

Aug. 3, 1965

J. LASOFF

3,197,938

APPARATUS FOR FORMING CLOSURES ON PACKAGES

Filed Jan. 31, 1962

3 Sheets-Sheet 1

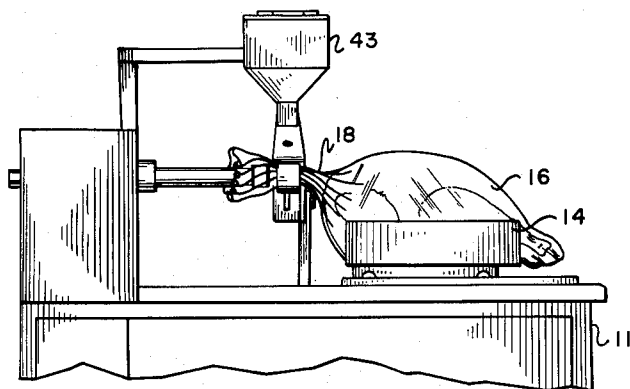


Fig. 1

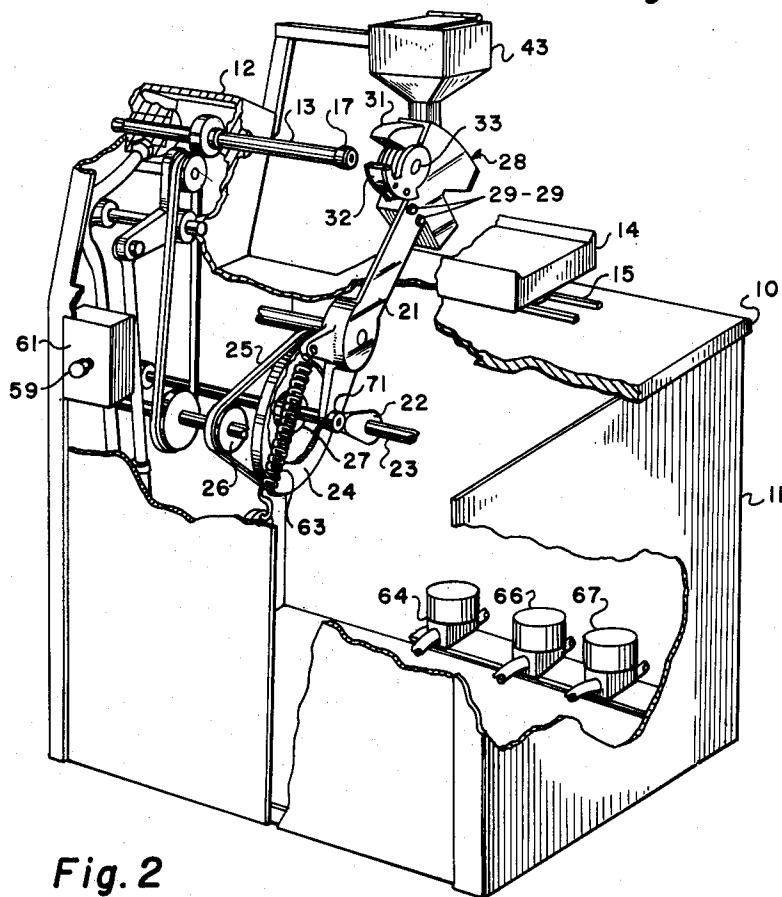


Fig. 2

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3 Sheets-Sheet 2

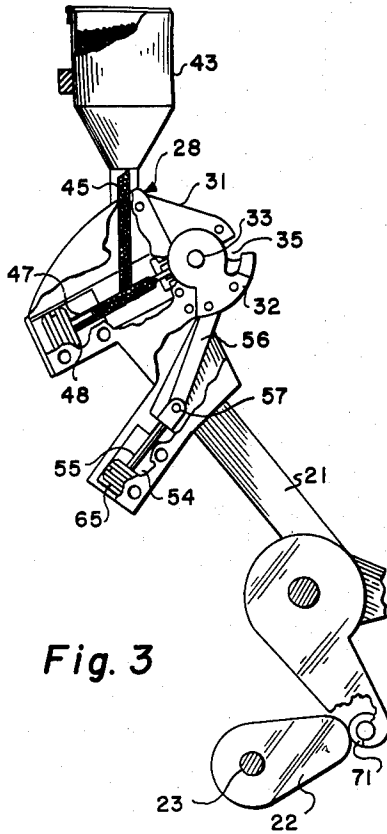


Fig. 3

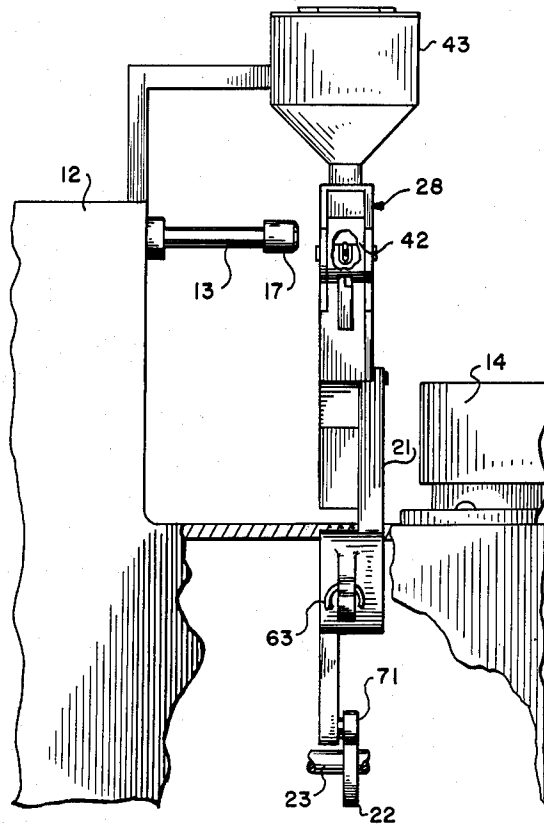


Fig. 4

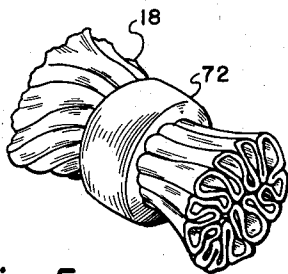


Fig. 5

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APPARATUS FOR FORMING CLOSURES ON PACKAGES

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4 Claims. (Cl. 53-135)

This invention relates to closures for packages made of plastic film, and particularly to those closures known as a "twisted seal." Twisted seals are commonly used to close the bags which are used to enclose poultry, sausage meat, hamburger, etc., and are formed by gathering the end of the bag and then twisting it tightly. Commonly, the twist is maintained by a metal clip which surrounds the neck and is tightly compressed against the twisted plastic.

When properly made, twisted seals are truly hermetic, but the presence of metal, particularly in bulk packages of ground meat, is sometimes undesirable. It has not been heretofore practicable to fuse the plastic in the twisted seal so that a "heat seal" can be made. The thin film covering the product immediately behind the seal usually softens and tears before the considerable mass of the plastic seal can be fused. For this reason, clips are commonly used. The present invention forms a plastic retaining ring for the twisted seal which is so firmly attached to the film that there is no danger of a clip coming loose and separating from the plastic bag. It may be coded either by indicia or color and is quickly made and inexpensive.

This invention has been developed as a component of high speed vacuumizing and bag closing machines and will be so described. As the description proceeds, however, it will become obvious that the apparatus may be used separately and that plastic retainers for neck seals can be formed as a subsequent operation and independently of the vacuumizing and twist sealing apparatus. It should also be understood that the word "bag" has been used as a convenient term, and not only includes true bags such as those used to enclose poultry, but rolled sheet wrappings which are commonly used to enclose sausage and ground meat and are closed with a twisted seal at each end of the package.

In high speed vacuum twist sealing machines the product, say a turkey, after having been placed in the bag, is placed on a table which permits limited horizontal motion. The neck of the bag is gathered about a hollow horizontal spindle through which air present in the bag is sucked out. When a sufficient degree of vacuum has been attained, the spindle begins to rotate, twisting the neck of the bag into a tight, rope-like twist. At the same time, the table moves slightly toward the end of the spindle to compensate for the shortening which occurs in the neck during the twisting operation.

Such a machine is exemplified by United States Patent No. 2,733,564, issued February 7, 1956, to Arthur G. Russell et al. As the preferred example, the present invention will be described as used in connection with machines of this type and in substitution for the metal clip applying mechanisms which are shown in the Russell et al. patent.

In the accompanying drawings:

FIGURE 1 is a partial front elevation of the machine illustrating the relative position of the head, spindle, and the product;

FIGURE 2 is an overall perspective, partially in section, exhibiting the drive mechanism;

FIGURE 3 is a side view, partially in section, of the die, the swinging arm, the cam, and the cam shaft;

FIGURE 4 is a partial front elevation of the head, spindle, arm, and cam;

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FIGURE 5 shows the completed seal retainer in place on a twisted neck;

FIGURE 6 is a side view of the head, partially in section, showing the heating chamber, the cavity charging means, and the faces which form the die cavity;

FIGURE 7 is a front elevation of the head, partially in section, showing the orifice in relation to the die chamber.

The machine comprises a work table 10 supported upon a cabinet base 11 in which is housed a driving motor and the vacuum pump (not shown). The machine is provided with a head stock 12 which as in the Russell machine contains a "vacuum bearing" which allows air to be drawn through the hollow spindle 13 which is rotated by an operative connection with the motor. Sliding table 14 moves longitudinally in ways 15 which are fixed to the work table 10.

The product 16 (here represented as a turkey already placed in a plastic bag) is placed on the sliding table 14. The neck of the bag is drawn over the nozzle 17 of spindle 13 which is then rotated for a few turns twisting the neck of the bag into a tight rope-like neck 18. When these operations are complete, a plastic retaining ring is molded about the twisted neck 18 of the bag by apparatus best shown in FIGURES 3, 4, 6, and 7.

The means employed comprises a small injection molding device which, mounted on a power-driven swinging arm 21 moves across the work surface to engage the twisted neck and, at the end of the retainer molding cycle, swings back to be out of the way. Arm 21 is driven by cam 22 on the cam shaft 23 which receives its power through belt 25 running over a pulley 26 on the main shaft and over a fly wheel pulley 24, attached to the cam shaft 23 (see FIGURE 2). The fly wheel pulley is engaged and disengaged on the cam shaft by an electric clutch 27. All parts responsible for the molding operation are mounted upon a head 28 which in turn is appropriately fastened to the swing arm 21, for example by the bolts 29-29.

The nose 31 of head 28 forms the rear half of the molding die. The forward half of the die is formed by the yoke 32 which rotates about studs 33-33 which, in this design, are formed integrally with the body. Nose 31 and the inner face of the yoke 32 follow circular arcs. The actual die chamber 35 is a radial slot cut in the extremity of the nose. Its dimension is such that a twisted seal may lie entirely within its confines. The top 36, rear 37, and bottom 38 of the chamber 35 are thus formed by the walls of the slot.

The side walls 39 and 41 of the die chamber are formed by the arms of yoke 32 while the forward end wall of chamber 35 is formed by the projection 42 of yoke 32 when the yoke is swung into its raised position. As the front elevation, FIGURE 4 shows the yoke 32, when closed, occupies a position above the bottom 38 of the die chamber. Thus, the neck is tightly compressed as the die closes and flash leakage along the neck and folds is prevented.

Optionally, top wall 36 may be arched and, for appearance, bottom wall 38 may be given a matching curve. If the bulk of the twisted neck 18 is small, rounded depressions 30 in the sides of the arch in the top wall 36, and rounded notches 40 cut in the top face of side walls 39 and 41, which together may enclose a major portion of the twist will, in this case, aid in sealing the cavity completely and prevent the leakage of flash.

The head also carries a small pellet receiver 43 which discharges its contents by gravity into the charging chamber 44 of a miniature injection molding device through the passageway 45 which is drilled in the head 28. Pellets are pushed from this chamber into the melt chamber 46 by the piston and piston ram 47 of air cylinder 48. Melt

chamber 46 is surrounded by electrical heating coils 49. Its exit port 51 opens into the rear wall 37 of die chamber 35.

The forward die element (yoke 32) is swung into open and closed positions by the air cylinder 54 (FIGURE 3), the piston rod 55 of which is secured to the link 56 by the pin 57. The upper end of link 56 is secured to the lower and outer portion of the yoke 32 by the pin 58.

After the twisted seal has been formed, the operator touches button 59. This initiates the operation of a process timer 61, the switches of which successively energize circuits and associated equipment which perform the following functions. In its first operation, the process timer first completes an electrical circuit through the electric clutch 27 mounted on cam shaft 23. Cam shaft 23 therefore begins to turn moving cam 22 and allowing the pull spring 63 to draw arm 21 forward. When the arm reaches its extreme forward position, the head 28, with its die chamber now open, has engaged the twisted seal which lies entirely within the open die chamber 35.

The timer then completes a circuit through an electro-pneumatic spool valve 64, and admits air behind the piston 65 of air cylinder 54. This causes the yoke to swing upward, and the die chamber to close. The process timer then energizes a circuit through a similar electro-pneumatic valve 66 which admits air behind the piston of air cylinder 48 and whereby piston ram 47 forces the molten charge in melt chamber 46 into the closed die.

The timer then opens solenoid water valve 67 and causes cooling water to flow through the drilled passages 68 and 69 formed in the head.

When cooling is complete, the process timer (1) opens the circuit through the water valve 67 and shuts off the water supply, (2) reverses the operation of electro-pneumatic valve 64, releasing air from behind piston of cylinder 54 and admits air ahead of the piston, thus opening die chamber 35, (3) the timer then reverses the operation of electro-pneumatic valve 66 releasing air from behind the piston of cylinder 48, and admitting air ahead of the piston, moving the ram 47 backwards and allowing a new charge of pellets to accumulate in the chamber 44, and (4) the timer then re-energizes the clutch circuit which causes cam 22 to rotate and by pushing against cam roller 71 forces the head 28 back to its retracted position. The device times out, and the molding cycle is complete.

It is to be understood that the air cylinders in the head and the water passages are connected to the valves and these in turn are connected to appropriate supply lines by flexible conduits. For simplicity in presentation, these conduits have not been shown.

Furthermore, since the process timer, clutch, and valves are conventional units and no part of this invention resides in their circuitry, the connections have not been shown or described.

The seal which is formed, shown in FIGURE 5, consists of a plastic ring 72 molded into and conforming internally to the external configuration of the twisted neck 18. If a ring is broken open, it will be seen that some of its substance has flowed into, that is, interpenetrated the folds and twists of the neck material. This intermolding of the ring with the neck material grips the twisted seal so tightly that untwisting is impossible. Ring 72 cannot be removed from the twist. Opening the package requires that the bag be cut or torn. Upon cooling, the plastic ring shrinks further, tightening the twisted neck.

If the bag is made of heat-shrinkage material, as are most poultry bags, a drawing backwards and a tightening of the seal occurs due to the heat derived from the molten plastic of ring 72. Although metal securing clips are commercially satisfactory, the present invention forms an even tighter hermetic seal when heat shrinking film is used.

A considerable choice of material for the ring 72 exists. Among suitable materials may be mentioned polyethylene, cellulose acetate, high impact polystyrene, and other well-

known injection molding thermoplastics. High density polyethylene has given superior results and because of its low cost and ability to withstand abuse is the preferred material.

In addition to the advantage that no metal clip is used, a considerable advantage of a plastic ring is the coding which becomes possible. Marking may be engraved in the die and the material which forms the ring may be colored so that particular products, weights, or grades may be quickly identified by the color or marking which is used.

What is claimed is:

1. A machine of the class described adapted to form a plastic retainer about the neck of a package, having a die comprising inner and outer arcuate elements, the inner element being fixed and normally presenting an open-faced die chamber with open side walls, the outer element forming the end and side walls of the chamber and being movable between positions in which the chamber is open and closed, power means to move the outer element into either of said positions, means to force a charge of molten plastic into the die chamber and means to cool the die.

2. Apparatus according to claim 1 wherein the side wall closing portions of the outer die element are adapted to occupy a closed position above the bottom wall of the die chamber and thereby compress the twisted neck seal of a package in the chamber to prevent flash and flow of molten plastic along said neck and beyond said walls when a charge of plastic is injected into said chamber.

3. In a twist-sealing machine having a head arranged to reciprocate into and out of engagement with the twisted neck of a package, the head having a body portion terminating in a fixed die element and presenting a die chamber having an open face adapted to receive the twisted neck of a package, the outer wall of the die leading away from said chamber along a circular arc, a movable die element pivoted on the body having its inner face concentric with the outer wall of the die chamber, power means to advance and retract the movable die element and thereby open and close the die, means to force a molten plastic substance into the die chamber when the die is closed, and means to cool the chamber operative after molten plastic has been forced thereinto.

4. In a machine of the class described a head including an injection molding device, means to reciprocate the head to bring it into and out of engagement with the twisted neck of the enveloping film covering of a package, said device having a mold chamber comprising a fixed die element having an arcuate face and provided with a slot the walls of which form the top, rear, and bottom members of the chamber, and a movable forward die element having its inner face eccentric with the outer face of the fixed die element, said outer element forming the forward and side walls of the die chamber when in its closed position, power means to open and to close the chamber, means to inject a charge of molten plastic into said chamber, and means to cool the chamber after the injection of the charge.

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FRANK E. BAILEY, *Primary Examiner*.

BROMLEY SEELEY, *Examiner*.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,197,938

August 3, 1965

Jacob Lasoff

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 66, for "heat-shrinkage" read -- heat-shrinking --; column 4, line 51, for "eccentric" read -- concentric --.

Signed and sealed this 18th day of January 1966.

(SEAL)

Attest:

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EDWARD J. BRENNER

Commissioner of Patents