

[54] **CLIPPING APPARATUS AND CLIPS THEREFOR**

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[51] Int. Cl. .... **B65d 83/00**

[58] Field of Search ..... 29/243.57, 33.52; 24/30.5 R, 30.5 P, 30.5 W, 30.5 T; 206/56 R, 56 AB, 56 DF

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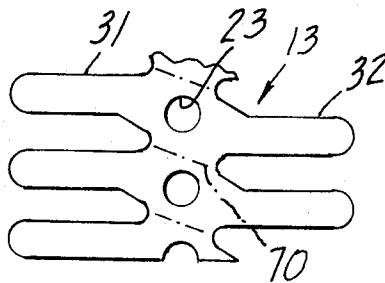
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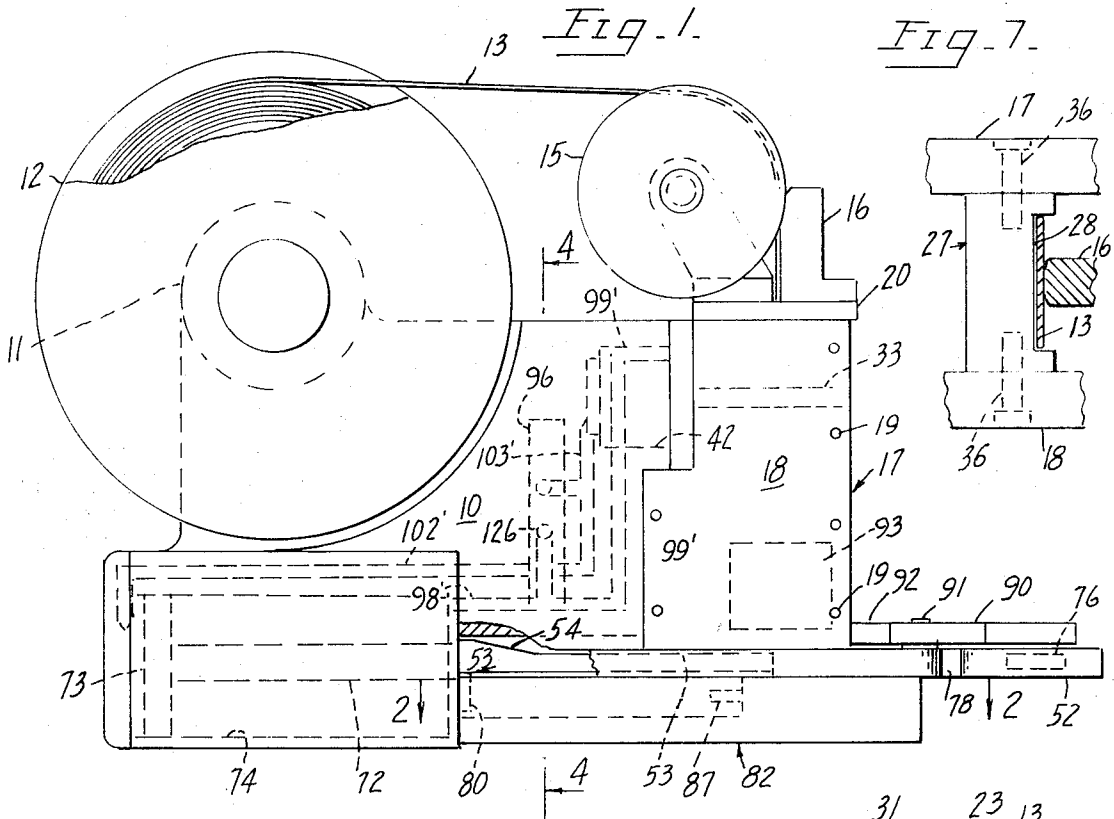
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[57] **ABSTRACT**

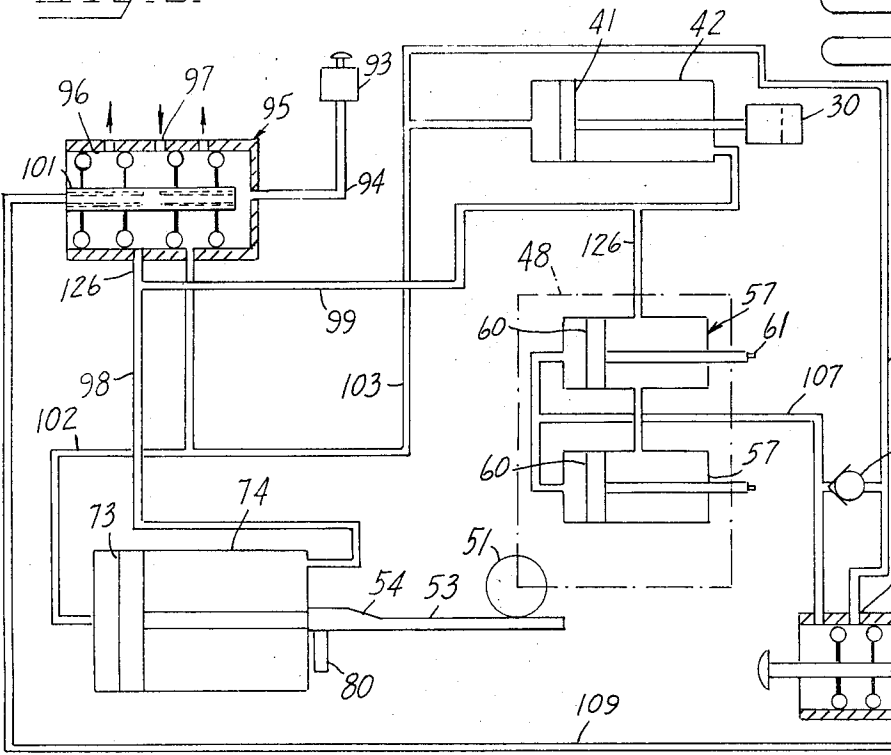
A clipping apparatus for forming a closure around the neck of a bag of flexible material or the like. Clips are supplied to the apparatus in the form of an elongated prestamped strip of planar sheet material which is wound on a supply reel. The strip is then formed to a generally U-shape in the device and thereafter individual clips are cut from the strip by a punch which, in cooperation with a die, applies the clip in encircling relationship to the product. The disclosed prestamped strip facilitates feeding of the same to the clipping operation and the shape of the clip facilitates use of the machine with clips having legs of different lengths.

**3 Claims, 9 Drawing Figures**

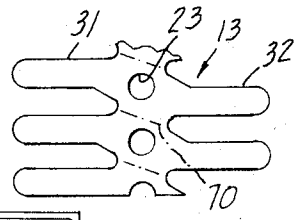




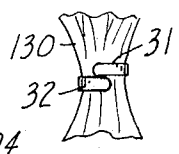
*Fig. 5.*

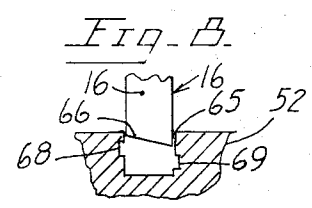
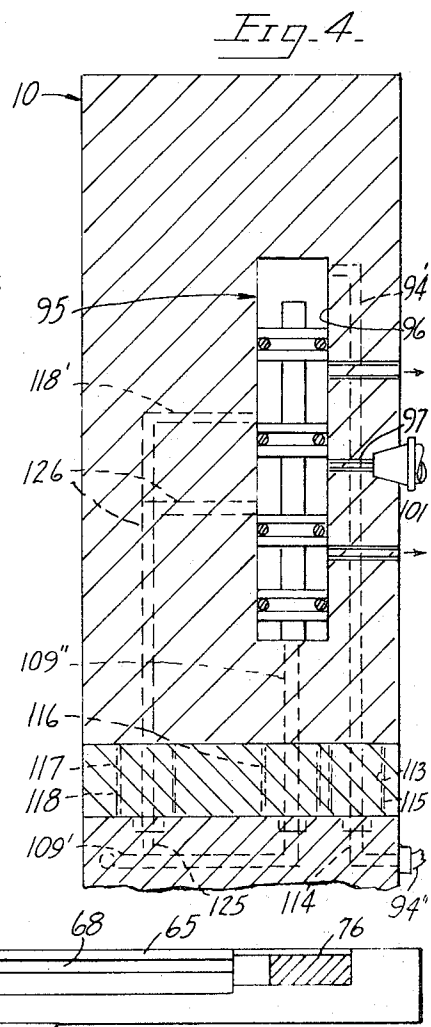
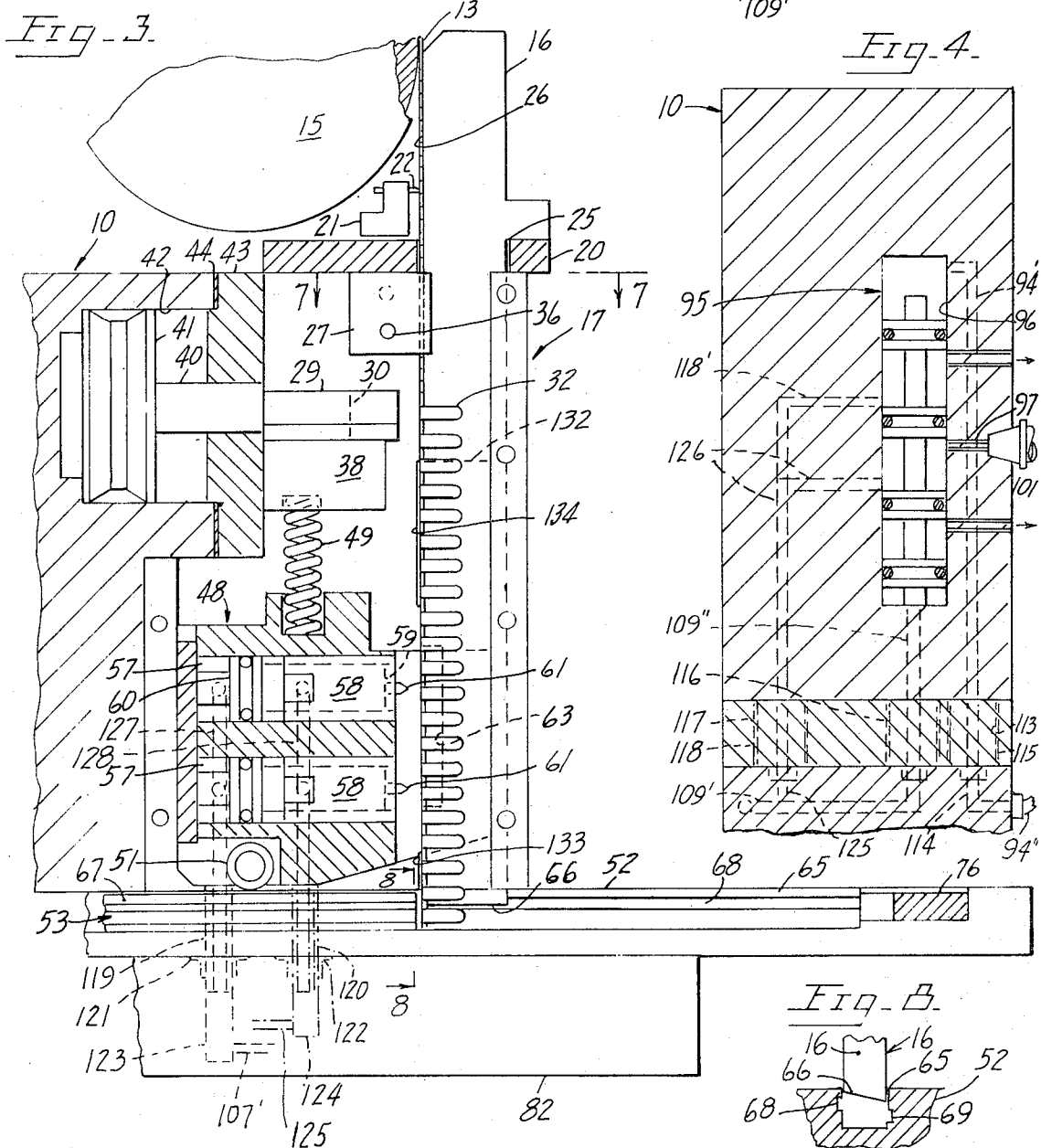
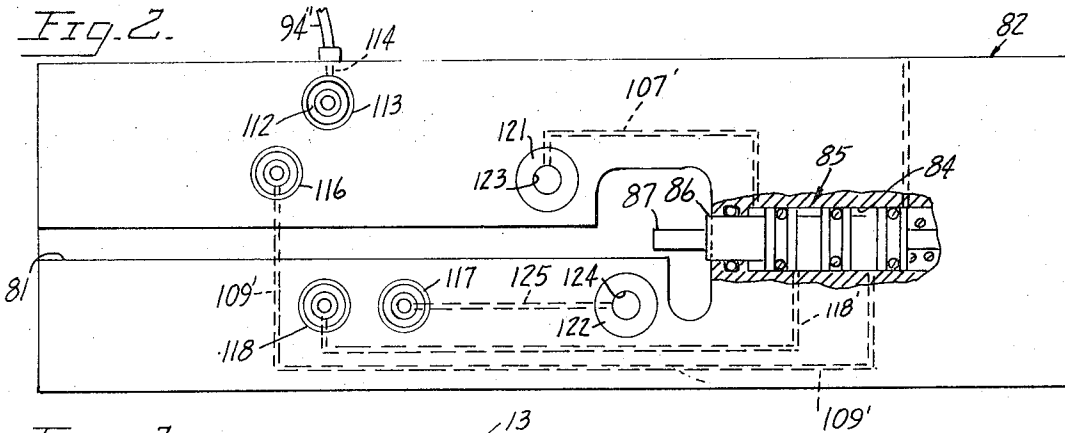


*Fig. 5.*



*Fig. 9.*





**CLIPPING APPARATUS AND CLIPS THEREFOR**

This invention relates to a clipping apparatus adapted to apply a closure clip to the neck of a bag of flexible material or the like and is particularly adapted for use in tying the neck of a bag containing produce or the like. The invention also includes the provision of a novel clip for use in making an effective closure.

In many instances it is desirable to tie the mouth of a paper or plastic bag containing produce or the like with a simple inexpensive clip. The main object of the present invention is therefore the provision of a novel apparatus and clip for forming a closure on a product such as the neck of a bag of flexible material.

Another object of the invention is the provision of a clip strip which may be provided in the form of a space-saving roll and thereafter fed from the roll to the apparatus which not only forms the clip to a generally U-shape but cuts successive clips from the strip and thereafter applies the clip to the product.

Still another object of the invention is the provision of a novel clip which may be provided in the form of an elongated planar strip which is shaped so as to facilitate feeding of the clips to the clip applying station.

Still another object of the invention is the provision of a clipping apparatus and clips therefor which permit use of clips of different sizes to accommodate products of different girth.

Another object of the invention is the provision of a clipping apparatus which may be driven by compressed air and which has optimum compactness so as to lend itself for use in conjunction with bagging machines of various configurations.

Other objects and advantages of the invention will be apparent from the following specification and from the drawings.

FIG. 1 is a side elevation of a clipping apparatus with portions broken away to show internal structure.

FIG. 2 is a top plan view of the block containing the reversing valve.

FIG. 3 is a fragmentary enlarged vertical cross sectional view through a portion of the housing.

FIG. 4 is a vertical cross sectional view taken in a plane indicated by lines 4—4 of FIG. 1 and showing the four-way valve.

FIG. 5 is a fragmentary plan view of the prestamped strip from which the clips are formed.

FIG. 6 is a schematic of the air lines and the associated actuated elements.

FIG. 7 is a top plan view of the main housing showing the strip guide.

FIG. 8 is a fragmentary vertical cross section through the die support showing the lower end of the rail in cooperation therewith.

FIG. 9 is a fragmentary side elevation of the neck of a plastic bag showing the completed clip.

In detail and first with reference to FIG. 1 the apparatus comprises a main body portion generally designated 10 and which is formed with a journal 11 on which a supply reel 12 is rotatably supported. The supply reel 12 is adapted to receive a relatively long length of strip 13 from which the clips are formed. This strip 13, preferably of aluminum, is prestamped to the configuration shown in FIG. 5 and is guided over a spool 15 and then fed downwardly along one side of a clip rail 16 which is secured to one leg of a generally channel shaped housing generally designated 17 (FIG. 3). To the open side of said channel shaped housing there is secured a

face plate 18 (FIG. 1) which is secured by screws 19 to the free ends of the legs of the channel shaped housing 17. In FIG. 3 the face plate 18 is removed to show the internal construction.

To the upper side of housing 17 there is secured a top plate 20 on which is swingably mounted a detent 21 which includes a detent pin 22 adapted to fit within one of the holes of a central row of holes in the strip 13 and which holes are indicated at 23 in FIG. 5. The function of the detent 21 is to prevent the strip 13 from moving in an upward position.

From the detent 21 the strip 13 passes downwardly through an aperture 25 in the top plate 20 and is retained in light engagement with the inwardly directed face 26 of rail 16 by means of a fixed retainer 27. As best seen in FIG. 7 the retainer 27 is provided with a generally C-shaped face 28 against which the strip 13 is slidably received. The retainer 27 not only holds the strip 13 against the rail 16 thus reducing the likelihood of the strip buckling but it also prevents lateral shifting of the strip 13 so that the central axis of the strip registers with the central plane of the rail 16. The retainer 27 may be removably secured by screws 36 to the housing 17 and the face plate 18 so that different retainers may be substituted depending on the width of the strip 13 to be employed.

Spaced downwardly from the retainer 27 is a forming punch 29 which is provided with a generally U-shaped forming face 30 for pressing the strip 13 against the rail 16 thus deforming the strip into a generally U-shape with the legs 31, 32 (FIG. 5) of the strip 13 received along the opposite sides of the rail 16. The strip forming punch 30 is slidably supported on a spring retainer 38 which is fixedly secured to the housing 17 and said punch is also slidably received in a groove 33 (FIG. 1) in the face plate 18. Secured to the inner end of forming punch 29 is the piston rod 40 of a piston 41 slidably received within a cylinder 42 formed in the body portion 10. Piston rod 40 is slidably received in an aperture formed in a cap 43 secured to the outer face of body 10 with a gasket 44 interposed between said cap and body to give an airtight seal. It will be apparent upon introduction of air under pressure to the left-hand end of cylinder 42 that the forming punch 30 is urged against the flat strip 13 to bend a portion of the same and to a generally U-shape. Preferably the vertical extent of the forming punch 30 is equal to the axial width of a clip.

Slidably supported for vertical reciprocation within the housing 17 is a slider block generally designated 48 which is formed at its upper end to receive therein a helical compression spring 49 which in turn is received at its upper end in fixed spring retainer 38. The compression spring 49 urges the slider block 48 downwardly at all times and the latter is provided at its lower end with a rotatably supported roller 51 in engagement with the upper side of a die support generally designated 52 and in which a punch 53 is reciprocally supported. As best seen in FIG. 1 the punch 53 is provided at its inner end with a camming surface 54 which, during the clipping stroke, is adapted to engage the roller 51 for urging the slider block 48 upwardly against the urgency of spring 49 a distance equal to the spacing of holes 23 on strip 13 (see FIG. 5).

The slider block 48 is provided with a pair of identical vertically spaced cylinders 57 within which are press fitted bushings 58. Slidably received within bush-

ings 58 are piston rods 59 of pistons 60. The outer ends of piston rods 59 are provided with strip feeding pins 61 which are adapted to be received within registering holes 23 when the slider block 48 is in its upper position. As will be seen later on in greater detail air is introduced into the left-hand ends of cylinders 57 when the slider block 48 is in its upper position so as to insert the feeder pins 61 within registering holes 23 in the strip 13. The punch 53 is subsequently retracted to the positions of FIGS. 1, 3 so as to permit the spring 49 to urge the slider block 48 downwardly to the position shown in FIG. 3 and at the same time feed the strip 13 a distance equal to the spacing between holes 23. In order to permit the feed pins 61 to pass through the holes 23 the face 26 of rail 16 is provided with an elongated recess 63. It will be understood that adequate feeding of the strip 13 might be accomplished by only one feeding pin 61 but it has been found that feeding action is improved and more accuracy insured by providing two feed pins 61 spaced apart as indicated.

As best seen in FIG. 8 the lower end of rail 16 extends downwardly into a longitudinally extending punch receiving slot 65 in die support 52 and is provided with a lower end 66 which is slantingly disposed relative to the horizontal. The free end of punch 53 is complementarily formed with a slanting upper face 67 (FIG. 3) so that the strip 13 is cut along a slanting line indicated schematically by dotted line 70 in FIG. 5. As seen in FIG. 8 the die support 52 is provided with a pair of longitudinally extending generally rectangular grooves 68, 69 in which are received the legs 31, 32 of each clip cut from the strip 13. To insure disengagement of the punch from the strip 13 on its retracting stroke a stripper generally designated 132 may be fixed in the housing 17 and formed to provide a lip 133 which curves around the juncture between the central body portion of the strip 113 and the leg 31 to retain said juncture against the rail 16. The stripper may be vertically elongated to provide a similar upper lip 134 to provide additional guidance for the strip 113.

As best seen in FIG. 1 the inner end of punch 53 is fixedly secured to the outer end of piston rod 72 of a piston 73 which is slidably supported in cylinder 74 integral with body 10. It will be apparent upon introduction of air under pressure to the left-hand end of cylinder 74 that the outer end of punch 53 is urged to the right as seen in FIG. 3 so that the upper slanting surface 67 of the punch cooperates with the slanting lower end of rail 16 to cut the strip 13 along line 70 and to urge the cut strip along the length of the passageway 65 and into engagement with a die 76 fixedly secured in die support 52. As stated above this clipping movement of punch 53 also engages the camming surface 54 on the punch with the roller 51 thus moving the slider block 48 to its upper position at which the feeder pins 61 are projected through a pair of holes 23 in strip 13. As will be seen later on the pistons 60 in slider block 48 are retracted after movement of the slider block to its lower position seen in FIG. 3 and before the punch 53 undergoes another cycle after retraction.

The die support 52 is provided with a laterally outwardly opening curved groove 78 (FIG. 1) through which the neck of a plastic bag or other product may be introduced to a position against the die 76 so that when the punch urges the clip against said die the legs 31, 32 of the clip are deformed into encircling relationship with the product.

Depending from the lower side of punch 53 is a pin 80 (FIG. 1) which extends through a slot in die support 52 and is received within a longitudinally extending slot 81 in a generally rectangular valve body 82 (FIG. 2) which in turn is fixedly secured against the lower side of die support 52. As best seen in FIG. 2 valve body 82 is formed with a longitudinally extending bore 84 of a reversing valve generally designated 85. The spool 86 of valve 85 is provided with an extension 87 which is engaged by the pin 80 on punch 53 when the latter approaches its final clipping position relative to die 76. As will be seen later on valve 85, among other functions, serves to reverse the punch 53 to the left-hand position shown in FIGS. 1 and 3.

For the purpose of initiating a cycle of the apparatus an actuator plate 90 is swingably supported on die support 52 by means of pin 91. As the product is inserted through slot 78 in die support 52 and urged against the die 76 the actuator plate 90 is swung about pivot 91 to actuate a linkage generally designated 92 connected to a valve 93.

Referring now to FIG. 6 the valve 93 is connected by means of a conduit 94 to one end of a four-way valve generally designated 95. This valve 95 is formed in the body 10 and includes a cylinder 96 (FIG. 4) and is of the type wherein its spool 101 is provided with small axially extending apertures connecting the central periphery of the spool with the opposite ends thereof. In normal inoperative position air under pressure is introduced to valve 95 through port 97 and said pressure is applied through conduits 98, 99 to the piston rod ends of cylinders 42 and 74 thus holding the clipping punch 53 and the forming punch 30 in retracted positions. Upon actuation of valve 93 the pressure in the right-hand end of valve 95 is relieved permitting the spool 101 to move to the right as seen in FIG. 6 thus applying pressure through conduits 102, 103 to the left-hand ends of cylinders 74 and 42. This provides simultaneous actuation of the forming punch and clipping punch. It will be noted in this connection that the actuation of the forming punch provides a means of frictionally securing the strip 13 relative to the rail 16 while the cutting step is being performed by the punch 53 on the strip 13.

At the same time the punching cylinders are being supplied with air under pressure conduit 104 supplies air to reversing valve 85 through port 88. It will be seen from FIG. 6 that the application of air under pressure through port 88 has no effect so far as moving the spool of valve 85. However near completion of the stroke of punch 53 and the application of the clip to the product the actuation of valve 85 by pin 80 causes the pressurized air from valve 85 to be directed through conduit 107 to the left-hand ends of cylinders 57 thereby projecting the feeding pins 61. It will be noted that the projection of pins 61 into holes 23 of strip 13 is not accomplished until the slider block 48 has been elevated by the camming surface 54. Upon actuation of valve 85 the pressure in conduit 109 connecting valves 85, 95 is relieved so that the spool of valve 95 returns to its left-hand position shown in FIG. 6. This of course causes the pistons 41, 73 to be returned to their retracted positions. In order to permit feed pistons 60 to remain in strip engaging position during the downward movement of slider block 48 under the urgency of spring 49 a check valve 111 is interposed between conduits 104, 107 so that it is necessary for pressure to be relieved in

line 104 before line 107 can be exhausted thereby permitting retraction of the feed pins. The fact that the effective areas on the right-hand sides of pistons 60 are considerably less than on the left-hand sides also contributes to delaying return of pistons 60 to their inoperative positions. In this manner the said feed pins 61 are not removed from the feeding holes 23 of strip 13 until the slider block 48 has reached its lowermost position.

One of the important features of the instant apparatus is that the numerous functions herein disclosed are carried out without the use of numerous external flexible conduits which would lead to complications especially when the clipper is employed with a related apparatus such as a bagging machine. It will be seen that the main body 10 and the return valve body 82 are employed as manifolds in which the various cylinders and conduits are formed so as to minimize the number of external conduits which, if present might foul related apparatus employed with the clipper. The main body 10 is provided with a vertically extending bore 96 (FIG. 4) constituting the cylinder of valve 95. The conduit 94 which bleeds the upper end of valve 95 upon initiation of the clipping stroke is a vertically extending drilled hole 94' in main body 10 opening outwardly of the lower face of said body 10. In order to connect this drilled hole with the reversing valve block 82 the latter is provided with an upwardly extending post 113 on the upper surface of valve body 82. A suitable opening 115 is formed in the die support 52 so that said post 113 may extend upwardly therethrough. The post 113 is provided with an O-ring 112 seal at its upper end so that when valve body 82 is secured to housing 17 by screws (not shown) a connection is thereby effected between conduit 94 and a drilled hole 114 in block 82 which connects with the flexible hose 94" shown in FIG. 2. This flexible hose is connected to the valve 93 which is actuated upon initiation of the clipping stroke when the product is inserted against the die 76. Additional posts similar to post 113 are indicated at 116, 117 and 118 in FIG. 2 for purposes to be described.

It will be understood that only those portions of the drilled holes and bores that constitute passageways are shown in the drawings. In the interest of clarity the terminal portions of the bores and drilled holes together with the plugs for closing the same are omitted from the drawings.

In order to effect an airtight connection between the vertically reciprocable slider block 48 and the valve block 82 the former is provided with a pair of downwardly extending hollow sleeves 119, 120 (FIG. 3) which are passed through suitable passageways in die support 52 and which are slidably received at their lower ends in resilient bushings 121, 122 respectively in block 82. These bushings 121, 122 are fixedly secured to block 82 at the upper ends of a pair of vertically extending conduits 123, 124 formed in said block. As best seen in FIG. 2 conduit 123 connects by a drilled hole 107' with the left-hand end of valve 85; said drilled hole constituting the conduit 107 shown in FIG. 6 and through which pressure is applied to the left-hand ends of the strip feeding cylinders 57 through a passageway 127 connecting with sleeve 119. The retraction of the strip feeding cylinders is accomplished by applying air through conduit 124 from a drilled hole 125 connecting at one end with said conduit 124 and from its other end with post 117 which in turn connects with a vertically extending passageway 126 in main

body 10. This passageway 126 is connected to valve 95 so as to normally receive air under pressure while the device is inoperative.

Passageway 128 connects the upper end of sleeve 120 with the right-hand ends of cylinders 57.

A post 116 on block 82 connects at its lower end with a conduit 109' which communicates with valve 85 as indicated in FIG. 2. Post 116 connects at its upper end with conduit 109''.

Post 118 serves to connect conduit 118' with the discharge port of valve 95 after actuation of the latter and with valve 85 as indicated.

The lines 102, 103 (FIG. 6) which connect with the left-hand ends of cylinders 74, 42 are indicated as drilled holes 102', 103', respectively in FIG. 1. Similarly drilled hole 98' constitutes the conduit 98 (FIG. 6) connecting the right-hand end of cylinder 74 with port 126 of valve 95. An additional drilled hole 99' connects port 126 with the right-hand end of forming cylinder 42.

Not only does the above described pneumatic system result in a compact assembly but optimum speed of operation is achieved since the length of the various conduits is reduced to a minimum.

As seen in FIG. 1 the supply reel 12 permits the storage of a relatively large number of clips thereon so that only infrequent replacement of filled reels is required. Thus the cost of the clips and the expense of operation is considerably reduced over devices which require the insertion of the clips in the form of rigid sticks of generally U-shaped cross section. (See, for example, Maestri U.S. Pat. No. 3,055,010). Another advantage of the present invention over prior art devices which require preformed clip sticks is that the provision of the planar strip 13 with legs 31, 32 at right angles to the longitudinal axis of the strip permits the use of strips with legs of different lengths so as to suit products of different girth. All that is required to adapt the apparatus to clips of different leg length is to substitute a retainer 27 appropriate to the width of the strip.

It will also be apparent that the provision of holes 23 in strip 13 permit optimum accuracy in feeding the strip so that uniformity of product is insured. Also the provision of said holes 23 enhances the securement of the completed seal (FIG. 9) to the product since the plastic film tends to be compressed into the hole 23 of the clip thus reducing the likelihood of slippage between clip and product.

As best seen in FIG. 9 the legs 31, 32 of the completed clip are readily accessible and it is a simple matter for a user to open up the clip, remove some contents of the package 130 and replace the clip manually.

We claim:

1. Means for forming a closure encircling a product such as a plastic bag or the like comprising:
  - an elongated strip of sheet material having a central body portion extending along the central axis of said strip,
  - a plurality of longitudinally spaced apart legs extending laterally outwardly from the opposite sides of said body portion and at right angles to said axis with the side edges of said legs being substantially perpendicular to said axis,
  - the legs on one side of said body portion being in staggered relation relative to the corresponding legs on the opposite side of said body portion,

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whereby a pair of adjacent legs on opposite sides of said body portion may be bent in parallel planes perpendicular to said axis to form a closure around such product.

2. Closure forming means according to claim 1 wherein said body portion is formed with apertures spaced apart longitudinally of said body portion a dis-

tance equal to the spacing of the legs on one side of said body portion to cooperate with a feeding means for longitudinally feeding said strip.

3. Closure forming means according to claim 1 wherein a pair of adjacent legs on opposite sides of said body portion are formed with colinear side edges.

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