

[54] CLOSING SYSTEM FOR BAGS AND THE LIKE

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[51] Int. Cl. B23p 11/00

[58] Field of Search..... 29/243.57, 243.56, 211 D, 29/243.5; 53/138 A

References Cited

UNITED STATES PATENTS

2,924,924 2/1960 Garapold et al. 53/112 B

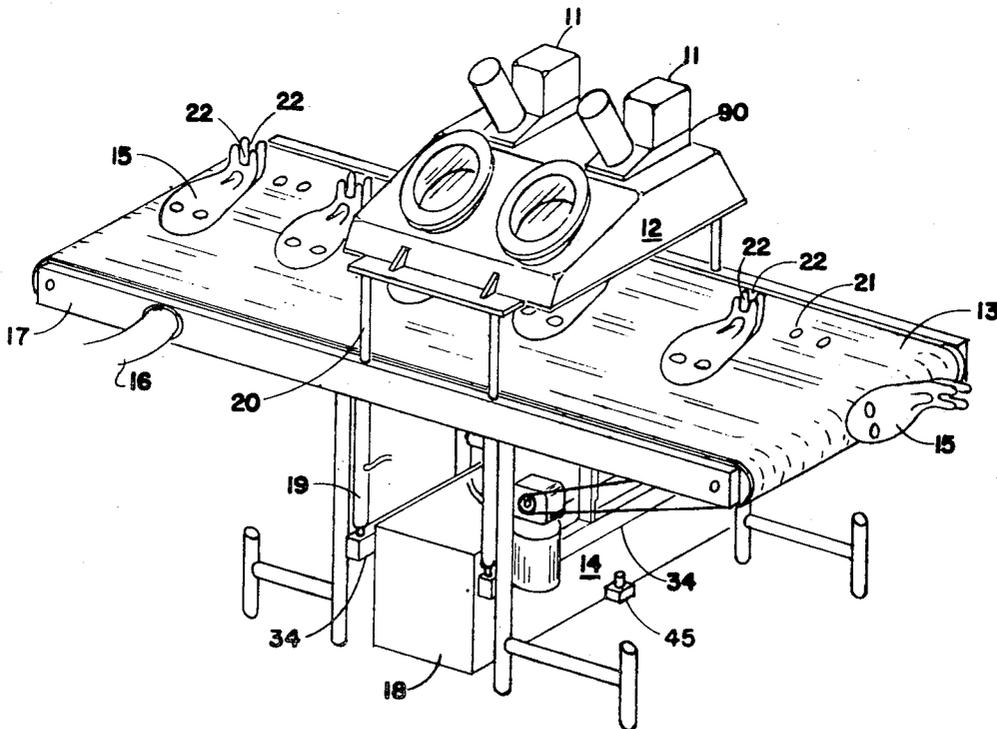
3,381,359	5/1968	Schroeder	29/243.57 X
3,383,746	5/1968	Narduzzi et al.....	53/138 A X
3,455,010	7/1969	Busler	29/243.57
3,693,314	9/1972	Reid et al.	53/138 A
3,699,745	10/1972	Reid.....	53/138 A

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ABSTRACT

[57] Disclosed is an apparatus and method for closing containers and especially useful for closing bags containing vacuum packaged products. The following features are included: means for straddling the bag's neck, means for positioning the bag's neck, means for pressure closing a clip, means for sensing that the pressure applied to close the clip is sufficient and associated apparatus for vacuumizing the bag.

2 Claims, 9 Drawing Figures



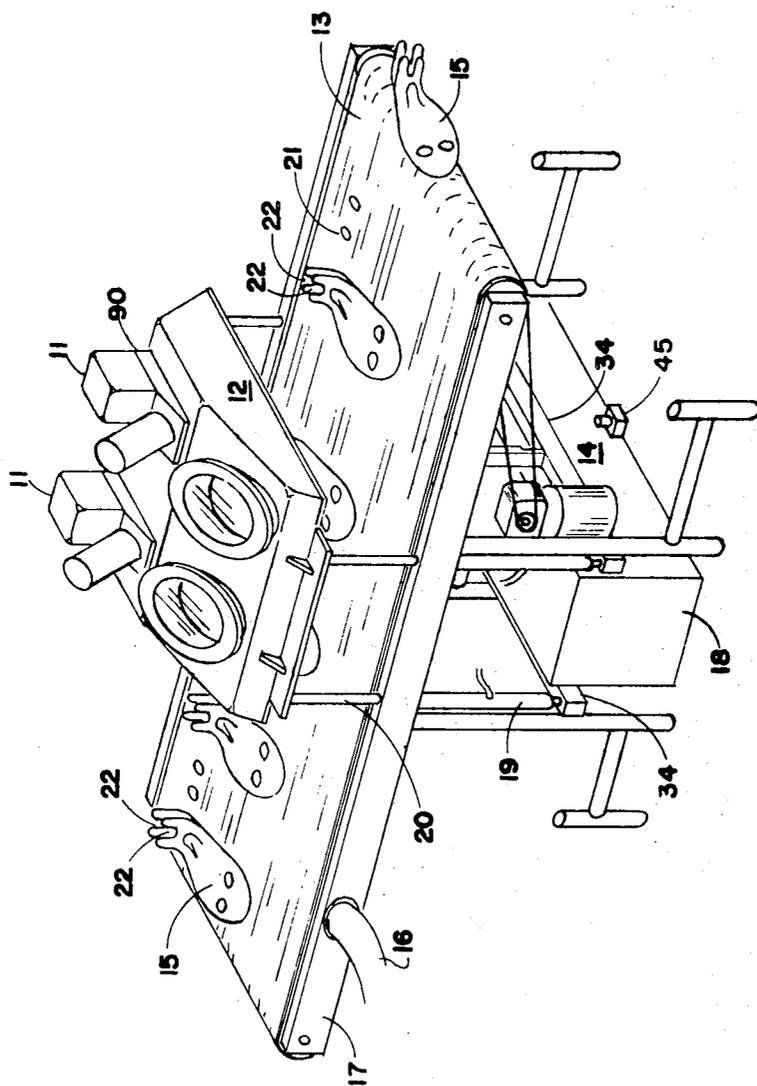


FIG. 1

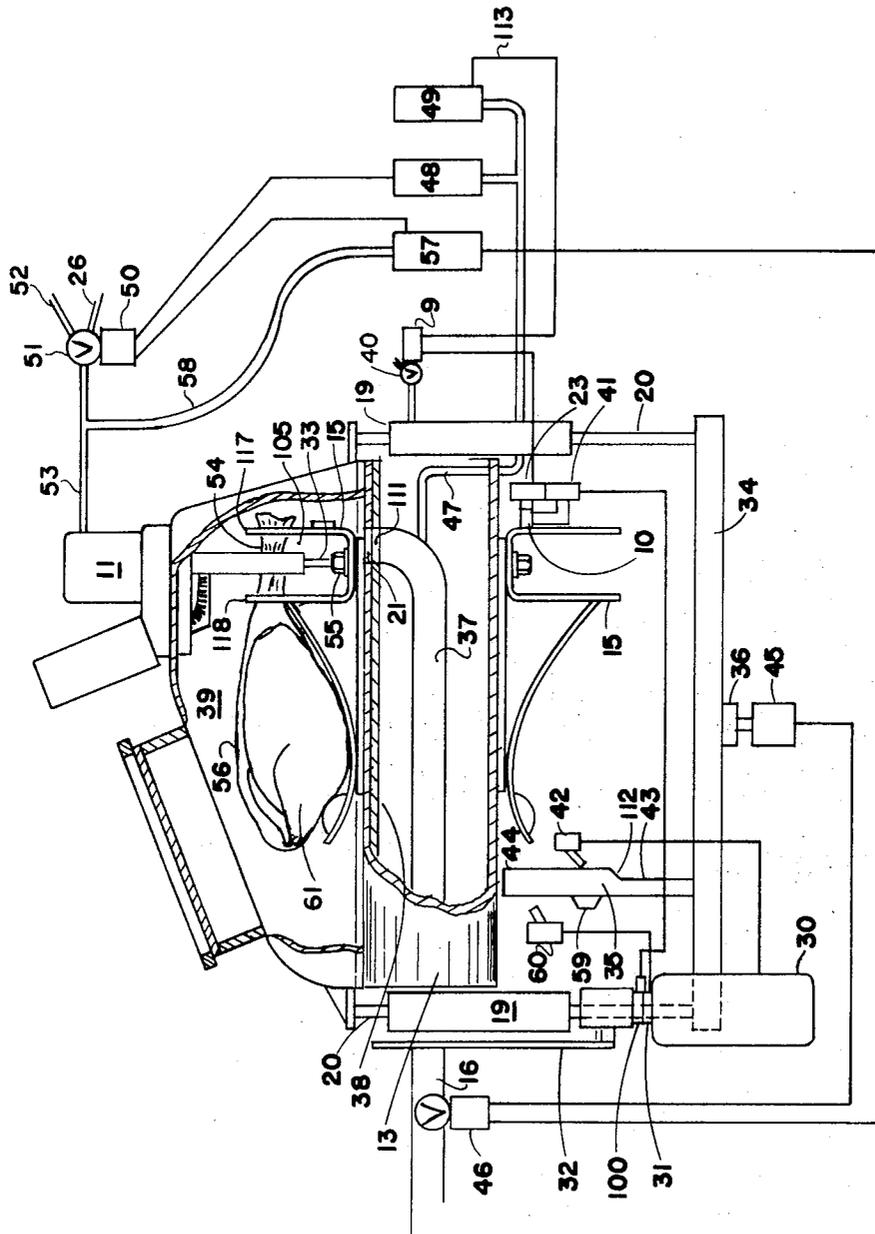


FIG. 2

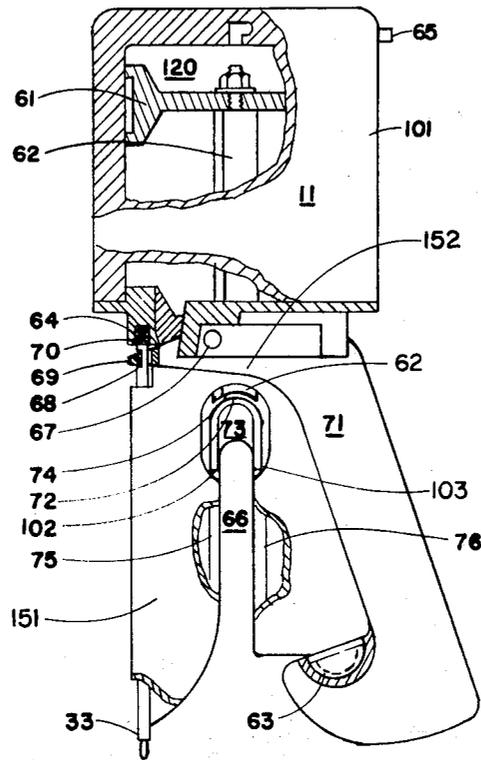


FIG. 3

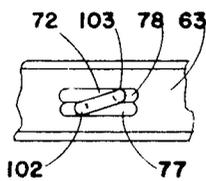


FIG. 4

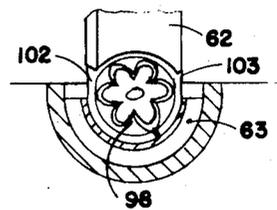


FIG. 5

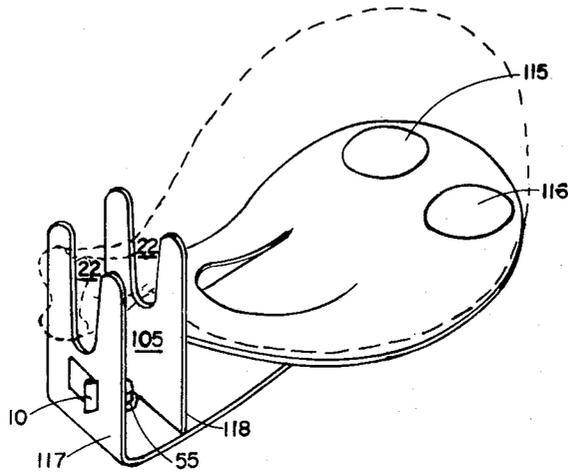


FIG. 8

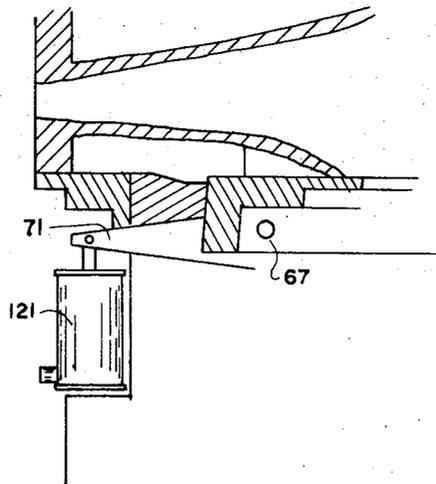


FIG. 9

CLOSING SYSTEM FOR BAGS AND THE LIKE

This is a division of application Ser. No. 97,747, filed Dec. 14, 1970 now U.S. Pat. No. 3,693,314.

BACKGROUND OF THE INVENTION

The present invention relates to a method and means for closing containers and is particularly applicable to closing bags subsequent to vacuumizing.

A primary object of the present invention is to provide a system for closing bags.

An additional object of the present invention is to provide a bag closing system for closing vacuumized bags.

A further object of the present invention is to provide a closing system in which the closing is accomplished in part by the application of pressure and the satisfactory attainment of the pressure quality to assure normal satisfactory closing is sensed to release the area sealed from the sealing means.

Another object of the present invention is to provide a highly efficient closing system which leads itself to economical manufacture.

SUMMARY OF THE INVENTION

These and other objects of the present invention are desirably satisfied by an apparatus which includes:

1. A clipper having a throat for the straddling of a bag neck,
2. A gate means for closing the clipper's throat and enclosing a bag straddled thereby,
3. A pressure means providing a clip in straddling position on the bag neck and closing the clip thereabout,
4. A pressure sensing means sensing when the pressure provided for closing the clip has reached a satisfactory clip closing quality, and
5. A closed clip freeing means responsive to the sensing means.

By an aspect of our invention in one preferred application thereof bags containing products such as meat cuts or fowl are closed after they have been vacuumized. The bagged products are initially placed on a conveyor which transports them to a vacuumizing zone. The clipper is incorporated into a hood member which is brought into contact with the conveyor to form a vacuum chamber around the product. The closing of the hood member brings the throat of the clipper into straddling position respecting the neck of the bag. As the hood and the clipper reach the bottom of their travel, a portion of the clipper is engaged with the conveying means causing the clipper gate means to close.

Air is then withdrawn from the vacuum chamber to form a vacuum therein which will in turn vacuumize the bagged product. After a certain level of pressure reduction has been reached in the vacuum chamber, a sensing means causes the clipper to close a clip about the bag's neck to seal the bag and thereby preserve the vacuum level therein. Subsequent to sealing, the closed clip is released by the clipper in response to a sensing that proper pressure was applied to close the clip. The air pressure within the vacuum chamber is returned to normal atmospheric and the hood is removed from the vicinity of the conveyor, removing the engaging portion of the clipper from engagement with the conveyor and thereby opening the gate means. The conveyor which

was stopped during the closing and opening of the hood now transports the vacuumized and closed bag away from the vacuumizing zone while at the same time transporting an unprocessed bag into the vacuumizing zone for the next vacuumizing cycle.

In this preferred embodiment, the sequencing of events is largely and advantageously determined by the conditions of the events themselves. First, the position of the product with respect to the vacuumizing zone indirectly signals the belt to stop and the hood to be lowered. Then the hood being positioned with the belt to form a vacuum chamber causes vacuumizing to begin. When a satisfactory chamber vacuum is obtained, relay means cause the bag closure device to operate. Subsequently, the obtaining of proper air pressure in the air-operated, bag closing means signals both the disengagement of the clipper closure means the the cessation of chamber vacuumization. When the chamber returns to normal atmospheric pressure, the hood member is made to rise. Finally, the upward motion of the hood triggers control means to start the conveyor and begin a new vacuumizing cycle.

This method of sequencing insures that the desired results of each event take place before the succeeding event occurs. It allows for variables, e.g., for instance in vacuum level and air pressure, and is thought to be superior to prior art control means which rely on timers and like means.

Additional aspects and further features of the present invention are included in the following Brief Description of the Drawings and Discussion of the Preferred Embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of the vacuumizing and closing apparatus.

FIG. 2 is a partial cut away elevation view and a schematic representation of the major elements of the vacuumizing and closing apparatus with the cylinders 19 and rods 20 foreshortened.

FIG. 3 is a partial cut away elevation view of the clipper closing means.

FIG. 4 shows in plan view a closure clip engaged with the anvil member of the clipping device shown in FIG. 3.

FIG. 5 is an elevation view of the closure clip of FIG. 4.

FIG. 6 is a plan view of a cylindrical clip feed member.

FIG. 7 is a partial elevation view of a cylindrical clip feed member.

FIG. 8 is an isometric view of a product locator.

FIG. 9 is a partial cut away view of an air operated gate assembly.

DISCUSSION OF THE PREFERRED EMBODIMENTS

General Discussion of the Preferred and Alternative Embodiments

In FIG. 1 we have shown a perspective view of one embodiment of the vacuumizing and closing apparatus. The major components of the apparatus include the bag closing clipper assemblies 11, the hood member 12, the conveyor belt 13, the conveyor belt drive assembly 14, the product locators 15, the connecting means 16 leading to an appropriate vacuum source (not shown), the apparatus support and frame assem-

bly 17, control box 18, pneumatic cylinders 19, and hood supporting piston rods 20.

In operation these components relate to one another and function in the following manner.

Still referring to FIG. 1, bagged products are placed on the locating members 15 which are at the upstream side of the machine, or in this figure, at the far end of the machine. The bags are situated so that their open ends lie in the U-shaped slots 22 of the locators 15. The slots 22 provide means that provide a somewhat gathered condition to the bag's neck region at two adjacent spaced apart areas. The bagged products are transported by conveyor 13 (to which locators 15 are attached by bolts or other means), to the vacuumizing and sealing zone comprising in this case the projection of hood 12 onto conveyor belt 13.

The conveyor is an endless belt of rubber or other like material and it transports the products into and out of the vacuumizing and sealing zone. The belt extends approximately the length of the apparatus and is powered by conventional means. The hood is mounted above the conveyor on pneumatic cylinders so that in its up position it is located out of the path of conveyed products and so that in its down position it contacts the conveyor to enclose the products located thereon and to form a vacuum chamber therewith. In this preferred embodiment, chamber vacuum is obtained through opening means in the conveyor belt. The conveyor's stop position is timed so that these vacuum opening means in the conveyor are adjacent a vacuum manifold positioned thereunder and connected with a conventional vacuum pump. The bag locating means are included as a part of the conveyor belt. These locating means position the bag with respect to the belt so that when the belt is stopped, the bag will lie properly to be engaged by the bag closing means. The bag closing means, which is included in the hood member and engages the bag's neck opening during the downward travel of the hood assembly, closes the bag after it was been vacuumized.

When two bagged products and their locators are positioned beneath the hood 12, the conveyor stops. At this time, air cylinders 19, through their associated hood support piston rods 20, lower the hood 12 until it contacts the conveyor and encloses the bagged products in the chamber thus formed. The open throat means 66 is moved to receive the bag's neck region 54 by the lowering of hood 12 by which it is carried. The gate means 71 closes the throat means 66 in response to the coming action of the actuating rod 33 when it is brought in to pressing engagement with the belt 13 by the lowering of the hood 12.

After the chamber configuration is obtained and the throat or bag neck enclosing space 66 of the clipper 11 has closed about the bag's neck 54, air from within the chamber is evacuated through conveyor openings 21, vacuum manifold 37 (FIG. 2) and vacuum connector line 16. When a sufficient vacuum level is reached in the chamber, clipper 11 crimps a clip around the open bag neck to seal off and preserve the vacuum level inside the bag. The bag's neck is then severed adjacent the clip by the severing means 150. When the bag has been sealed, air cylinders 19 raise the hood 12, and the conveyor is started again. The vacuumized and closed bag is carried out of the vacuum sealing zone where it may be removed from the locator and be borne away for further processing.

Certain variations may be made in the components of the vacuumizing and closing apparatus as described and shown and still fall within the generally preferred embodiment of the present invention. For instance, it is not necessary to employ a single vacuumizing zone. Longer conveyors may be provided with two or a plurality of vacuumizing and sealing zones. Nor is it necessary that two bagged products be vacuumized during each vacuumizing and sealing cycle as shall be illustrated in this application. One or any additional number of products within practical limits may be located in the vacuum chamber and be vacuumized and closed with each cycle. Furthermore, although preferred, it is not necessary in some instances to employ mechanical bag closing devices of the type shown and to be more fully described in the following. For instance, the bag's open end may have malleable metal injected about the bag's neck or the bag's neck could be heat sealed.

Additional variations in alternative examples may be made in the manner of vacuumizing and in the configuration of the product locators. Although it has been found particularly advantageous to employ the vacuumizing method shown, it is also possible to apply a vacuum to the chamber through the hood assembly, rather than through the conveyor belt.

The configuration of the product locators may be varied to suit the requirements of the particular object to be vacuum packaged. The locators 15, shown in FIGS. 1, 2 and 8, are useful for bagged fowl, particularly turkeys. Other types of locators may be advantageously employed for other types of products. Certain products require no locators other than positioning marks on the conveyor belt.

In certain instances it may be desirable to vary the manner of actuating the hood member 12. Although raising and lowering in a vertical manner by pneumatic cylinders is preferred, the hood may also be raised and lowered by mechanical linkages, lever arms or the like. It is also possible to bring the hood into contact with the conveyor by mounting the hood on pivotable supports so that it engages the conveyor by a swinging action.

Having described now the more general aspects of the present invention, the discussion is directed to operable details of the preferred apparatus as shown and described. This detailed discussion includes description of the components necessary for sequencing the various events in vacuumizing and sealing packages, description of the mechanical clipping device, and description of a clip feed mechanism.

Clipping Device

Referring now to FIG. 3 we have shown the clipper assembly 11 in partial cut away view. The major components of the clipper assembly include piston housing 101, piston member 61, piston chamber 120, a frame portion 151, an elongated throat 66 passing into the frame portion 151, piston rod and clip drive, punch means 62 which is the clip applying means for moving the clip through throat 66 and about the bag's neck region 54, clip crimping anvil means 63, and an outwardly biased reciprocal member or clipper actuating rod 33 on one side of the throat 66 and a pivotal gate member 71 on the opposite side of throat 66 with an arm 152 connecting the pivotal member 71 to the reciprocal member 33. The arm 152 is formed integral with pivotal member 71. The reciprocal member 33 is biased outwardly by spring 70. The arm 152 is engaged

in notch or driving rod notch portion 68 for moving the member 71 pivotally about pivot point means or pin 67. The gate is pivoted across the throat 66 when the reciprocal member 33 is pressed against its bias and away from the throat when the member 33 is allowed to return to its bias. The engagement of the reciprocal member with the surface of conveyor 13 moves the member 33 against its bias and the removal of the member from the surface allows its return to bias. A clip delivery track is formed in the throat 66 on its facing linear walls as grooves 75 and 76. The punch 62 is provided at the upper end of the throat for moving the clips through the delivery track. A clip crimping anvil means 63 is mounted on the gate member 71 for positioning below the punch when the gate closes the throat 66. The piston 61 is attached to the end of punch 62 opposite the throat 66. The air cylinder or piston chamber 120 mounts the piston for moving the punch through the throat 66. Other components include air entry port 65 and the gripping jaw swing arm connector 69 which is a portion of arm 152. Spring 70 is mounted in recess 64. In operation these elements cooperate to enclose a bag's neck and thereafter crimp closed a clip around a bag's open neck.

The entire clipping apparatus is adapted to vacuumize and close bags and the like containing products. The clipper 11 and its directly supported apparatus is carried downwardly with the hood member, to which it is attached by an adapter means 90 (FIG. 7). In this manner the clipper is mounted adjacent to the surface of the conveyor 13. As the clipper proceeds downwardly, it engages or straddles the bag neck in the throat space 66 as previously mentioned. The throat space 66 is sufficiently large in dimension to facilitate proper air evacuation from the bag through the bag neck after closure. The throat is dimensioned to maintain the neck region of the bag captive and at the same time allow sufficient openness of the neck region to permit evacuation of gas therefrom prior to the closing of bag with a clip. The throat means is also sufficiently restrictive to cause the inflation of the bag due to internal gas if the exterior of the bag is subjected to reduced gas pressure.

The bag neck is held in position to be so engaged by the U-shaped slots 22 located in the two vertical end pieces of the product locator 15 as seen in FIG. 8. Two crown members 115 and 116 at the rear of the locator also aid in positioning the product. The clipper straddles the bag neck in the arm 105 between the two vertical end pieces 117 and 118 as further depicted in FIG. 2.

Preferably subsequent to gate closing, high pressure air is introduced into the port 65 by the valve means 51 forcing the piston 61 and associated piston rod and clip drive 62 downwardly. These parts functioning under the air pressure provide a clip closing means. The clip engaging end 74 of clip drive rod 62 carries an individual clip 72 from space 73 downwardly along the track formed by the grooves 75 and 76 and around the bag neck located in space 66. Grooves 75 and 76 are located within the body of the frame surrounding space 66 so that the legs 102 and 103 of the clip will not slip out of the carrying track and so that they will not pinch and become entangled with the bag neck material.

Clip drive 62 forces the clip and the bag neck to proceed downwardly through space 66 into subsequent engagement with the anvil member 63 which defines in its

closed position the bottom portion of space 66. The respective ends or legs 102 and 103 of the clip are engaged into the crimping slots or grooves of the anvil member as seen in FIGS. 3, 4 and 5. As the punch proceeds downwardly, the clip ends are cammed toward one another and bent into a tight loop about the bag neck 98 (FIG. 5). Since each clip leg engages separate anvil grooves it is necessary that the clip be angled with respect to the grooves. The punch drive 62 and guide slots 75 and 76 may be angled to the anvil as in the example shown in FIGS. 3, 4 and 5, or the anvil grooves themselves may be angled with the punch and guide slots remaining straight.

During the clip engaging and crimping period, high pressure air is applied through port 60 against the upper surface of piston 61. When a predetermined pressure level has been reached and adequate clip crimping achieved, pressure sensitive switch 57 seen in FIG. 2, actuates valve 51 so that the application of high pressure air to port 65 is terminated and a vacuum is applied instead through port 65. Pressure sensitive switch 57 is the means that senses when the pressure provided has reached a satisfactory clip closing quantity and quality. The pressure sensitive switch 57 is connected to air chamber 120 for sensing when the pressure therein indicates a satisfactory clip closure.

The vacuum lifts piston 61 into the region of lower pressure air and hence disengages it from contact with the now closed clip. Thus the means supplying the vacuum are the closed clip freeing means for freeing the pressure closed clip for subsequent removal from the clipper. The closed clip freeing means is responsively connected to the means sensing when the pressure provided has reached a satisfactory clip closing quantity. The clip freeing means is responsive to the sensing means to free the closed clip. Thus a superior device is provided for closing the neck regions of bags, the device including means for sealing the neck region and means sensing the conditions for a satisfactory seal. The means for sealing the neck region include means for providing a sealant member about the neck region.

Drive member 62 is raised sufficiently high by the vacuum so that the next clip from the clip supply will drop in the space 63 and thereby be available for the next vacuumizing and closing cycle. The bag neck is freed from space 66 when the hood and hence the clipper is raised. Actuator 33 is also removed from contact with engaging means 55 (see in FIG. 2), and is forced downwardly by spring 70, moving the jaw 71 and associated anvil 63 away from the bag's neck. When an air cylinder gate actuator is employed, the cylinder is caused to open the gate after clipping takes place.

There is also another method of actuating gate or jaw member 71. In this method (as seen in FIG. 9), the actuating rod 33 is replaced by an air cylinder 121. The air cylinder is connected to the gate 71 so that when the cylinder is activated, it rotates the gate about pivot means 67. The air cylinder is preferably activated prior to high pressure air being introduced into port 65 (FIG. 3), for example, by a limit switch engaged as the hood contacts the conveyor 13. It should also be noted that in certain cases other means may be employed to actuate a gate in enclosing space 66.

Clip Feed and Supply Apparatus

Referring now to FIG. 6 and 7, I have shown the clip feed and supply apparatus. The apparatus comprises

basically a clip supply cylinder with storage chambers and a clip feed track leading into communication with clip feed space 73 of clipper 11 as seen in FIG. 3.

In FIG. 7 cylinder 80 is shown attached to plate 81. The cylinder is revealed in cut away view to show clip supply chambers 82 and 83. Cylinder 80 is manually rotatable about shaft 84 so that the clip supply chambers can be moved into position over clip feed track 85. Clips are mounted on guide members such as guide member 86 in chamber 82.

A stop ring 87 is provided so that the clip guides lie in correct alignment with the clip feed track 85. This stop ring 87 is also shown in FIG. 6 and includes notched sections 88. These notched sections lie in radial array around stop ring 87 and with respect to the clip supply chambers, in such a manner that spring loaded stop 89a can provide a fixed registration point for correct guide alignment with the clip feed track 85.

Both clipper 11 and clip supply cylinder 80 are mounted by bolts, screws or other convenient means to adaptor 90 as seen in FIG. 7 and seen in isometric view in FIG. 1. Opening 91 is provided in adaptor 90 for receipt of the lower portion of clipper assembly 11. Opening 92 is provided for receipt of the upper portion of clip feed track 85 and opening 93 is provided for journaled receipt of the lower end of shaft 84. Plate 81 has a corresponding opening through which shaft 84 passes and has an additional opening 95 through which the clips may pass.

All of the clip supply chambers are normally uncovered except for the chamber which is in communication with opening 92 and aligned over feed track 85. This chamber is covered at its upper end by member 89 which is biased toward the cylinder's top by a resilient O-ring 110 which is pressed thereagainst by bolt 94 and washer 97. Member 89 is pressed sufficiently tight against the cylinder's top to preserve vacuum in the subject chamber and in main vacuum chamber 39. However, it is not pressed thereagainst so tightly that slidable movement is rendered difficult when the cylinder is rotated to align a new chamber with the clip feed track 85.

Whenever the level of clips is below plate 81, it is necessary to rotate the cylinder so that a chamber containing a complete supply of clips is positioned over the clip feed tracks 85 and opening 95. In order to be able to conveniently note when the clip supply is low, it has been found advantageous to construct the cylinder 80 from clear plastic material. Cast acrylic type of plastic has been employed, however, other types of plastic including polycarbonate or polystyrene may also be used.

The clips employed in the clipping device are of conventional type and manufacture. They may vary in size for different applications and the clipper and clip supply apparatus may likewise be varied accordingly. Such clips are usually taped together 92 (FIG. 7) along their closed ends so that a clip located in space 73, as seen in FIG. 3, will be held in that location by the tape itself and by the following clip to which it is taped. It will only travel downwardly when engaged by the drive member 62 (FIG. 3) and thereby separated from the following clip in the row of clips. The taped clip supply is flexible so that it will slide down gravity feed track 85 and present a new clip in space 73 after the previous clip has been severed from the taped together clip supply.

Sequencing of Events and Sequencing Apparatus

Referring now to FIG. 2, I have shown the preferred mechanical, electrical, and pneumatic apparatus for obtaining the proper event sequences in vacuum packaging and closing bagged products. Also reviewed are the apparatus elements to be sequenced as generally described in the preceding discussion.

The overall apparatus includes endless belt 13, belt drive motor 30, and drive motor clutch 31 and brake 100. Also included are chain drive member 32, hood member 12 (FIG. 1), clipper assembly 11, and clipper actuating rod 33. Product locators 15 are employed and are attached in pairs around the belt 13 so that when the belt is stopped (by means to be subsequently discussed), a pair of locators 15 will lie in the sealing zone.

Additional elements are the hood actuation pneumatic cylinders 19, the support piston rods 20, and the piston tie bars 34 (FIG. 1). These tie bars increase the rigidity of the hood actuating mechanism and provide a mounting means for drive mechanism actuating rod 35, and vacuum means actuating block 36.

Other apparatus includes the vacuum line 16 which extends into the interior of the apparatus and joins the vacuum manifold 37. The manifold communicates with the vacuum chamber 39 through opening means 111 in the reinforcing plate 38 (which is attached to the frame 17, FIG. 1), and conveyor opening means 21.

The further apparatus actuators, valves, switches, etc., which comprise the remainder of FIG. 2 will be described more completely in the following. These additional components are shown somewhat schematically for simplicity; in actual devices they are primarily located in control box 18 (FIG. 1). And although the aforementioned and subsequently discussed components have proved particularly advantageous, it should be noted that other combinations and types of devices may be substituted to achieve the requisite functions.

Major events to be sequenced are (1) lowering the hood, (2) stopping the conveyor, (3) applying vacuum to the vacuum chamber, (4) clip sealing the bag's open end, (5) venting the chamber to atmospheric pressure, (6) raising the hood, and (7) restarting the conveyor. Sequencing is accomplished by employing sensing, signaling and actuating means wherein the condition of a preceding event controls the progression to a subsequent event.

After initially starting the conveyor (which is accomplished by conventional solenoid and switch means), the first action of the vacuumizing and closing cycle is to lower the hood. This takes place when striker 10, attached to the lead locator 15 of a locator pair, strikes the arm of switch 23 as the locators pass underneath the belt in the embodiment shown.

Switch 23 is electrically connected to valve actuator 9 which, upon being energized, opens valve 40. Valve 40 controls the pressure line to pneumatic cylinders 19 and, by being opened to atmosphere, allows hood member 12 to fall under the influence of gravity. Due to the damping action of air trapped within the cylinders 19, the hood drops slowly, rather than abruptly, into the path of the product locators.

During this time the belt has continued to move and has caused striker 10 to contact switch 41 for the second event. Switch 41 is connected to the clutch 31 and the brake mechanism 100 of belt drive motor 30 and,

upon being activated, causes the motor clutch to be disengaged and the brake to be applied. This in turn causes the conveyor belt to stop.

Switch 41 is shown beneath switch 23 for clarity's sake. It should be noted that in actual practice it is located to the rear of switch 23 so that striker 10 contacts, first, switch 23, and then 41. Furthermore, it should be noted that switch 41 is positioned with respect to the strikers of the equidistantly spaced locator pairs and with respect to the vacuumizing zone so that it stops the conveyor at the correct time or position for (1) lining up the vacuum openings in the belt and reinforcing plate, (2) positioning the locators in the vacuumizing zones, and (3) aligning the locators properly with the hood borne clipping units.

The hood member completes the major portion of its descent after the belt is stopped to avoid interference with the product locators. Proceeding downwardly with the hood is the tie bar 34, to which is attached the motor actuating rod 35 and the vacuum actuating block 36.

Actuating rod 35 has an inset surface 43 and a raised surface 44. The actuating arm of switch 42 lies in this inset portion 43 when the hood and, hence, the block are in their up position. However, as block 36 descends, the actuating arm of switch 42 is raised onto surface 44 by switch cam element 112, thereby activating switch 42. The switch 42 is connected to the power input of drive motor 30 and upon being activated turns off the power to motor 30. This is a safety measure to prevent possible conveyor travel while the hood member is down.

At the bottom travel of the aforesaid components, the vacuum actuator block 36 strikes the switch 45 for the third major event. The switch is connected to vacuum valve actuator 46 which opens line 16 to the vacuum source (not shown). Air is then evacuated from chamber 39.

Tubing line 47 leads from vacuum manifold 37 to pressure sensitive switches 48 and 49. When a predetermined vacuum level commensurate with satisfactory vacuumizing has been reached in chamber 39 and, hence, manifold 37, pressure sensitive switch 48 is activated for the fourth major event, or bag closing. Valve 51 is opened to high pressure air line 52, through electrically connected valve actuator 50, and high pressure air between 40 and 80 psi is delivered from valve 51 through line 53 to the clipper assembly 11.

The clipper assembly has been previously moved downward into the vicinity of the bag neck 54 by the downward movement of the hood 12 as previously described. In one closure embodiment the clipper's engaging jaw is closed around the bag neck as the jaw actuating rod 33 (FIG. 3) is brought into contact with product locator engaging means 55 (FIG. 8). However in other embodiments the engaging jaws are closed by the action of an air cylinder mechanically connected thereto. In either of the above or other alternative cases, after the jaw is closed, high pressure air, as indicated, is introduced into clipper piston chamber 120 (FIG. 3) and the clip is delivered around the bag neck 54 and crimped to close off the bag neck and thereby preserve the vacuum which has been created within bag 56.

The application of high pressure air to the piston chamber of clipper 11 is continued until the bag has been satisfactorily closed and a predetermined pressure

level (for instance 60 psi) reached in the clipper piston chamber. Then pressure sensitive switch 57 registers this pressure level through air line 58 and signals actuator 50 to close the high pressure feed air line 52 and open the vacuum line 26. The vacuum application returns the clipper piston and other components to their normal, out-of-operating condition.

Pressure sensitive switch 57 is also connected with the main vacuumizing chamber vacuum line actuator 46. After the predetermined pressure level has been created in clipper 11, switch 57 signals actuator 46 for the fifth major event. The valve associated with actuator 46 is closed to vacuum and opens line 16 so that the vacuum chamber 39 is vented to atmosphere.

When the chamber and hence the manifold 37 and line 16 have reached atmospheric pressure level, pressure sensitive switch 49, through connecting line 47, signals actuator 9 to open valve 40 to high pressure air for the next event. In this action cylinders 19 cause piston support rods 20 to ascend and to thereby raise the bond member 12.

As the hood is being raised, switch 45 is reset and switch 42 is returned to its normal engaging position with respect to inset face 43, thereby returning power to the belt drive motor 30. The final event in the cycle occurs as the actuator bar 35 continues its upward travel, when, at the proper height to allow the hood to clear the locators 15, striker 59 engages switch 60. This action disengages the clutch 31 and disengages the conveyor drive brake 100, thus causing the conveyor to resume its normal travel. The now bagged and vacuumized product 61 is delivered out of the vacuumizing zone.

After vacuumizing, the product may be subjected to conventional processing such as heat shrinking the biaxially oriented polymeric film often employed as bag material. The products may be lifted off the conveyor by hand and transported to subsequent processing stations. However, considerable benefit is realized when the bags are allowed to drop off the end of the conveyor onto another conveyor leading to a heat shrink, or other operation. The product locators 15 (FIG. 8), are particularly suited for this since the open U-shaped slots 22 (FIG. 8) allow the product to fall easily off the locator when it is inverted at the end of the conveyor.

Operation

Turning now to the operation of our packaging and closing procedure and by way of example to the preferred embodiment of our invention in packaging poultry products such as cleaned and dressed hens, a loading operator would sequentially remove individual bagged birds from a supply and place the bags with the birds therein individually onto a product locating means 15 (FIGS. 1, 2 and 8). Each bag is positioned in its locator with the bottom of its outer closed end portion engaged between and against two spaced apart projecting crown members 115 and 116 as shown in FIG. 8. The forward open end of the bag where it encompasses the neck end of the bird is retained cradled in the cut out cradle portion of the locator where it slopes upwardly as shown in FIG. 8. The bag's open neck passes through the two vertical end pieces 117 and 118 which are spaced apart for receipt of the clipper jaw portions therebetween. The bag's neck passes through slots 22 in the end pieces 117 and 118 and is retained and positioned thereby. The bag's neck is thus

engaged at two adjacent spaced part areas. As shown the product locators are arranged in pairs and thus two locators would be loaded in succession. In this way the bag with a product or article therein is placed on a conveying means.

In the preferred form of practicing this invention with the preferred embodiment, once power is supplied to the apparatus the apparatus will cycle continuously as hereinafter described. The loaded pair of locators is thereby brought under hood 12. The pair of loaded product locators is stopped in position under the hood 12 in the area where the vacuumizing of the product occurs by the striker 10 engaging the switch 23 on a companion pair of product locators signaling the actuating means 9 to stop the conveying means and lower the hood member onto the conveying means. In this way the conveyor is stopped in response to the bag thereon reaching a predetermined location and the hood means is then automatically brought into contact with the conveyor means to form a vacuum chamber therebetween and enclose the product.

As the hood 12 lowers onto the conveyor 13 the open throat space or means 66 (FIG. 3) of each of the open ended clippers 11 straddles a respective bag neck where the bag neck passes through the two U-shaped slots 22 of the product locator. As the hood, and hence the clipper, reach their lower positions actuator 33 (FIG. 2) strikes engaging surface 55 on a respective locator 15 and is driven upwardly against spring 70 rotating the jaw member 71 about pivot point 67 positioning the clipper anvil 63 in line for the receipt of a clip for closing the neck of the bag at a later time. The vertical path of actuator 33 is translated into the swinging motion of the jaw member by notch 68 being engaged by mechanical linkage 69. Anvil 63 is a part of the jaw 71 and is also swung around so that it lies directly beneath and thereby encloses space 66 in which the bag neck is located and thereby enclosing the bag's neck region therein. The neck region of the bag is now mounted for closing and evacuation. The open space 66 and the slots 22 are of such dimension that ample and sufficient space or opening is left and remains for the air in the bag to escape therefrom to allow evacuation of the air. At the same time the cooperation of the clipper throat and the slots serve to retain the bag during its subsequent inflation, during evacuation and restrict the outflow of gas from the neck region prior to clipping to assist in bringing about the inflation. Thus the dimension of the clipper throat and slots should be sufficiently restrictive respecting the outflow of air to cause or at least assist in causing the inflation of the bag if the exterior of the bag is subjected to reduced gas pressure.

When the hood member contacts the conveying means to form a vacuum chamber or confined zone therewith its position is sensed and actuating means are signaled to initiate the evacuation of air from manifold 37 and through opening 21 from chamber 39. This is accomplished by engagement of the vacuum actuator block 36 with the switch 45 opening lines 16 through vacuum valve actuator 46.

As the chamber is evacuated the bag inflates. This is effective in providing for the substantially complete evacuation of the bag because this prevents the normal drawing down of the neck of the bag onto the neck end of the bird preventing air trapped further down in the bag from escaping from the bag. It is believed that in principle this is because as evacuation of the chamber

occurs the air pressure in the bag is higher than the air pressure outside of the bag within the confines of the vacuum chamber. Therefore the air in the bag inflates the bag and brings about its own escape. In this way the chamber 39 and the bag therein are vacuumized.

The vacuum level within the chamber is brought to a level previously determined, and by way of example 25 inches of mercury vacuum, by partial evacuation of the air from the confined zone and from the container over a period of, for example, 3 seconds to produce the desired degree of vacuumization within the bag. The bag is then closed in response to a predetermined level of air evacuation from the chamber. Actuating means are signaled by a means sensing the level of vacuum to actuate the bag closure means to close the neck of the bag. This is done through pressure sensitive switch 48 sensing the vacuum level in the manifold 37 which actuates valve 51 to its open position to high pressure air line 52.

The clip is pressure closed to seal the bag through the application of high pressure air through line 52 to the piston 61 in chamber 120. A clip is closed around each of the bag necks to preserve the vacuum level thus created in the bag. The clip is closed by a punch means engaging the closed end of the clip, delivering the clip downwardly in its track through the throat means around the bag neck located in space 66 and forcing the legs of the clip into bending contact with the anvil means 63 to crimp the clip and mechanically close off the bag neck. The clip serves as a sealant about the bag's neck.

Next a sensing is made that the closure means has satisfactorily closed and sealed each bag by detecting that a predetermined pressure level has been reached in each clipper piston chamber 120 to provide a satisfactory clip closing quality and pressure sensitive switch 57 is activated signaling actuator 50 to close the high pressure air line 52 and open the vacuum line 26 returning the clipper piston and other components to their retracted positions releasing the hold exerted thereby on the now clipped neck of the bag. Thus the closed clip is released in response to the sensing that the pressure provided to close the clip has reached a satisfactory clip closing quality. It will be understood that both clipper chambers 120 are directly connected to line 53 although the purposes of illustration only one chamber connection is shown. Pressure sensitive switch 57 also signals actuator 46 which opens or vents the vacuum chamber 39 to atmosphere. In this way the chamber is vented to atmospheric pressure responsive to the bag being closed.

Next a sensing is made that the vacuum chamber has reached atmospheric pressure and actuating means are signaled to actuate the movement of the hood member from contact with the conveying means. When the chamber and manifold 37 reach atmospheric pressure, this is sensed by pressure sensitive switch 49 through connecting line 47. Pressure sensitive switch 49 signals actuator 9 to open valve 40 to high pressure air to raise the hood. In this way the hood member is raised in response to atmospheric pressure being attained in the chamber. In respective clippers, spring 70 opens the gate 71 and the clipper throat clears the closed neck of the bag as the hood rises.

Next a sensing is made when the position of the hood member is such that its parts are clear of the bagged products and their locators. Actuating means are then

13 signaled to actuate the conveying means to start. Switch 45 is reset, and switch 42 is activated to power the belt drive motor 30 as the hood rises and when the hood has raised sufficiently to clear the locators striker 59 engages switch 60 which disengages clutch 31 and conveyor brake 100 causing the conveyor to resume its normal travel transporting the bag container from the confined zone. In this way the conveyor means is started responsive to the hood member being raised transporting the closed bags away from the area where vacuumizing occurs.

The conveyor carries the locator and its striker 10 past switch 23 and this switch is then reset for the next cycle. The other locator in the pair does not have a striker on it so it passes the switch without initiating any action. When the hood reaches its fully up position with the pistons fully extended it is held in this position by the pressure in the cylinders.

During the time the vacuumizing and closing cycle is being carried out automatically the operator sequentially loads the next pair of product locators with two bagged birds as previously described. The two now packaged birds are removed from the conveyor either by tumbling off of the product locators as they pass under the conveyor or by being lifted off the conveyor by another operator. When the pair of freshly loaded product locators passes into position under the hood the cycle is ready for its repetition.

It may be seen that in our preferred procedure the neck of the bag is confined and the initial escape of air from the bag is at least somewhat restricted. The pressure on the outside of the bag is reduced and the bag which contains gas, usually air, is inflated. The gas in the bag that caused the inflation is withdrawn until the quantity withdrawn permits the bag to be returned to at least substantially its initial dimensions while the reduced pressure is maintained on the outside of the bag. The bag is then mechanically closed to maintain the reduction in the internal gas. Then the reduced pressure is removed from outside the bag further constructing

the dimensions of the bag.

While in accordance with the patent statutes, we have described what at present is considered to be the preferred embodiments of our invention, it will be obvious to those skilled in the art that numerous changes and modification may be made therein without departing from the invention and it is therefore aimed in the appended claims to cover all such equivalent variations as fall within the true spirit and scope of the invention.

We claim:

1. A clipper for mounting adjacent to a surface comprising a frame portion, an elongated U-shaped throat member movable into said frame portion, an outwardly biased reciprocal member on one side of said throat member, a pivotal gate member on the opposite side of said throat member, an arm connecting said pivotal member to said reciprocal member, said reciprocal member through said arm pivoting said gate across said throat member when pressed against its bias and away from said throat member when it is allowed to return to its bias, the engagement of said reciprocal member with said surface moving said reciprocal member against its bias and the removal of the reciprocal member from said surface allowing the return to bias, clip delivery track formed on both inner walls of the U-shaped throat member, a reciprocal punch at the upper end of the throat member for moving clips through said delivery track and an anvil mounted on said gate member below said punch for closing said clips when said gate closes said throat.

2. A clipper according to claim 1 including a piston attached to the end of said punch opposite said throat member an air chamber mounting said piston for moving said punch through said throat member, an air pressure sensing means connected to said air chamber for sensing when the pressure therein indicates a satisfactory clip closure.

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