is urged into contact with the contoured edge of the cam 61. An adjusting bolt is mounted at 67 on the frame 12 for adjustment of the angle through which the feed lever 59 is to be oscillated.

The feed lever 59 carries on its free end an abutment 68 and feed pawl 69 which coact to firmly engage the continuous strip 14 during the pivotal motion of the feed lever in the counter-

clockwise direction (i.e., toward the blank forming and applying station S) and to substantially disengage the continuous strip during the pivotal motion of the feed lever in the clockwise direction (i.e., away from station S). The abutment 68 is fastened to the feed lever 59 by a pair of bolts 70 passing through respective slots 71 formed in the abutment, so that the position of this abutment is adjustably variable toward and away from the feed pawl 69.

The feed pawl 69 is pivotally mounted at 72 on the feed lever 59 and is disposed on the side of the continuous strip 14 opposite to the abutment 68. The feed pawl 69 is formed to include an arm 73 which is engaged by a torsion spring 74, such that the feed pawl is biased to turn in the counterclockwise direction and hence to urge the continuous strip 14 against the working surface 75 of the abutment 68.

Generally labelled 76 in Figure 1 is a mechanism for locking the continuous strip 14 against reverse movement during the pivotal motion of the feed lever 59 away from the blank forming and applying station S. The locking mechanism 76 comprises an abutment 77 and locking pawl 78 disposed on opposite sides of the continuous strip 14 being fed along the predetermined path. The abutment 77 is fastened to a bracket 79, which projects from the frame 12, by a pair of bolts 80 passing through respective slots 81 formed in the abutment, so that the position of this abutment is also adjustably variable toward and away from the locking pawl 78.

The locking pawl 79 is pivotally mounted at 82 on a mounting arm 83 secured to the bracket 79. An arm 84 formed integral with the locking pawl 78 is engaged by a torsion spring 85 such that the locking pawl is biased to turn in the counterclockwise direction to urge the continuous strip 14 against the working surface 86 of the abutment 77. The aforesaid guide roll 58 is rotatably mounted on the distal end of the bracket 79.

Although the operation of this apparatus is believed to be apparent from the foregoing description, further amplification will be made in the following summary of such operation. It is assumed, in starting the description of operation, that the continuous strip 14 has just been fed by the feed mechanism 13 into abutting engagement with the stop 49 at the blank forming and applying station S. The desired unit length of the continuous strip 14 thus projects from the cutting die 41, ready to be severed and bent into a bottom stop blank.

The pulley 18 on the drive shaft 16 is in constant rotation during the operation of the apparatus. The drive shaft 16 makes a single complete revolution each time the one-revolution clutch 19 is engaged as by the actuation of the unshown switch. During each complete revolution of the drive shaft 16, the crankpin 23, crank webs 24 and 25, and crankpins 26 and 28 of the dual crank mechanism 21 follow the paths depicted in

Figure 5, resulting in the independent reciprocation of the first 27 and second 29 rams.

It will be observed from Figure 5 that during each complete revolution of the drive shaft 16, the crankpin 23 follows a circular path, through positions M1, M2, M3, M4, M5 and M6, thereby causing linear reciprocation of the crankpins 26 and 28 through positions C1, C2, C3, C4, C5 and C6 and positions P1, P2, P3, P4, P5 and P6 respectively. The corresponding numerals suffixed to the letters M, C and P represent the corresponding positions of the crankpins 23, 26 and 28. These suffixed numerals further denote the sequential positions occupied by the three crankpins.

Thus, at the start of each complete revolution of the drive shaft 16, the crankpin 23 is in the position M1 spaced a suitable angle in the clockwise direction from its uppermost position M6, and the crankpins 26 and 28 are in the respective positions C1 and P1. As the crankpin 23 travels from position M1 to position M2, which is spaced 90 degrees from the uppermost position M6, the crankpin 26 is lowered a distance D1 from position C1 to position C2, whereas the crankpin 28 is lowered a much shorter distance d1 from position P1 to position P2.

The cutting and bending punch 33 is thus forced downwardly by the first ram 27 connected to the crankpin 26 via the compression spring 89. Although the stop applying punch 38 descends simultaneously with the cutting and bending punch 33, the stop applying punch is not yet loaded by the second ram 29 connected to the crankpin 28. The descending cutting and bending punch 33 first coacts with the cutting die 41 to sever the unit length of the continuous strip 14 by its cutting edge 36. Subsequently coacting with the bending die 43, the cutting and bending punch 33 bends the severed unit length of the strip 14 into an inverted U-shaped bottom stop blank, shown at 87 in Figure 7, that is now forced into the guide groove 37 in the cutting and bending punch. The cutting and bending punch 33 further descends until its cam surface 51 moves into sliding engagement with the cam follower surface 50 of the die carrier 44, thereby forcing the latter rearwardly against the bias of the compression spring 48. The bending die 43 is thus retracted from under the stop applying punch 38, leaving the bottom stop blank 87 received in the guide groove 37 in the cutting and bending punch 33.

During the travel of the crankpin 23 from position M2 to lowermost position M3, the crankpin 26 is lowered a distance D2 from position C2 to position C3, whereas the crankpin 28 is lowered a greater distance d2 from position P2 to position P3. Thus lowered rapidly, the second ram 29 acts on the stop applying punch 38 and causes the same to apply the bottom stop blanks 87 to the fastener chain 15 in coaction with the stop applying die 53. A bottom stop is thus formed on the fastener chain 15 in a predetermined position thereon.

While the bottom stop blank 87 is being

applied as above to the fastener chain 15, the cutting and bending punch 33 serves to hold the fastener chain against the stop applying die 53.

The compression spring 89 is compressed to absorb some downward motion of the crankpin 26 within the guide slot 88 while the bottom stop blank 87 is being applied to the fastener chain by the stop applying punch 38.

The crankpin 23 subsequently travels back to the initial position M1 through the positions M4, M5 and M6. The crankpins 26 and 28 are thus returned to the initial positions C1 and P1 through the positions C4, C5 and C6 and the positions P4, P5 and P6, respectively. During this return motion of the crankpin 26 and 28 the feed mechanism 13 is actuated to deliver the next unit lengths of the continuous strip 14 to the blank forming and applying station S.

The feed lever 59 is first pivoted from its position of Figure 6A to that of Figure 6B against the bias of the tension spring 66 as the cam follower roll 63 thereon rides over the greatest radius portion 61' of the rotating cam 61. During this pivotal motion of the feed lever 59 away from the blank forming and applying station S the feed pawl 69 is urged to turn in the clockwise direction against the bias of the torsion spring 74, whereas the locking pawl 78 of the locking mechanism 76 is urged to run in the counterclockwise direction. As a consequence, the abutment 68 and feed pawl 69 on the feed lever 59 slides over the continuous strip 14 while the latter is frictionally restrained from movement by the locking pawl 78 coacting with the abutment 77.

As the greatest radius portion 61' of the cam 61 moves past the cam follower roll 63, the feed lever 59 is pivoted from its Figure 6B position back to that of Figure 6A under the bias of the tension spring 66. As indicated in Figure 6C, the feed pawl 69 is urged to turn in the counterclockwise direction, and the locking pawl 78 is urged to turn in the clockwise direction, during this pivotal motion of the feed lever 59 toward the blank forming and applying station S. The continuous strip 14 is therefore held firmly engaged between abutment 68 and feed pawl 69 while being allowed to slide between abutment 77 and locking pawl 78.

The continuous strip 14 is thus fed to the blank forming and applying station S through the guideway 42 in the cutting die 41, until the leading end of the strip abuts against the stop 49 on the die carrier 44, which by now has been spring returned to the working position of Figure 2. As will be understood by referring again to Figure 5, the cutting and bending punch 33 is raised higher than its starting position while the crankpin 23 is travelling from position M5 to position M1 through the uppermost position M6. This is to permit the continuous strip 14 to be fed out of the guideway 42 in the cutting die 41 without the least possibility of being impeded by the cutting edge 36 of the cutting and bending punch 33.

Thus, with the next unit length of the

continuous strip 14 delivered as above to the blank forming and applying station S, one cycle of operation is completed. The foregoing cycle is repeated to form the successive unit lengths of the continuous strip 14 into bottom stop blanks and to apply them to the fastener chain 15, which is also fed intermittently.

It is understood that the present invention is not to be restricted by the exact details of the exemplified apparatus disclosed herein but is inclusive of modifications or changes which will readily occur to those familiar with the art. For example, the apparatus may be adapted for the application of top stops to a fastener chain by modifying the punches and dies, as taught by the noted Japanese Patent Publication No. 42-16835. It will also be seen that the apparatus operates in an essentially identical manner if the stop applying punch 38 is secured to the second ram 29; in this case, the crankpin 26 may also be secured to the first ram 27.

CLAIMS

1. Apparatus for forming end stop blanks from a continuous strip of metal or the like and attaching the end stop blanks to a fastener chain in successive predetermined positions thereon, comprising: a frame; a drive shaft rotatably mounted on said frame; a feed mechanism for intermittently feeding the continuous strip along a predetermined path in order to deliver successive unit lengths of the continuous strip to a blank forming and applying station, said feed mechanism comprising: a feed lever pivotally mounted at one end of said frame and having the other end disposed for reciprocation along said predetermined path of the continuous strip; means for causing oscillation of said feed lever in step with the rotation of said drive shaft; and means on said other end of said feed lever for engaging the continuous strip during the pivotal motion of said feed lever toward said blank forming and applying station and for substantially disengaging the continuous strip during the pivotal motion of said feed lever away from said blank forming and applying station; means disposed at said blank forming and applying station for severing the successive unit lengths of the continuous strip

- delivered by said feed mechanism and for forming the severed unit lengths of the strip into end stop blanks; means disposed at said blank forming and applying station for attaching said end stop blanks to the fastener chain in successive predetermined positions thereon; and a dual crank mechanism operatively connecting said drive shaft to said severing and forming means and said applying means for actuating the same, said dual crank mechanism comprising a gear-toothed crank disc formed on said drive shaft, said oscillation causing means comprising a camshaft rotatably mounted on said frame, a cam on said camshaft and a driven gear formed on disc camshaft and meshing with said gear-toothed crank disc.

2. Apparatus according to claim 1, wherein said oscillation causing means further comprises means for biasing said feed lever into engagement with said cam.

3. Apparatus according to claim 1 or 2, wherein said engaging and disengaging means comprises: an abutment formed in fixed relationship to said feed lever and disposed on one side of the continuous strip; a feed pawl pivotally mounted on said feed lever and disposed on the other side of the continuous strip; and spring means causing the feed pawl to urge the continuous strip against said abutment.

4. Apparatus according to claim 3, further comprising means for locking the continuous strip against movement during the pivotal motion of said feed lever away from said blank forming and applying station, said locking means comprising: a second abutment formed in fixed relationship to said frame and disposed on one side of the continuous strip; a locking pawl pivotally mounted on said frame and disposed on the other side of the continuous strip; and second spring means causing the locking pawl to urge the continuous strip against said second abutment.

5. Apparatus according to claim 4, further comprising means for adjustably varying the positions of said first and the second abutments with respect of said feed and the locking pawls, respectively.

6. Apparatus substantially as herein described with reference to and as illustrated in the accompanying drawings.

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continuous strip 14 delivered as above to the blank forming and applying station S, one cycle of operation is completed. The foregoing cycle is repeated to form the successive unit lengths of the continuous strip 14 into bottom stop blanks and to apply them to the fastener chain 15, which is also fed intermittently.

It is understood that the present invention is not to be restricted by the exact details of the exemplified apparatus disclosed herein but is inclusive of modifications or changes which will readily occur to those familiar with the art. For example, the apparatus may be adapted for the application of top stops to a fastener chain by modifying the punches and dies, as taught by the noted Japanese Patent Publication No. 42—16835. It will also be seen that the apparatus operates in an essentially identical manner if the stop applying punch 38 is secured to the second ram 29; in this case, the crankpin 26 may also be secured to the first ram 27.

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delivered by said feed mechanism and for forming the severed unit lengths of the strip into end stop blanks; means disposed at said blank forming and applying station for attaching said end stop blanks to the fastener chain in successive predetermined positions thereon; and a dual crank mechanism operatively connecting said drive shaft to said severing and forming means and said applying means for actuating the same, said dual crank mechanism comprising a gear-toothed crank disc formed on said drive shaft, said oscillation causing means comprising a camshaft rotatably mounted on said frame, a cam on said camshaft and a driven gear formed on disc camshaft and meshing with said gear-toothed crank disc.

2. Apparatus according to claim 1, wherein said oscillation causing means further comprises means for biasing said feed lever into engagement with said cam.

3. Apparatus according to claim 1 or 2, wherein said engaging and disengaging means comprises: an abutment formed in fixed relationship to said feed lever and disposed on one side of the continuous strip; a feed pawl pivotally mounted on said feed lever and disposed on the other side of the continuous strip; and spring means causing the feed pawl to urge the continuous strip against said abutment.

4. Apparatus according to claim 3, further comprising means for locking the continuous strip against movement during the pivotal motion of said feed lever away from said blank forming and applying station, said locking means comprising: a second abutment formed in fixed relationship to said frame and disposed on one side of the continuous strip; a locking pawl pivotally mounted on said frame and disposed on the other side of the continuous strip; and second spring means causing the locking pawl to urge the continuous strip against said second abutment.

5. Apparatus according to claim 4, further comprising means for adjustably varying the positions of said first and the second abutments with respect of said feed and the locking pawls, respectively.

6. Apparatus substantially as herein described with reference to and as illustrated in the accompanying drawings.



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