Dec. 27, 1966 M. J. G. TIPPER 3,293,736

CLIPPING APPARATUS FOR APPLYING A CLIP AROUND A BAG END INCLUDING GATE MEANS FOR POSITIONING THE BAG END

Filed June 28, 1965 4 Sheets-Sheet 1

FIG_1

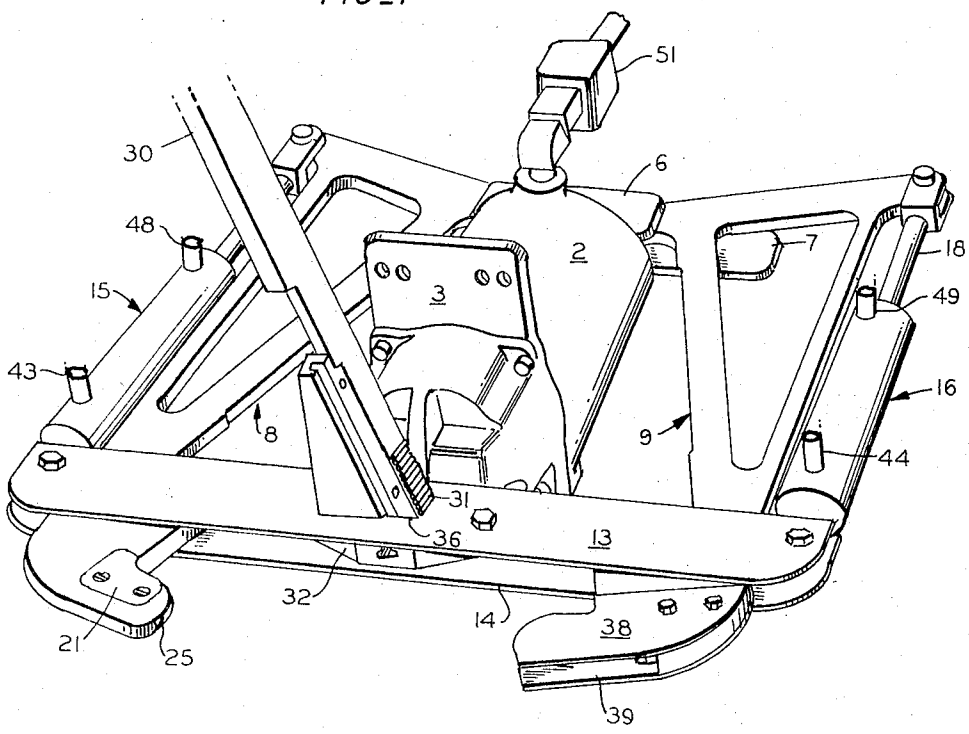
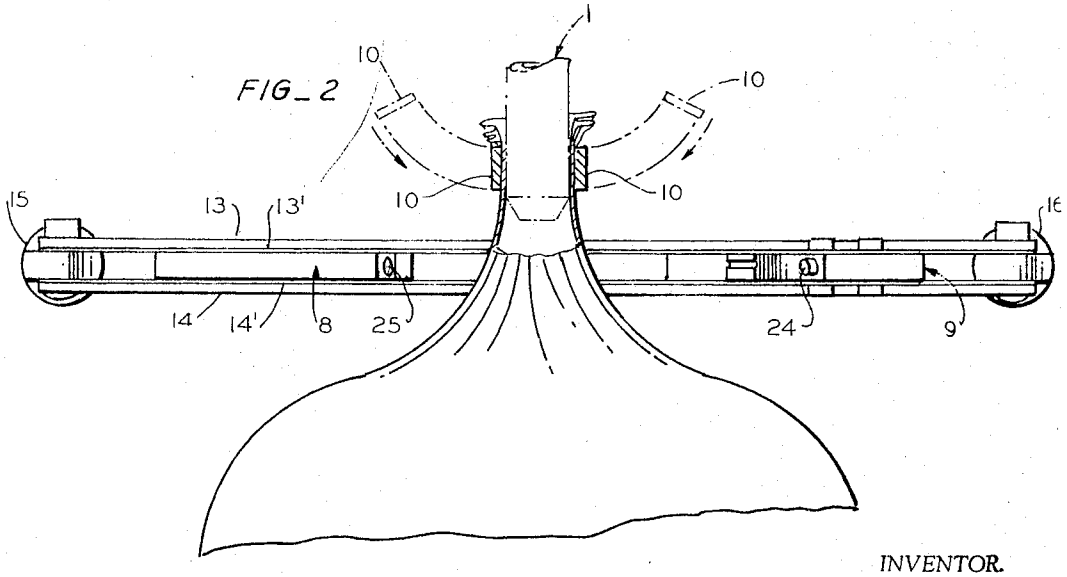


FIG_2



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Filed June 28 1965 4 Sheets-Sheet 2

FIG_3

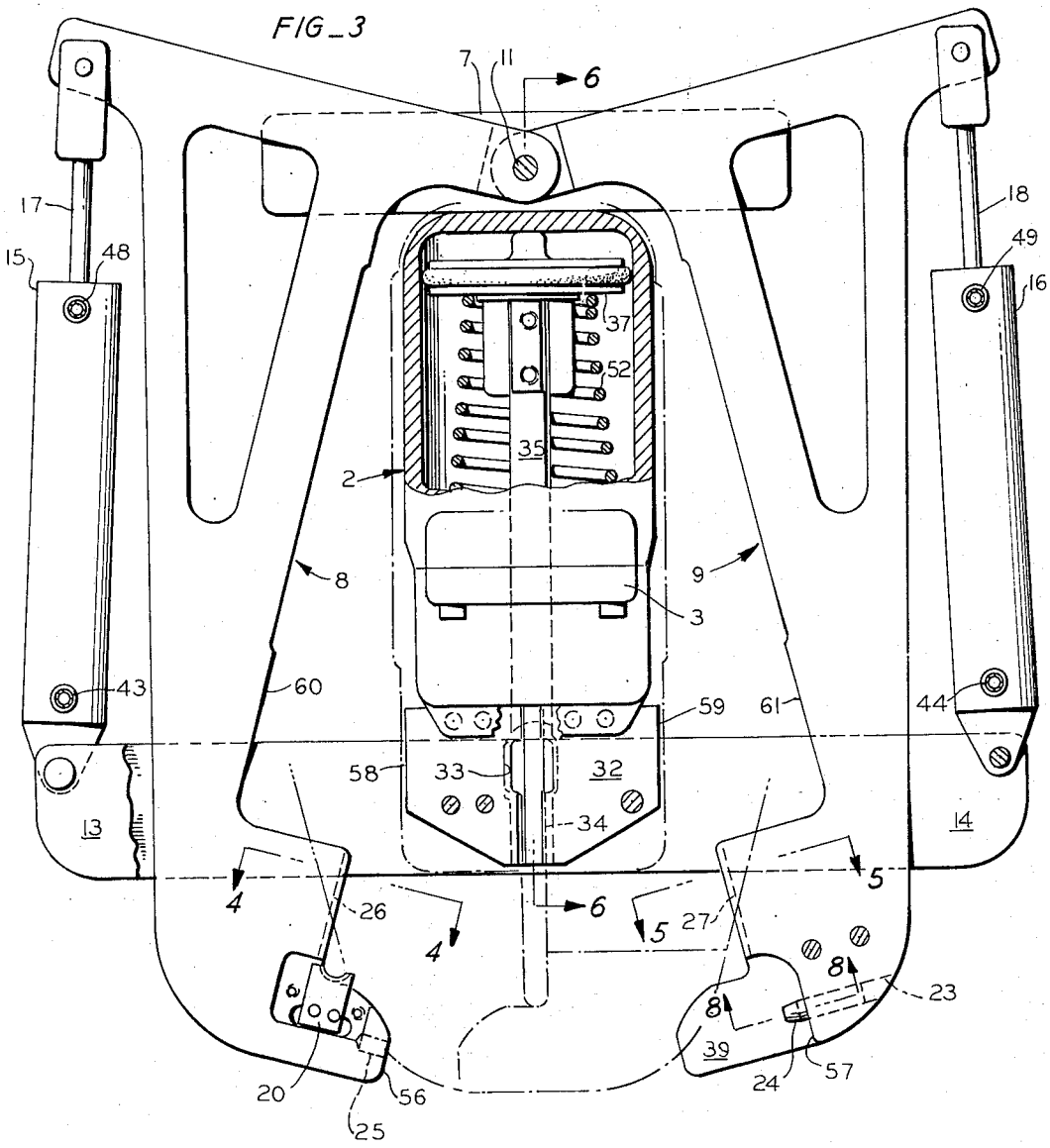


FIG_4

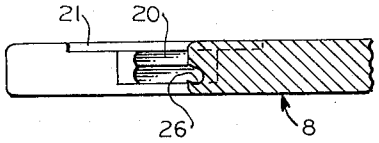
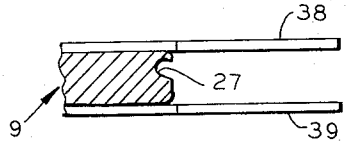


FIG_5



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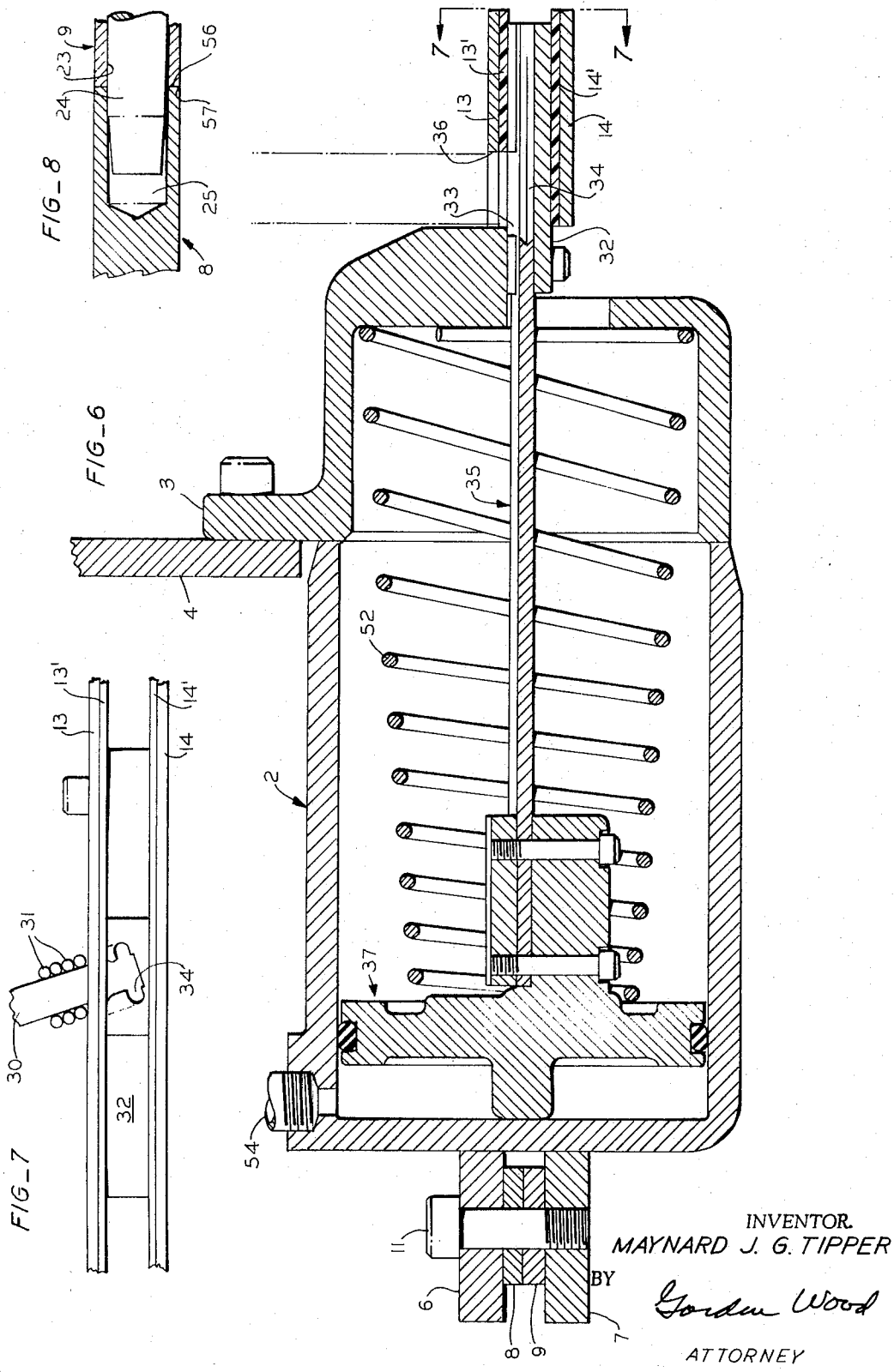
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CLIPPING APPARATUS FOR APPLYING A CLIP AROUND A BAG END INCLUDING GATE MEANS FOR POSITIONING THE BAG END

Filed June 28 1965 4 Sheets-Sheet 3



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CLIPPING APPARATUS FOR APPLYING A CLIP AROUND A BAG END INCLUDING GATE MEANS FOR POSITIONING THE BAG END

Filed June 28, 1965 4 Sheets-Sheet 4

FIG_10

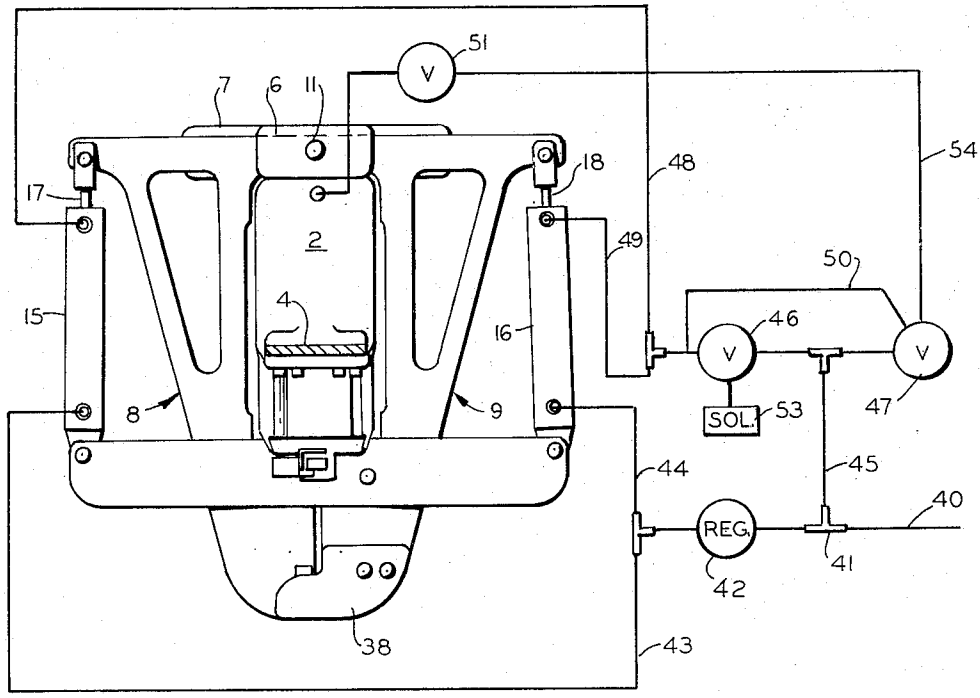
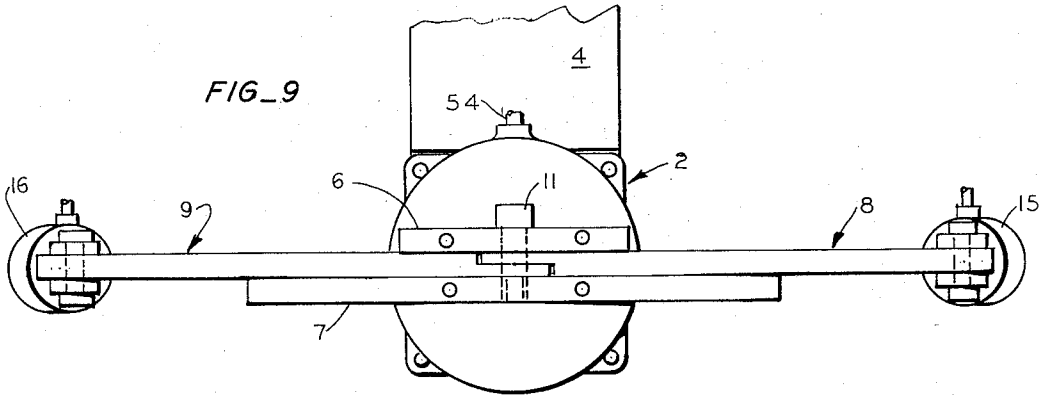


FIG_9



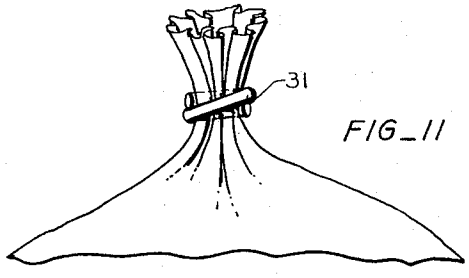


FIG_11

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3,293,736

CLIPPING APPARATUS FOR APPLYING A CLIP AROUND A BAG END INCLUDING GATE MEANS FOR POSITIONING THE BAG END

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7 Claims. (Cl. 29—243.57)

This invention relates to an apparatus for applying a permanent fastener around an article and is particularly adapted for applying a U-shaped metal clip to the end of a flexible or deformable casing or bag enclosing a product such as foodstuff.

Heretofore, devices of this general nature have been provided with a restricted throat along which the casing, bag or other article to be sealed has been passed to the inner end of the throat in which position the article is properly located to permit the clip to encircle the article. In some instances where the material of the article to be gathered is unwieldy and difficult to feed through a throat, a swingable gate has been provided in order to facilitate positioning of the article in its proper position relative to the clip deforming die. An example of such an apparatus is shown in Patent No. 2,880,419.

In many installations it is difficult to orient the gathered neck of the bag, casing or other article to be sealed in the desired clipping position by means of prior art devices having fixed throats and even by devices of the type having a swinging gate as shown in the above cited patent. This difficulty is especially present in applications wherein the end of a casing or the mouth of a flexible bag must be positioned around a filling spout and contracted at a point beneath the spout to a greatly reduced area to permit the clip to encircle the article. An example of such an application is in sealing plastic bags of the type employed for packaging milk and which bags are subsequently shipped in corrugated cartons. In such an operation the milk is generally fed into the bag through a downwardly directed filling spout or nozzle with the mouth of the bag encircling such spout or nozzle. The greater the diameter of the filling nozzle the faster is the filling time and it is therefore desirable to make such diameter as large as possible thus requiring the bag to be provided with a relatively large filling mouth. In automatic or semiautomatic machinery it thus becomes difficult to position the relatively large mouth of the bag in surrounding relationship to the filling nozzle and at the same time provide for sealing the bag at a point downwardly from but closely adjacent the discharge end of the nozzle in order to make optimum use of the material of the bag.

One of the main objects of the present invention is the provision of a clipping apparatus which, generally, is an improvement over presently available devices of like nature in that the step of positioning the article to be sealed at the clipping station is greatly facilitated by such apparatus.

Another object of the invention is the provision of a clipping apparatus provided with means for quickly and effectively restricting the throat or mouth of the article to be sealed so that a relatively large amount of material such as exists in the case of a wide mouth milk bag may be quickly and effectively restricted to a position alongside the die which serves to deform the clip around the article.

Another object of the invention is the provision of a clipping apparatus which is, in effect, double gated in that both the die support and its associated article positioning member are both swingably mounted so that a greater amount of area is provided at the clipping station for positioning the article to be sealed in those applications

where a relatively large area is required such as in filling milk bags and the like.

Yet another object of the invention is the provision of an apparatus incorporating relatively movable die supports and gates which at the same time affords the rigidity required to resist the relatively large clipping force imparted to the die by the power driven punch.

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

FIG. 1 is a perspective of the invention in open position.

FIG. 2 is a front elevation of the device of FIG. 1 showing a fluid filling nozzle and bag clamping means in dotted lines. The clip magazine and other structure of FIG. 1 is omitted to improved the clarity of the view.

FIG. 3 is a top plan view, partly broken away and in section, of the device of FIG. 1 with the arms indicated by dot-dash lines in their inner positions.

FIG. 4 is a fragmentary section through the die supporting arm as taken in a plane indicated by lines 4—4 of FIG. 3.

FIG. 5 is a fragmentary cross section through the gate arm as taken in a plane indicated by lines 5—5 of FIG. 3.

FIG. 6 is a longitudinal section taken in a plane indicated by lines 6—6 of FIG. 3.

FIG. 7 is a fragmentary front elevation showing the feed plate.

FIG. 8 is a fragmentary sectional view through the gate arm as taken in a plane indicated by lines 8—8 of FIG. 3 but showing both arms in their inner positions.

FIG. 9 is an end elevation of the device of FIG. 1.

FIG. 10 is a semischematic piping arrangement.

FIG. 11 is a fragmentary side elevation of a plastic bag with a clip attached thereto.

With reference first to FIG. 2, the preferred form of the invention is illustrated in cooperation with a downwardly directed filling nozzle generally designated **1**, and a pair of opposed clamping elements **10** for releasably securing the mouth of the bag to be sealed to the nozzle **1**. The filling spout **1** and clamping elements **10** are shown in dotted lines since they do not form a part of the present invention. It will be understood that the clamping elements **10** may be arranged on any suitable pivots to swing toward and away from the nozzle **1** as indicated in FIG. 2.

The invention comprises a relatively large diameter air cylinder generally designated **2** which is provided with an integral upwardly extending flange **3** (FIG. 1) by which the apparatus of the present invention may be secured to an adjacent structure such as indicated at **4** in FIG. 6. Fixedly secured to the rear end of cylinder **2** are upper and lower elongated supports **6** and **7** between which a pair of arms or gates generally designated **8** and **9** are oscillatably supported. Extending between supports **6** and **7** is a pivot pin **11** on which both arms **8** and **9** are adapted to swing (FIG. 6). The adjacent ends of said arms **8** and **9** are reduced in thickness so that both arms may be accommodated in the space between upper and lower supports **6**, **7** (see FIG. 9). At this point it will be noted that the lower support **7** is somewhat longer in length than upper support **6** so that said lower support **7** may take a considerable amount of the weight of the arms **8**, **9** during the operation of the same.

At the opposite end of cylinder **2** from pivot **11** and fixed relatives to said cylinder **2** are another pair of elongated upper and lower supports **13**, **14**, respectively, between which the adjacent free ends of arms **8**, **9** are slidably received. In order to reduce friction it is preferable that the opposed faces of upper and lower supports **13**, **14** be provided with liners **13'**, **14'** of Teflon or like antifriction material (FIG. 2).

Pivotally secured at one of its ends to one end of the upper and lower supports 13, 14 is an elongated air cylinder 15 and at the opposite ends of said supports a similar air cylinder 16 is pivotally supported. The other ends of cylinders 15, 16 are connected to arms 8, 9, respectively, as best seen in FIG. 3 for a purpose to be described later on in greater detail.

The piston rod 17 of air cylinder 15 is pivotally connected to arm 8 and the piston rod 18 of cylinder 16 is similarly connected to arm 9. At this point it will be noted that the ends of arms 8, 9 opposite the pivot pin 11 swing toward each other when the air cylinders 15, 16 are contracted, and swing away from each other when said air cylinders are expanded.

Upper and lower supports 13, 14 are fixedly secured by screws or the like to the end of air cylinder 2 which is opposite the end supporting pivot pin 11. In this manner the entire apparatus is supported from the main air cylinder 2, which in turn is fixedly secured to the adjacent structure 4.

Arm 8 is provided at its outer end with a die 20 which is received within a relatively deep recess formed in the outer end of arm 8. A shallower recess outwardly of die 20 receives a guard plate 21 (FIG. 1) which not only serves to retain the die 20 in place but is formed along its upper edge to define a portion of the throat which receives the article to be sealed when the arms 8, 9 are in their inner positions.

The outer end of arm 9 is formed generally complementarily to the outer end of arm 8 and is provided with a bore 23 in which is press-fitted a dowel 24 of hard metal. When the arms 8, 9 are in their inner adjacent positions the dowel 24 is received within a bore 25 formed in the outer tip of arm 8. At this point it is pertinent to note that dowel 24 is formed with a frustoconical outer tip (FIG. 8) so as to be readily received in bore 25 in arm 8. However, a portion of the dowel 24 projecting from arm 9 is cylindrical so that when said portion is received in bore 25 of arm 8 a strong connection between arms 8, 9 is effected with the adjacent surfaces of said arms in engagement.

Arms 8 and 9 are formed with grooves 26, 27, respectively, which cooperate to provide a channel along which the clips are urged toward the die 20.

For the purpose of feeding U-shaped clips to the above-described mechanism there is provided an upwardly extending clip rail 30 on which a relatively large number of clips 31 may be stored and gravity fed along rail 30 toward the upper elongated support 13 (FIG. 1). Said elongated support 13 and its liner 13' are notched as at 36 to permit the clips 31 to pass therethrough and into a feed plate 32 which is secured to cylinder 2 and provided with a generally rectangular clip receiving opening 33 (FIG. 3) permitting the lowermost clip on clip rail 30 to be received within a feed channel 34 formed in feed plate 32.

The means for driving the clips into engagement with die 20 comprises an elongated punch 35 which is secured at its inner end to the piston 37 of cylinder 2 (FIG. 6) and which is received at its outer end in feed plate 32. Punch 35 is adapted to reciprocate along the length of said feed plate 32 and grooves 26, 27 in arms 8, 9 upon the admission of fluid such as air to the end of the cylinder 2 that is adjacent the pivot 11. The clip receiving channel that is defined by grooves 26, 27 in arms 8 and 9, respectively, is in alignment with the feed channel 34 in feed plate 32 so that said punch 35 drives a clip from the clip receiving opening 33 in feed plate 32 along the length of grooves 26, 27 and into engagement with the die 20. When the arms 8, 9 are in their inner positions the portions of said arms adjacent grooves 26, 27 constrain the material to be sealed within a relatively small area so that the clip may encircle the material and tighten itself around the latter. Details of the cooperation of the clip with the die are not disclosed herein as such details are disclosed in Patent No. 3,210,835 of October 12, 1965, Patent No. 3,239,926 of March 15, 1966, and in application Serial No. 395,707 filed September 11, 1964.

At this point it should be noted that the particular arrangement herein disclosed of the arms 8, 9 is extremely important in effecting a rigid support for the die 20 so as to resist the relatively strong force of the punch and at the same time to permit the outward swinging of arms 8 and 9 to permit sufficient room for an operator to properly position the mouth of the bag on the filling nozzle. One of the important features permitting this result is the provision of a unitary pivot 11 about which both arms 8, 9 swing. It will be noted that the centerline of the air cylinder 2, the pivot 11 and the line of action of the punch 35 are all in alignment. If two spaced apart pivots were provided the force of the punch 35 would tend to swing the arms 8, 9 outwardly during the deformation of the clip thereby resulting in an unstable structure. By the arrangement shown, the resistance to the force of the punch takes the form of tension in the arms 8 and 9 and there is no tendency for a torque to develop that would tend to spread the arms apart during the clipping operation.

Another advantage gained by the particular arrangement of the arms 8, 9 as disclosed herein is the cooperation of the dowel 24 in causing both arms 8, 9 to act as a unit so that not only is the strength of both arms available for resisting the force of the punch but perfect alignment of the path of travel of the clip 31 and the die 20 is insured. It will be understood that since both arms 8, 9 are movable it is extremely important to return said arms to a predetermined registering position in alignment with the centerline of the cylinder 2 at the time the clipping operation is perfonmed.

As best seen in FIGS. 3 and 8, the outer ends of arms 8, 9 are formed with abutting surfaces 56, 57 respectively adjacent bore 25 and dowel 24. When the arms are in their inner positions, said surfaces 56, 57 are in engagement. In the event one of the arms 8, 9 reaches the inner position before the other, they are automatically centered relative to the path of travel of the clip by feed plate 32, the opposite ends 58, 59 of which are adapted to be engaged by surfaces 60, 61 formed on arms 8, 9. When the arms 8, 9 are properly centered in their inner positions a few thousandths of an inch clearance exists between the ends 58, 59 of plate 32 and the surfaces 60, 61 of arms 8, 9 (FIG. 3).

To assist in gathering the material of the article to be sealed there are provided a pair of upper and lower guard plates 38, 39 respectively on the outer extremity of arm 9. These guard plates slide along the opposite faces of the portion of the arm 8 adjacent die 20 as arms 8, 9 move to the inner position thus assisting in maintaining the die 20 in coplanar relationship with a central horizontal plane through the cylinder 2. The inwardly directed edges of guard plates 38, 39 are contoured so as to assist in gathering the material to be clipped toward the relatively small space between channel grooves 26, 27 of arms 8, 9 respectively.

In FIG. 10 there is shown schematically one form which the piping for the mechanisms may take when air is employed as the power medium. An air supply line 40 is connected by a tee 41 to a regulator 42 from which air is conducted to the two conduits 43, 44 which supply the low pressure ends of arm actuating cylinders 15, 16. The regulator 42 is set at a relatively low pressure, for example 15 p.s.i., so that the pressure in lines 43, 44 becomes a substitute for a spring return holding the arms 8, 9 in a normally open position as shown in FIG. 1.

Tee 41 is also connected by means of line 45 to three-way valves 46, 47. Valve 46 is actuated by means of a solenoid 53 and is connected to lines 48, 49 which conduct the air under pressure to the high pressure ends of arm actuating cylinders 15 and 16 so that upon opening valve 46 the arms 8, 9 are simultaneously swung to their inner positions.

Valve 47 which supplies the pressure end of the punch actuating cylinder 2 is of the type which includes a pilot valve (not shown) supplied by a line 50 connected to the discharge side of valve 46. Upon actuation of valve 46 the pilot in valve 47 is actuated to open valve 47 after a relatively short time delay which permits the arms 8, 9 to attain their innermost position.

For the purpose of exhausting cylinder 2 as quickly as possible after the power stroke a quick exhaust valve 51 is provided in line 54 which supplies the cylinder 2. Valve 51 operates to open cylinder 2 to the atmosphere as soon as a reduction in pressure occurs in line 54. This permits spring 52 in cylinder 2 to retract the punch from the clip before the arms 8, 9 move toward their outer positions under the urging of the slower acting pressure from regulator 42. This is important since the friction between clip 31 and die 20 would be sufficient to resist the outward movement of the arms 8, 9 is force were being applied to the clip at the time the arms 8, 9 begin to move outwardly to release the article which has already been sealed.

It will be seen that the above described structure is sufficiently flexible to permit an operator to position the mouth of a milk bag or the like in proper clipping position and at the same time the structure is sufficiently rugged to withstand the relatively high forces developed during the punching operation.

The above specific description of the preferred form of the invention is not to be taken as restrictive as it will be apparent that various modifications in design will occur to those skilled in the art without departing from the scope of the following claims.

I claim:

1. In a clipping apparatus adapted to secure a clip about an article,

means for urging a clip along a path of travel toward a clipping point,

a die at said point adapted to be engaged by said clip for deforming said clip about such article,

a die holder supporting said die at a point in said path,

a gate cooperatively associated with said die holder for defining an article receiving space between said gate and said die holder,

means supporting said gate for movement in a direction laterally away from said path in one direction, and

means supporting said die holder for lateral movement away from said path in the opposite direction, whereby a relatively large space is provided between said gate and said die holder for receiving such article therein.

2. Apparatus according to claim 1 wherein said die holder supporting means includes a pivot about which said holder is swingable to effect such movement.

3. Apparatus according to claim 1 wherein said holder and gate are provided with abutting portions adapted to be engaged when said holder and gate are moved inwardly relative to said path.

4. Apparatus according to claim 1 wherein said gate and holder are provided with interengaging elements cooperating at the inner positions of said gate and die to resist the clipping force on said die.

5. In a clipping apparatus adapted to secure a clip about an article such as a wide mouth bag or the like,

a fluid actuated cylinder provided with a piston,

an elongated punch fixed at its inner end to said piston and adapted at its outer end to move a clip along a path of travel toward a clipping point,

a die holder swingably supported at one end on a pivot fixed relative to said cylinder,

a die on the other end of said die holder adapted to deform such clip under the urgency of the fluid in said cylinder when said holder is in an inner position with said die positioned at said clipping point,

a gate swingably supported at one end on a pivot fixed relative to said cylinder and cooperatively associated at its other end with said holder for defining an article receiving space between said holder and gate when said gate is in an inner position, and

means for swinging said holder and gate oppositely outwardly away from said path to provide a relatively large space for receiving said article therein.

6. Apparatus according to claim 5 wherein the pivots of said holder and gate are coxial with the common axis intersecting said path at the opposite end of said cylinder from said clipping point.

7. Apparatus according to claim 6 wherein said holder and gate are provided with interengaging elements adjacent said clipping point for connecting said holder and gate together during the clipping operation.

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