

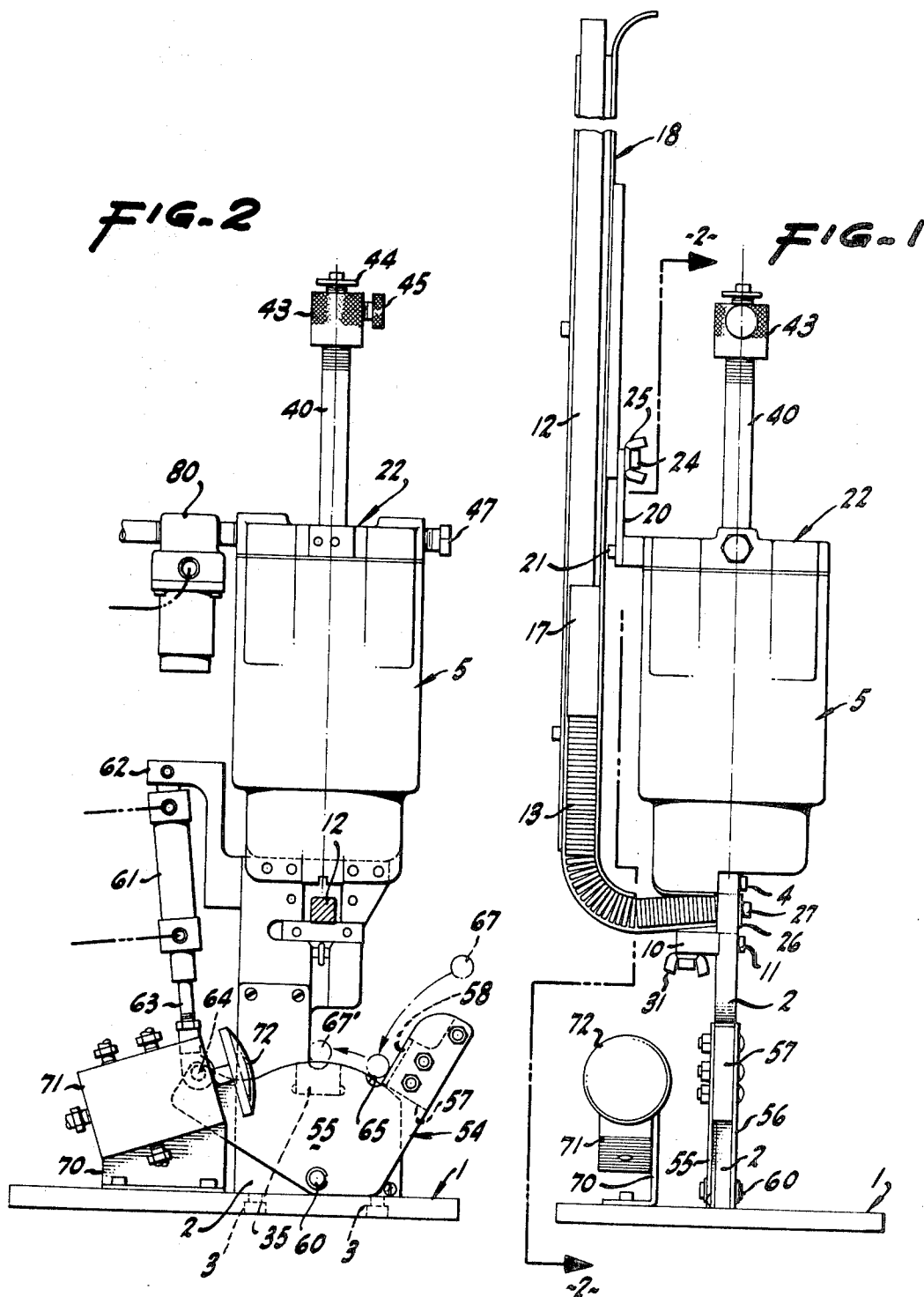
June 8, 1971

K. A. KLENZ
CLIPPING DEVICE

3,583,056

Filed Sept. 16, 1968

4 Sheets-Sheet 1



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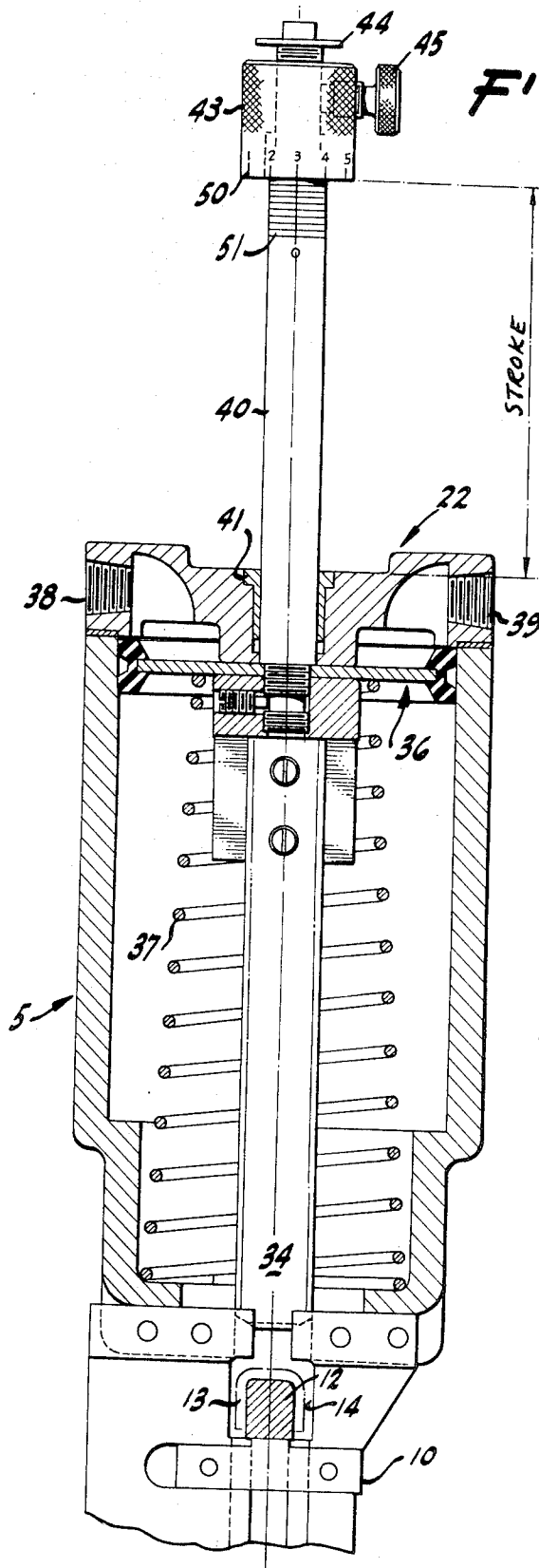
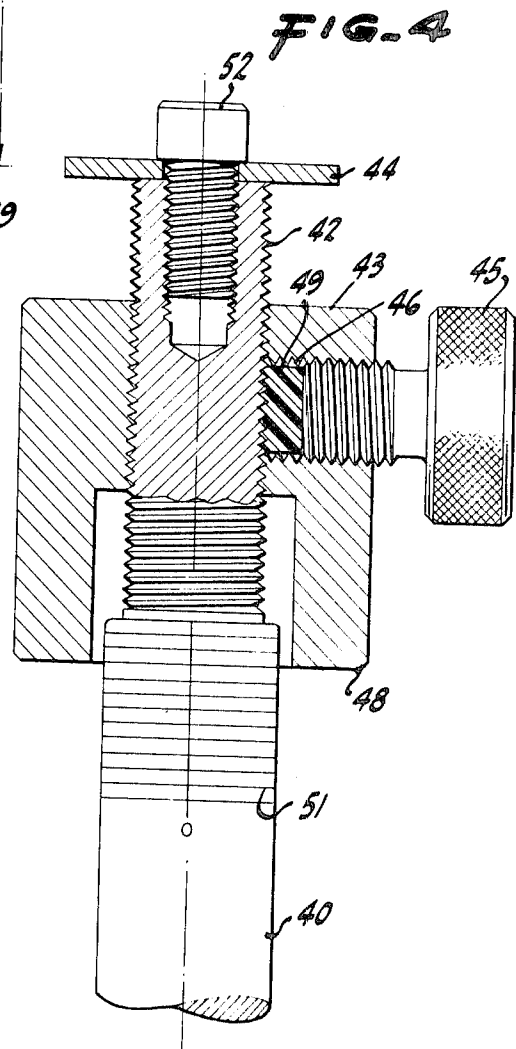
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FIG. 7

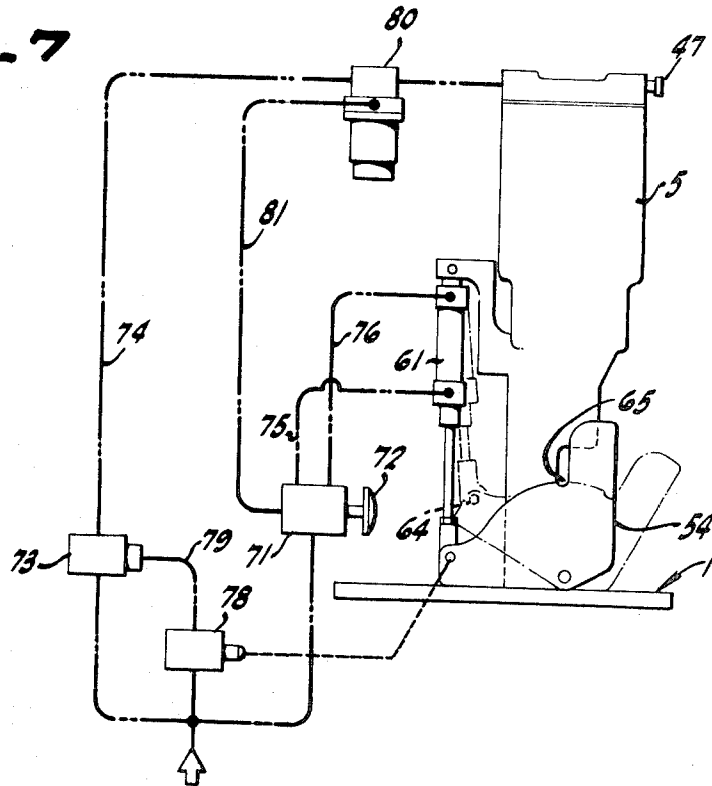


FIG. 5

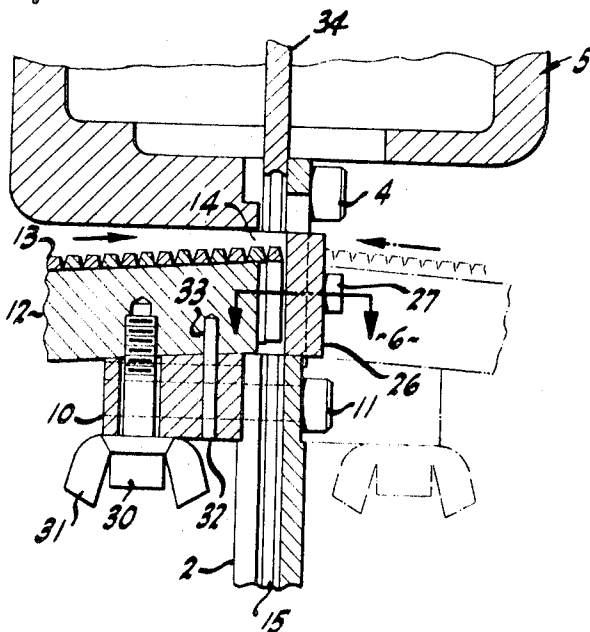
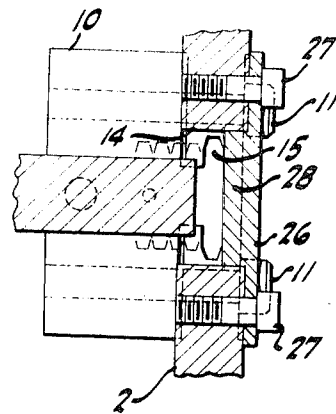


FIG. 6

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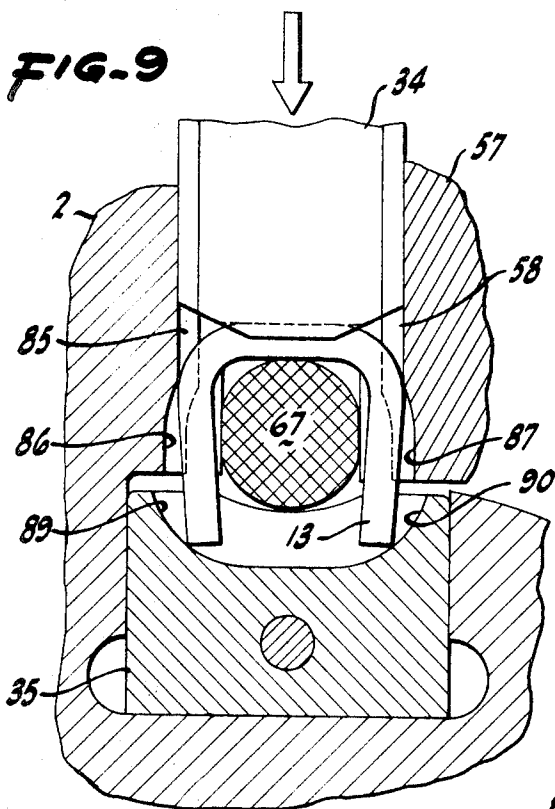
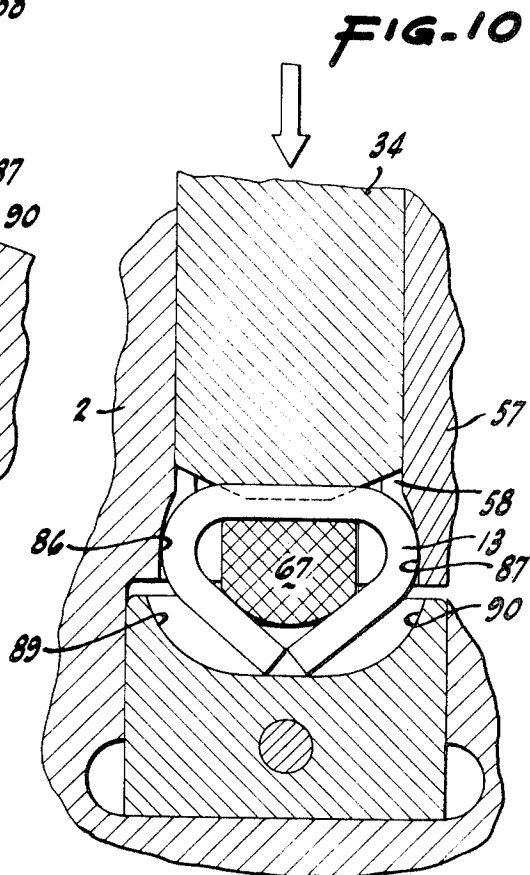
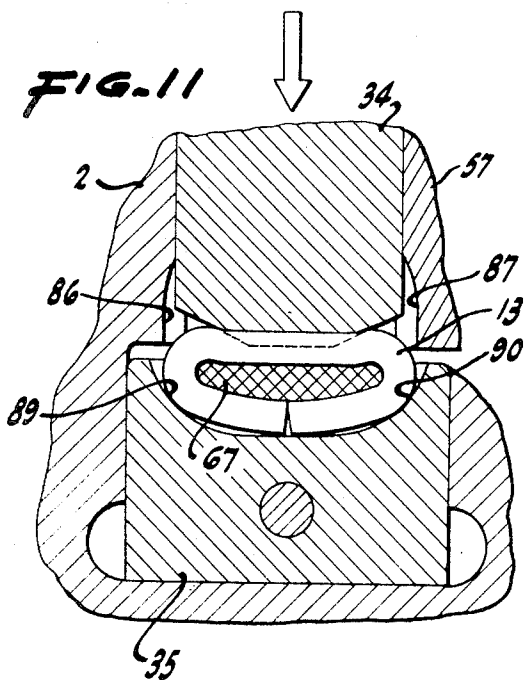
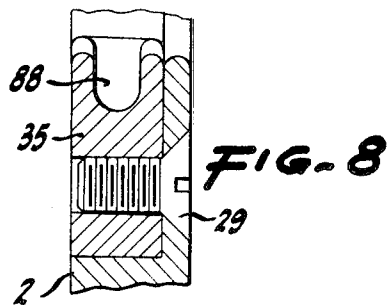
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3,583,056

CLIPPING DEVICE

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7 Claims

ABSTRACT OF THE DISCLOSURE

A clipping device for applying a U-shaped clip around an article such as the mouth of a plastic bag or sausage casing in order to obtain a tight seal. An upwardly and inwardly swinging gate is provided for gathering the flexible materials prior to clipping and the clipping apparatus is constructed to permit reversibility from a right hand operation to a left hand operation and vice versa. In addition, the clip track and die are formed to restrain the ends of the crown of the clip during deformation to enhance the gripping action of the clip and therefore the seal it forms. Means is also provided for adjusting the maximum force on the clip during deformation so that the crimping action of the device may be regulated as desired.

This invention relates to a clipping device for applying a U-shaped metal clip to the mouth of a bag enclosing a product or to other types of flexible containers such as sausage casings.

The main object of the present invention is to generally improve apparatus of the subject type and the instant invention may be considered to be an improvement over U.S. Pat. No. 2,880,419. Although the invention will be described with reference to the use of a butt-type clip similar to that employed in said above mentioned patent, it will be understood that many features of the invention will be applicable to the use of other type clips, for example crossover clips.

Another object of the invention is the provision of a clipping apparatus that is adapted to be readily converted from a right hand operation to a left hand operation and vice versa. This feature is important since in most instances the clipping apparatus must be used in conjunction with other operations and, until it is actually installed, the more desirable arrangement is not known.

Another object of the invention is the provision of a swinging gate that swings upwardly and inwardly relative to the clipping apparatus as distinguished from the downwardly and inwardly swinging gates which are typical of the prior art. As will be seen later on, the gate of the present invention employed to gather the neck of the article to be sealed minimizes pinching of the material and thus contributes to a more lasting and effective seal.

Another object of the invention is the provision of a readily actuated crimp control means by which the crimping force exerted on the clip to deform the latter may be accurately predetermined so as to obtain the best seal possible under the particular conditions existing.

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

FIG. 1 is a front elevation of a clipping device incorporating the invention.

FIG. 2 is a side elevation of the device, partly in section, taken in a plane indicated by lines 2—2 of FIG. 1.

FIG. 3 is a vertical cross section through the clipping cylinder.

FIG. 4 is a greatly enlarged fragmentary cross section through the crimp control device for adjusting the clipping force.

FIG. 5 is a cross section through the die support showing the means for reversing the clip rail.

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FIG. 6 is a horizontal cross section through the die support and clip rail as taken along lines 6—6 of FIG. 5.

FIG. 7 is a schematic piping arrangement.

FIG. 8 is a vertical cross section through the die showing the means for securing the same to the die support.

FIGS. 9 to 11 are schematic views showing the progressive deformation of a clip when used in the subject apparatus.

In detail, and first with reference to FIGS. 1 and 2, the invention may be supported on a base 1 to which is secured an upstanding die support generally designated 2. This die support 2 is generally rectangular in form and may be secured to the base 1 by screws 3 extending upwardly through the latter and into the lower edge of the die support. Fixedly secured to the upper end of die support 2 by means of screws 4 is the lower end of the clipping cylinder generally designated 5.

At a point downwardly from cylinder 5 a rail block 10 is fixedly but removably secured to the die support 2 by means of screws 11 which are passed through said die support and into threaded engagement with said block. Secured to the block 10 is the lower end of a generally vertically extending clip rail 12 along which clips 13 may be fed downwardly and inwardly into die support 2; the latter being formed with a through opening or entrance 14 through which the clips are used to a position in registration with a vertically extending clip track 15 formed in die support 2. (FIG. 5.)

The clips 13 successively are urged downwardly and inwardly toward the die support by means of a weight 17 (FIG. 1) and a sheet metal clip guide 18 of generally U-shaped cross section is provided in partially encircling relation to clip rail 12 in order to prevent accidental removal of the clips 13 from the rail 12. This clip guide 18 may be conveniently secured to the upper end of cylinder 5 by means of a bar 20 secured at its lower end by screws 21 to the head 22 of cylinder 5. To secure the upper end of bar 20 to the clip guide 18 a screw 24 provided with a wing nut 25 is provided so that the guard and clip rail may be readily disconnected from the rest of the structure.

Referring to FIGS. 5 and 6, the opening 14 in the die support 2 through which the clips 13 are fed is closed on the side opposite clip rail 12 by means of a removable plate 26 which is secured to the die support by a pair of screws 27. This removable plate 26 is provided with a rectangular projection 28 which is snugly received within the through hole 14 so as to form a stop for the clips 13 as the same are urged inwardly of the die support 2.

At this point it will be noted that the above described structure permits the clip rail 12 and its connections to be reversed from the left hand side of die support 2 as seen in FIGS. 1 and 5 to the right hand side as indicated by dot-dash lines in FIG. 5. This may be done merely by removing head 22 of cylinder 5 and screws 11 and swinging the entire assembly to the opposite side of die support 2. Removable plate 26 is of course replaced on the opposite side of the die support.

Removal and installation of the clip rail assembly may be simplified by securing rail 12 to the block 10 by means of screw 30 provided with wing nut 31. As best seen in FIG. 5, this screw 30 passes through block 10 and into threaded engagement with rail 12. A positioning pin 32 carried by block 10 may be received within a complementarily formed hole 33 in rail 12 to facilitate the accurate assembly of rail 12 with block 10. To the same end the above noted wing nut 25 permits disconnection of the clip rail assembly from head 22.

The clips 13 are successively urged downwardly along clip track 15 by means of a punch 34 which is translatable from a retracted upper position within cylinder 5 (FIG.

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3) to an extended lower position at which it forces a clip 13 into engagement with a die 35 which is secured in a pocket in die support 2 by means of screw 29. (FIG. 8)

The upper end of punch 34 is secured to a piston 36 which is urged to the upper position shown in FIG. 3 by means of a compression spring 37. Downward movement of piston 36 and punch 34 is effected by introducing air under pressure into cylinder 5 through head 22. This head 22 is provided with an inlet 38 on one side and a similar inlet 39 on the other side. Whichever one of the inlets 38, 39 is more convenient may be employed and the other inlet may receive a gage or may be plugged by means of a plug 47 (FIG. 2).

The head 22 is centrally apertured to receive there-through an upwardly extending shaft 40 secured at its lower end to piston 36. The aperture in head 22 may be provided with a bearing sleeve 41 to provide a sliding fit with shaft 40 and to effect a seal. The upper end of shaft 40 is provided with threads 42 and a nut 43 is threadedly mounted thereon. Removal of the nut 43 from the upper end of shaft 40 is prevented by a washer 44 which is secured to the upper end of shaft 40 by means of screw 52. As best seen in FIG. 4, the nut 43 may be adjustably secured to shaft 40 by means of a set screw 45 threadedly received within a radially extending hole 46 in nut 43. A nylon plug 49 is preferably interposed between the inner end of set screw 45 and the threads 42 so that the necessary friction may be provided on said threads without marring the same.

From the structure shown in FIGS. 3 and 4 it will be apparent that the length of the stroke of punch 34 can be adjusted by turning nut 43 until the bottom side 48 of said nut engages the top of head 22 on the downward stroke of the piston 36 when the desired amount of crimping on the clip 13 has been accomplished. This means of "crimp control" is important in that it is essential to apply sufficient force to the clip to create a seal and at the same time not to apply an excessive force that might crush or cut the material of the article being sealed. In this connection it will be understood that, although injury to a relatively tough plastic would not be likely, certain more frangible materials such as cellulose tend to fail under excessive crushing forces. By experimentation the setting of nut 43 on shaft 40 may be predetermined so that when a quantity of similar articles are to be run the operation may be performed with the assurance that an effective seal will be created and at the same time an excessive force which might otherwise cause failure of the sealed article will not be developed.

To facilitate the accurate positioning of nut 43 the same may be provided along its lower edge with indicia 50 at spaced points around the periphery of said nut and the shaft 40 may be formed with a plurality of peripherally extending parallel grooves 51 which, cooperating with the bottom edge 48 of nut 43 provide a means for visually indicating the distance from the washer 44 to the nut 43 and therefore the stroke of the punch 34. It will be understood that, although the bottom 48 of nut 43 engages the top of cylinder head 22 upon each downward stroke of piston 36, such engagement is not with sufficient velocity to create undesirable noise and vibration since the energy of the piston assembly is almost entirely dissipated by the deformation of the clip 13 as shown in FIGS. 9 to 11.

Another feature of the present invention resides in the means for gathering the mouth of the flexible bag or other container prior to application of the clip. Heretofore in applications of this kind the gathering function has been performed by a swinging gate which swings downwardly and inwardly from an open position to a closed position for constricting and positioning the article to be sealed at a point directly above the die. An example of this prior art type of gate may be seen in U.S. Pat. No. 2,880,419. The swinging gate of the present invention is generally designated 54 (FIG. 2) and comprises a pair of opposed side plates 55, 56 which straddle the die support 2. At the

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upper outer ends of plates 55, 56 there is interposed between said plates a block 57 which is formed with a groove 58 constituting a continuation of the clip track 15 of die support 2.

Intermediate the opposite ends of the gate 54 and at a point adjacent base 1 a pivot 60 is provided on die support 2 by which the gate assembly is swingably supported for movement from its normal open position shown in FIG. 2 to its inner working position shown in FIG. 7. Swinging movement of the gate 54 is effected by means of a cylinder 61 pivotally secured at its upper end to a bracket 62 carried by die support 2. The piston rod 63 of cylinder 61 is operatively connected at its lower end by pivot 64 to gate 54. It will be apparent, upon introduction of fluid under pressure to the upper end of cylinder 61, that the gate 54 will be swung about pivot 60 from its outer position to its inner position at which inner position the mechanism is ready to receive a clip 13 downwardly along track 15 and its extension 58. As best seen in FIG. 2, the opposed side plates 55, 56 of gate 54 are provided with a smooth arcuate notch 65 which, when the gate is in its inner position, registers with the similarly formed upper surfaces of the die 35. By the above described structure the flexible mouth of a bag or similar article 67 may be positioned by the operator across the gate 54 and approximately within the notch 65 so that when the gate 54 is swung to its inner position the article is properly positioned at 67' to receive a clip 13 therearound. It will be apparent that since the article is "carried" into the clipping position by means of gate 54 there is no opportunity for the material of the article to be damaged by pinching between relatively moving parts. Prior are devices involving downwardly and inwardly swinging gates require that the article be positioned by the operator approximately above the die and that the gate then be swung downwardly to complete the gathering action on the flexible material. Such an operation increases the likelihood that the flexible material of the container will become damaged by pinching between the gate and the die support.

Mounted on a bracket 70 carried by base 1 is a valve 71 provided with an actuator button 72 which, when the article has been applied to the clipper as above described, may be depressed by the left hand of the operator to initiate the clipping cycle. This clipping cycle is preferably powered by air pressure in the manner shown in FIG. 7. A source of air under pressure is connected to a normally closed valve 73 which is in turn connected through line 74 with the upper end of clipping cylinder 5. The compressed air source is also connected through the above noted valve 71 and line 75 with the lower end of the gate actuating cylinder 61. This connection is normally open so that the inoperative position of said gate is as shown in FIG. 2. Upon depression of button 72 by the hand of the operator after the article 67 has been placed within the notch 65, valve 71 exhausts the lower end of cylinder 61 and applies air pressure to the upper end of cylinder 61 through line 76. This causes the gate 54 to swing to its inner position at which the actuated end of the gate engages a normally closed valve 78 that is also supplied with air under pressure. When valve 78 is opened by physical contact with the gate 54 air pressure is directed through line 79 to normally closed valve 73 thereby opening the latter and permitting the air pressure to be directed on the upper side of piston 36 within cylinder 5. This causes the punch 34 to go through its working stroke to apply a clip around the article 67; the exact amount of travel of the punch 34 being determined by the position of nut 43 on shaft 40. As deformation of the clip 13 proceeds air pressure within cylinder 5 builds up and at a predetermined pressure causes pressure regulator valve 80 to connect with a line 81 which in turn is connected to the bore of slide valve 71 to return the latter to its inoperative position with the button 72 projected. This also removes the air pressure from the upper end of gate

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actuating cylinder 61 and applies air pressure to the lower end thereby opening the gate. Pressure regulator valve 80 may be of the type shown in U.S. Pat. 3,446,239.

By the above described arrangement it will be seen that the various steps of the operation are in timed sequence and only the depression of button 72 is required to initiate the entire cycle; the operator having no discretion in the clipping operation except for positioning the article 67 within the gate as above described.

Another important feature of the present invention, especially when butt-type clips are used, resides in the design of the track and die structure which forms the closure around the article 67. In FIGS. 9-11 the groove of the clip track 15 in die support 2 is indicated at 85 and the groove 58 in block 57 of gate 54 is shown in opposed relation to groove 85. The lower end portions of grooves 85 and 58 immediately above die 35 are relieved slightly by arcuate reliefs 86, 87 respectively so that when the clip 13 is partially deformed as shown in FIG. 10 the effective length of the crown portion of the clip 13 is permitted to enlarge slightly from its original length but at the same time the relieved sides of the clip track constitute effective abutments to prevent enlargement of said crown length beyond a predetermined slight amount.

Before the punch 34 reaches its final crimping position (FIG. 11) at which the clip 13 is completely deformed and free from the clip track it will be noted that the greatest squeezing effect on article 67 is achieved between the partially deformed position of FIG. 10 and the point at which the crown portion becomes free of reliefs 86, 87 and is in engagement with the opposite arcuate ends of the groove 88 in die 35. This restrain of the deforming clip is important in that excessive spreading of the crown during the final crimping step is prevented thus enhancing the uniformity of the pressure applied to article 67. If the clip is not restrained by abutments adjacent the ends of the clip crown the legs of the clip are more likely to spread apart at their point of engagement and prevent the imposition of uniform pressure on article 67. The above described structure also insures that the article 67 is subjected to radially inwardly directed pressure around its entire circumference and not merely to a vertically imposed flattening force.

Another advantage accruing from the above described structure resides in the fact that the abutments 86, 87 retain the free ends of the clips legs in engagement throughout the clip deforming step. This prevents said ends of the clip from opening and presenting surfaces that might otherwise injure the thin material of article 67. In fact the above described structure maintains the deforming clip as close as possible to a closed ring as radially inwardly directed pressure is applied to the article 67 thus insuring the uniform pressure that is required to provide optimum sealing effect with a minimum of damage. Even as the closed clip is flattened at the last stage shown in FIG. 11 the arcuate end portions 89, 90 of the die groove 88 present abutments preventing spreading of the clip legs.

I claim:

1. In a clipping device for applying a U-shaped clip around a flexible article such as a casing,
 - a die against which such clip is deformed,
 - a punch for urging such clip against said die,
 - a gate swingably supported for movement from an outer position spaced from one side of said die to an inner position closely adjacent said die for constricting such article to a position adjacent said die,

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pivot means on the opposite side of said die from said punch for swingably supporting said gate for such movement.

2. A device according to claim 1 wherein said gate is provided with an extension to a point on the opposite side of said die from the constricting portion of said gate, and extensible power means for swinging said extension and so swinging said gate between said positions.

3. A device according to claim 1 wherein said gate is provided with a groove for slidably receiving a leg of such clip therealong.

4. In a clipping device that includes a fluid driven punch and a die for urging a clip against said die for deforming such clip about an article to be sealed,

an extension fixed relative to said punch,

a stop of rigid material carried by said extension and adjustable to different positions along the length thereof,

an abutment on said device adapted to be engaged by said stop for limiting movement of said punch in a direction toward said die,

whereby the crimping effect on said clip may be controlled by the position of said stop.

5. A device according to claim 4 wherein said device includes a cylinder and a fluid driven piston therein extending outwardly from one end of said cylinder, a head on said cylinder at the opposite end of said cylinder, a shaft fixed relative to said piston and slidably received through an aperture in said head, an adjustable stop carried by said shaft and adapted to engage said head to define the end of the working stroke of said punch.

6. A device according to claim 5 wherein said stop is threadedly secured to said shaft and rotatable thereon to different working positions as desired.

7. In a clipping device that includes a clip track along which a U-shaped clip is urged by a punch into deforming engagement with a die,

a die support formed to provide such track and provided with a clip entrance extending between opposite sides thereof and intersecting said track,

a clip rail along which clips are fed through said entrance and to said track,

means on opposite sides of said die support for securing said rail thereto to permit reversing said device from a right hand device to a left hand device and vice versa,

a stop adapted to be received within said clip entrance, means on opposite sides of said die support for securing said stop to the side thereof opposite the side to which said rail is secured.

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U.S. Cl. X.R.

29—208, 211