

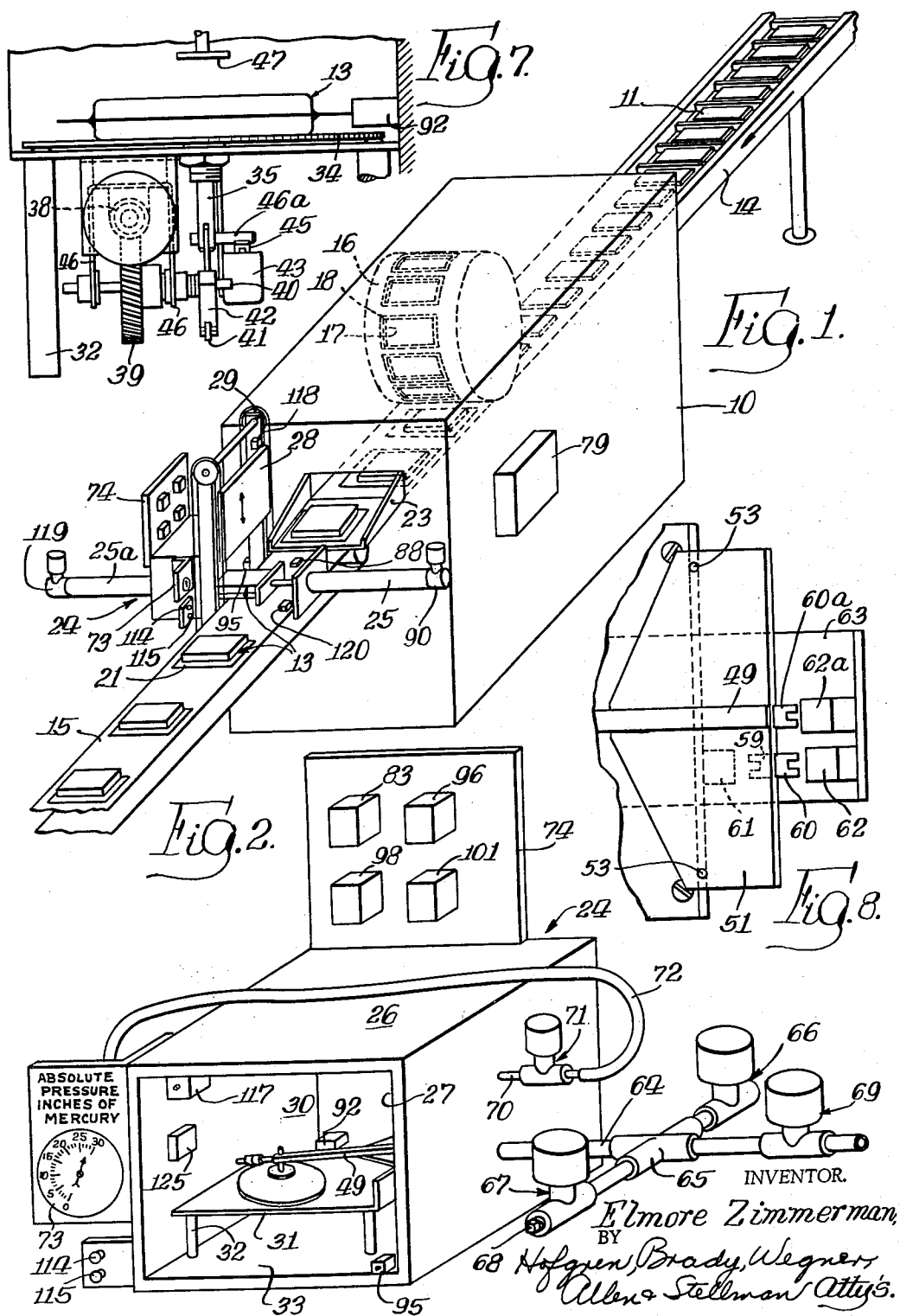
Jan. 14, 1964

E. ZIMMERMAN
METHOD OF AND APPARATUS FOR DETERMINING
VACUUM CONDITIONS IN PACKAGING

3,117,441

Filed May 16, 1961

3 Sheets-Sheet 1



INVENTOR.

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Allen & Sellman Attys.

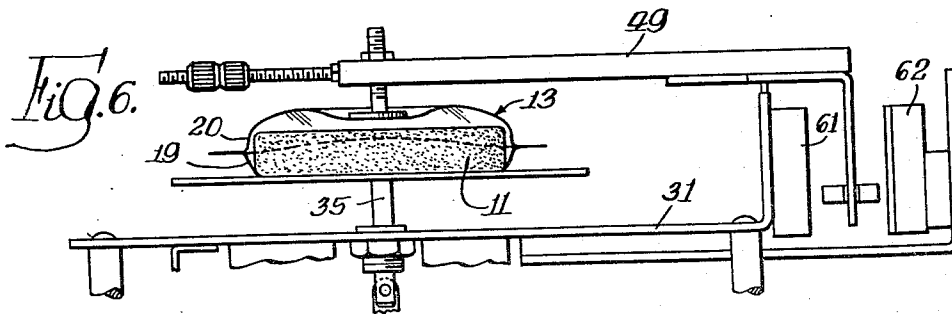
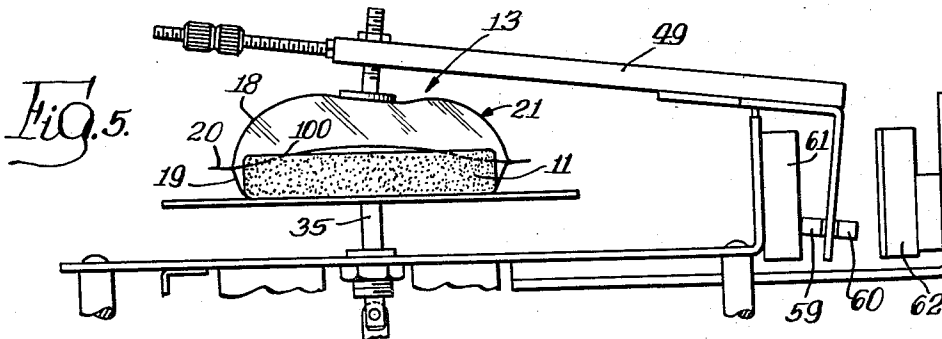
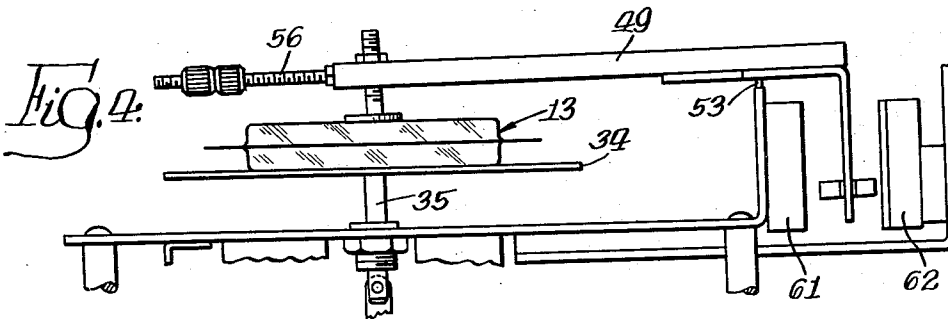
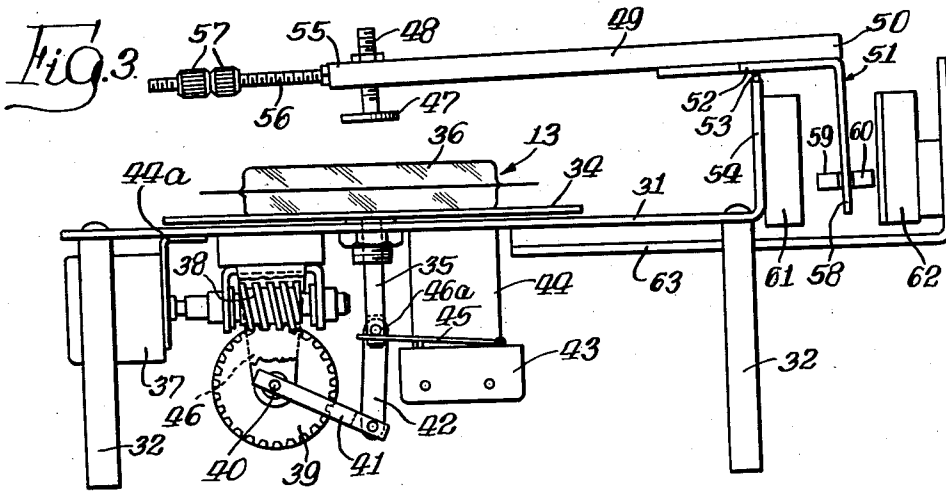
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3 Sheets-Sheet 3

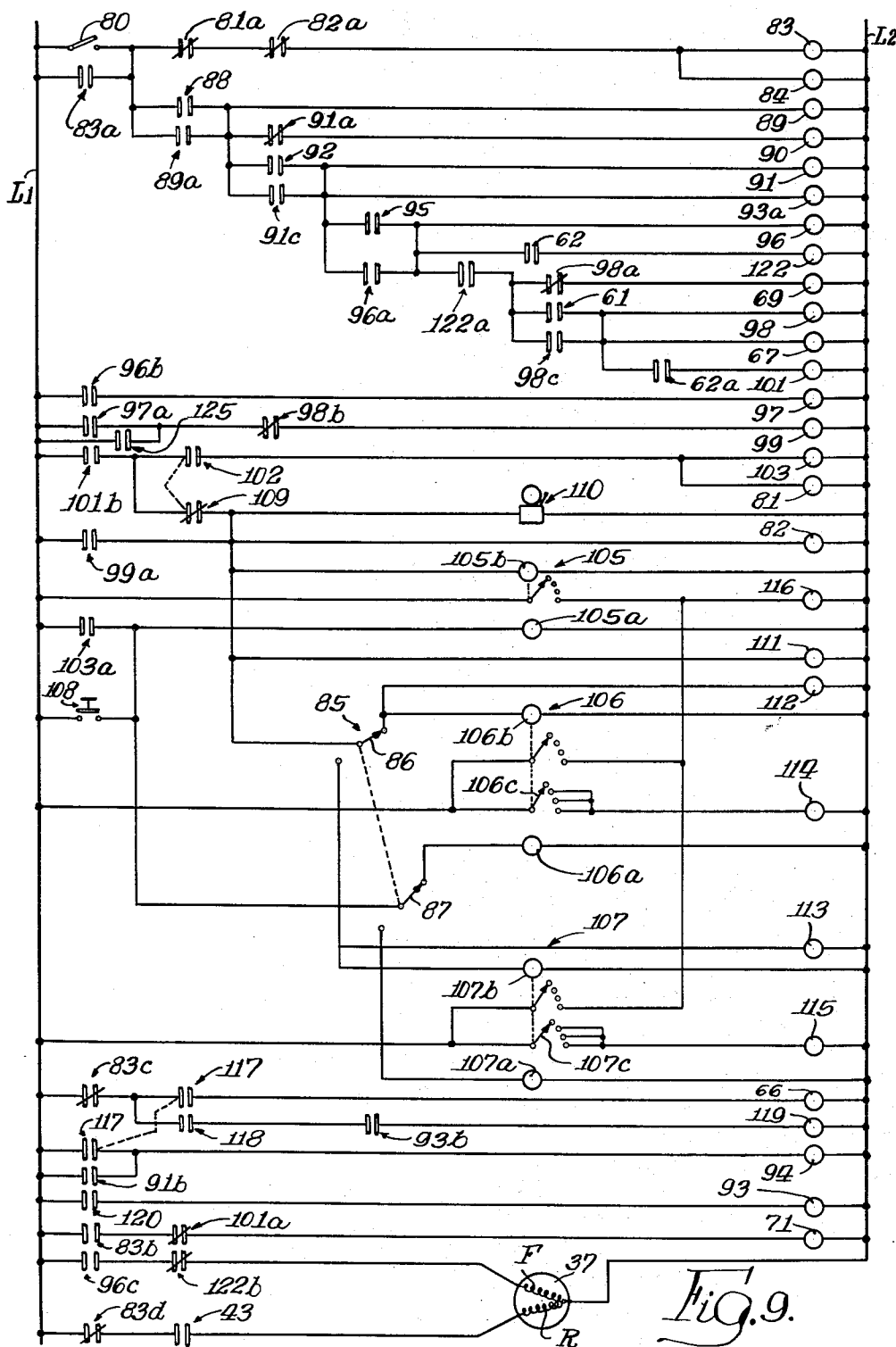


Fig. 9.

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3,117,441
METHOD OF AND APPARATUS FOR DETERMINING VACUUM CONDITIONS IN PACKAGING
 Elmore Zimmerman, 923 Fairfield Ave., Elmhurst, Ill.
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 10 Claims. (Cl. 73-37)

This invention relates to packaging and in particular to vacuum sealed packaging.

It has been found that food products, such as meat, cheese and the like, may be kept fresh and wholesome for extended periods, such as up to six to eight weeks, at a temperature of approximately 40° F., by suitable vacuum packaging. Further, such vacuum packaging has proven efficacious in preventing rusting of packaged ferrous elements, and in maintaining sterile conditions in sterilized packages. Machines have been developed for vacuum packaging such products at a high rate of speed. These machines have been perfected to a state wherein a high level of quality control is obtained. It has been found, however, that even with such highly efficient and accurate machines that the extremely low vacuum pressure condition is not always maintained in all of the packages. More specifically, to obtain the desired keeping qualities, the vacuum condition must be one of approximately 10 millimeters of mercury absolute pressure or less. Such a package wherein the pressure is, for example, 20 millimeters of mercury absolute pressure would appear to have a good low pressure sealed condition while yet the packaged product in such a package would rapidly deteriorate, rust, become unsterile, etc., apparently due to the presence of the increased amount of oxygen therein.

Heretofore, the condition of the vacuum in the sealed packages has been determined primarily by visual inspection, reliance being placed upon the inspector's personal skill in evaluating the condition of the vacuum. Because of the difficulty of detecting small differences in the vacuum condition, such a method of determining the vacuum has not been found to be fully satisfactory. Substantial economic losses may occur where the vacuum condition is not maintained at the preselected low value, and thus the vacuum packaging art has had a long felt need for a simple, inexpensive, yet highly accurate method of determining such vacuum conditions.

The present invention comprehends a novel method of determining the vacuum condition within a vacuum sealed package effectively solving this serious problem.

Thus, a principal feature of the present invention is the provision of a new and improved method of determining a vacuum condition within a vacuum sealed package.

Another feature of the invention is the provision of such a method for determining the vacuum condition within a package having a sealed flexible enclosure, comprising the steps of disposing the enclosure within a chamber, reducing the pressure within the chamber to substantially below the pressure within the package to distend the enclosure, increasing the pressure to permit a retraction of the enclosure toward the undistended arrangement, and determining the pressure within the chamber when the enclosure is in a preselected incompletely retracted arrangement.

A further feature of the invention is the provision of such a method wherein different vacuum sealed packages are positioned seriatim to have a portion thereof at a preselected plane from which and toward which the distention and retraction respectively are directed.

Still another feature of the invention is the provision of a new and improved method of determining the vacuum condition within a plurality of packages each having a sealed flexible enclosure.

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Yet another feature of the invention is the provision of such a method including the steps of moving the packages seriatim in a preselected path, removing a first package from the path, disposing the first package within a chamber, reducing the pressure within the chamber to substantially below the pressure within the enclosure to distend the same, increasing the pressure to permit a retraction of the enclosure toward the undistended arrangement, and determining the pressure within the chamber when the enclosure is in a preselected incompletely retracted arrangement, removing the first package from the chamber removing a second package from the path, disposing the second package within the chamber, reducing the pressure within the chamber to substantially below the pressure within the enclosure of the second package to distend the same, increasing the pressure to permit a retraction of the enclosure of the second package toward the undistended arrangement, determining the pressure within the chamber when the enclosure of the second package is in a preselected incompletely retracted arrangement, and removing the second package from the chamber.

Still another feature of the invention is the provision of a novel method of controlling delivery of a plurality of vacuum sealed packages from a vacuum sealing apparatus having a preselected number of sealing stations.

A further feature of the invention is the provision of such a method including the steps of selecting a first package from a first of the stations, determining the condition of the vacuum in the first package, selecting an additional package from each of one or more additional stations, determining the condition of the vacuum in each additional package, and providing an indication when the vacuum condition of said selected packages is determined to be above a preselected low pressure condition.

Another feature of the invention is the provision of such a method wherein said indication comprises a stopping of the apparatus.

Yet another feature of the invention is the provision of a novel method of controlling delivery of such vacuum sealed packages for selective indication of the determination of a preselected number of such packages having an undesirable relatively high vacuum pressure condition therein.

A further feature of the invention is the provision of such a method of controlling delivery of vacuum sealed packages wherein said indication is effected when the preselected number of defective packages is of successively selected packages.

Still another feature of the invention is the provision of such a method of controlling delivery of vacuum sealed packages wherein the defective packages are delivered from one station of a multi-station apparatus.

Still another feature of the invention is the provision of a new and improved apparatus for determining the vacuum condition within a package having a sealed flexible enclosure.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a perspective view of an apparatus for vacuum packaging seriatim a plurality of objects, having associated therewith an apparatus embodying the invention for determining the vacuum condition within the vacuum sealed packages;

FIG. 2 is a perspective view of the apparatus for determining the vacuum condition;

FIG. 3 is a front elevation of a portion thereof;

FIG. 4 is a front elevation thereof generally similar to FIG. 3 but illustrating the arrangement of the appa-

ratus upon disposition of the package to be tested at a preselected position in relation thereto;

FIG. 5 is a view generally similar to that of FIG. 4 but illustrating the arrangement of the apparatus and package upon a lowering of the pressure within the surrounding chamber to a preselected value lower than that in the package;

FIG. 6 is a view generally similar to that of FIG. 5 but with the apparatus and package as arranged at the time of making a determination of the pressure therein;

FIG. 7 is a fragmentary side elevation thereof with the apparatus as arranged in FIG. 3;

FIG. 8 is a fragmentary plan view thereof; and

FIG. 9 is a schematic diagram of the control circuitry thereof.

In the exemplary embodiment of the invention as disclosed in the drawing, a vacuum sealing apparatus is shown to comprise a conventional machine 10 to which is delivered seriatim a plurality of objects 11, illustratively comprising meat products, to be vacuum packed in machine 10 in a suitable flexible enclosure 21 to define a completed vacuum sealed package generally designated 13. As shown in FIG. 1, the objects to be packaged, herein illustratively food products such as meat products, may be delivered to the machine 10 by a suitable conveyor 14 and the packages 13 may be delivered from the machine 10 by another suitable conveyor 15. In illustrating the invention, the machine 10 is shown to comprise a conventional form of such machines wherein a cylindrical drum 16 is provided with circumferentially spaced cavities 17 across which is disposed a sheet 18 of suitable heat sealable plastic material and drawn into the cavity, as by application of a vacuum therein, to receive the upwardly extending meat products 11. A similar sheet 19 of heat sealable plastic material is disposed under the meat product 11 and the two sheets are heat sealed along a peripheral outwardly projecting edge portion 20 to define the enclosure generally designated 21. At the time of sealing the two sheets together, a vacuum is drawn within the enclosure 21 by suitable conventional means (not shown) so that the resultant package 13 has a low vacuum pressure therein, herein preferably no greater than approximately 10 millimeters of mercury absolute pressure.

From the package forming machine 10 the packages 13 are delivered onto conveyor 15 by suitable means such as chute 23. Adjacent the chute 23 and conveyor 15 is a vacuum determining apparatus generally designated 24. Selected packages delivered from the machine 10 are removed as they are delivered to conveyor 15 and are delivered to the vacuum determining apparatus 24 by suitable means such as pusher 25.

Referring now more specifically to FIGURES 2 through 8, vacuum determining apparatus 24 includes a cabinet 26 having a front opening 27 selectively closed by a door 28 controlled by a suitable pulley operator 29. When door 28 is disposed across opening 27, the chamber 30 within the cabinet 26 is sealingly closed.

Within chamber 30 is provided a flat support 31 carried on a plurality of posts 32 to extend horizontally spaced above the bottom wall 33 of the cabinet. A table 34 is secured to the upper end of a rod 35 for vertically reciprocable movement above support 31 to position a package 13 placed thereon with its upper surface portion 36 disposed in a preselected horizontal plane as shown in FIG. 4. The adjustment of rod 35 is effected by a suitable electric motor 37 driving a worm gear 38, in turn driving a worm wheel 39 on a shaft 40 having a control arm 41 connected thereto. The control arm is connected, in turn, to a link 42 connected to the control rod 35. A conventional normally closed micro-switch 43 is secured to the support 31 by a suitable bracket 44 and is actuated by an operator 45 controlled by a pin 46a as best seen in FIGS. 3 and 7. Motor 37 is secured to support 31 by a suitable bracket 44a and the gearing is

similarly carried on the support 31 by a pair of brackets 46.

Directly above table 34 is a small sensing button 47 having a preselected area, herein 1.276 square inches, carried at the lower end of a screw 48 adjustably threaded through a long arm 49 carrying at one end 50 an angle bracket 51 having an upper horizontal leg 52 pivotally resting on a pivot 53 on an upturned end 54 of support 31. The distal end 55 of the arm 49 is provided with a threaded extension 56 on which is mounted a pair of adjusting nuts 57 for adjusting the force moment of the arm assembly about pivot 53 to provide an effective downward force on the package enclosure 21.

The angle bracket 51 includes a downturned leg 58 carrying a first magnet 59 on one side thereof and a pair of magnets 60 and 60a on the opposite side thereof. A first magnetic switch 61 is mounted on support end 54 for selective actuation by magnet 59 and a pair of magnetic switches 62 and 62a is mounted on a support 63 extending from support 31 for actuation by magnets 60 and 60a, respectively. The switch 61 is arranged to be closed when the arm 49 is pivoted in a clockwise direction to an extreme position as shown in FIG. 5. Switch 62 is arranged to open whenever the magnet 60 is spaced therefrom by a movement of the arm 49 in a clockwise direction of more than 1° from its counterclockwise extreme position, and switch 62a is arranged to close when the arm 49 returns to the substantially horizontal position of FIG. 6. Micro-switch 43 is arranged to open when the table 34 is lowered to its extreme lowermost position as shown in FIG. 3.

As indicated briefly above, chamber 30 is selectively sealingly closed by door 28. As shown in FIG. 2, a conduit 64 extends through cabinet 26 to communicate with chamber 30 and is connected by a suitable X-fitting 65 to a first solenoid operated valve 66 for venting the conduit 64 to atmosphere, a second solenoid operated valve 67 for venting slowly the conduit 64 through a small orifice 68 to the atmosphere, and a third solenoid operated valve 69 for connecting the conduit 64 to a suitable vacuum pump (not shown). Also extending through the cabinet 26 is a second conduit 70 connected through a fourth solenoid operated valve 71 to a tube 72 connected to a gauge 73 indicating the absolute pressure within chamber 30, illustratively indicating the pressure in inches of mercury. A panel 74 may be secured to the cabinet 26 at the rear thereof for carrying a plurality of relays 83, 96, 98 and 101. As shown in FIG. 1, an additional control 79 may be mounted on the side of the machine 10.

Vacuum determining apparatus 24 may be utilized independently of a packaging machine, such as packaging machine 10, as by manual placement of selected packages therein. However, in illustrating the invention, the operation of apparatus 24 in association with machine 10 to provide an automatic control of the machine will be described, it being understood that the functioning of the apparatus 24 is generally similar in either circumstance. More specifically, as shown in FIG. 9, the electrical control of the machine 10 and apparatus 24 is initially by means of a momentarily closed switch 80 connected to one power lead L1 and through a pair of normally closed timer switches 81a and 82a to a relay coil 83 connected to the other power lead L2 and a counter coil 84 connected in parallel with coil 83 to lead L2. Switch 80 comprises a single pole switch mechanically driven by the packaging machine 10 to close once during a preselected number of cycles of the machine 10; herein the preselected number of cycles comprises the product of a whole number and the number of stations or cavities 17 plus or minus one. The whole number is merely a convenience factor which is a function of the relative speed of the machine 10 and the rate at which the apparatus 24 may effect a pressure determination. Control switch 80 may be disposed within control 79 and also within control 79 is provided a double pole selector switch 85 which

is similarly mechanically driven by the machine 10 to vary positions of the movable contacts 86 and 87 thereof uniquely corresponding to each of cavity stations 17. In the illustrated embodiment the drum 16 is provided with sixteen cavities, or stations, 17. However, to simplify the understanding of the operation, it will be assumed that the drum is provided with only two cavities which may be effected with the drum, as shown, by suitably spacing the meat products 11 prior to their delivery to the machine 10 so that only the pair of diametrically opposite cavities are actually employed. Where the meat products are delivered to the machine so that each cavity is utilized, the operation of the machine can be determined by a simple extrapolation from the following description. Thus, assuming a convenience factor of one, the switch 80 is arranged to close momentarily every third cycle of the machine. The closing of switch 80 energizes coil 83 which closes its associated contacts 83a to hold this circuit in after switch 80 opens and at the same time the counter coil 84 is energized. As the package 13 drops from the chute 23, it engages a normally open switch 88 which is connected through contacts 83a to power lead L1 and to a relay coil 89 connected to power lead L2. Relay coil 89 in turn closes its normally open associated contacts 89a. The closing of contacts 83a and 89a energizes a solenoid valve 90 connected from power lead L2 thereto through a set of normally closed relay contacts 91a. Solenoid valve 90 operates the pusher 25, illustratively comprising a hydraulic ram, to push the selected package 13 from the conveyor 15 into the chamber 30 of the apparatus 24.

When the selected package is positioned in place on the table 34 it closes a normally open switch 92 carried on the rear wall of the cabinet 26. The closing of switch 92 energizes a relay coil 91, thereby opening contacts 91a associated therewith, and concurrently energizes a latch coil 93 connected in parallel with coil 91 to power lead L2. The opening of contacts 91a de-energizes the ram solenoid valve 90 allowing the pusher to return to its original position. At the same time, coil 91 operates a second set 91b of contacts associated therewith to energize another solenoid valve 94 controlling the door mechanism 29 to move the door to a closed position across the chamber opening 27. A third set of normally open contacts 91c associated with coil 91 is closed by the energization thereof to hold in the circuit to this coil.

When the door 28 closes, it operates a switch 95 to energize a relay coil 96 which closes an associated set of normally open contacts 96a to hold coil 96 energized. At the same time, the closing of switch 95 energizes the solenoid valve 69. A second set of normally open contacts 96b associated with coil 96 are closed by the energization of the coil to energize a 25-second timer 97.

After the package 13 enters the chamber 30 and the door 28 closes the chamber 30, an automatic elevation of the package may be effected to dispose the package in the position of FIG. 4 prior to the determination of the vacuum condition. This may be done to accommodate packages having different thicknesses, so that in each instance the movement of the plastic sheet away from the product will be from a single horizontal plane, thereby eliminating errors in the measurements as the result of different angular positions of the arm 49. To this end the forward windings F of the motor 37 are connected to power lead L1 through a set of normally open contacts 96c associated with coil 96 and through a set of normally closed contacts 122b associated with coil 122. Thus, when coil 96 is energized, the motor is automatically operated to raise the table 34 until such time as switch 62 opens. The opening of switch 62 is adjusted so that the arm 49 will be substantially at the position of FIG. 4 at this time.

Upon completion of the pressure determination, it is desirable to lower the table 34 automatically to the position of FIG. 3. This is effected by connecting the reverse

windings R of the motor 37 to the power lead L1 through normally closed contacts 83d associated with coil 83 and switch 43 which allows the motor 37 to return the table fully to retracted position.

As discussed above, solenoid valve 69 is connected to a suitable vacuum pump (not shown) so that opening of the valve 69 effects an evacuation of chamber 30 lowering the pressure thereof. Assuming that the package 13 tested has a gross leakage condition, such as caused by an incomplete seal, no seal, a channel due to a fold in the plastic sheeting, a hole in the sheeting due to a cut, tear, flaw in the material or the like, the pressure within chamber 30 does not drop below the pressure within the package and thus the package remains in the condition of FIG. 4. As arm 49 is not pivoted by any expansion of the package, switch 61 remains open, thereby maintaining coil 98 de-energized thereby maintaining contacts 98a associated with coil 98 normally closed and when contacts 97a are closed by operation of coil 97 after a twenty-five second delay, relay coil 99 is energized through normally closed contacts 98b associated with coil 98. Energization of coil 99 closes a set of normally open contacts 99a associated therewith to indicate the defective package as discussed in greater detail subsequently.

In the event that the package 13 does not have a gross leakage but merely a minor leak, an expansion of the enclosure 21 will occur as the pressure in the chamber 30 drops. When the enclosure expands sufficiently to pivot the arm 49 substantially above the horizontal position, switch 61 will be closed by the magnet 59 thereby energizing coil 98.

Energization of coil 98 opens contacts 98a thereby de-energizing solenoid valve 69 and preventing further evacuation of the chamber. At the same time, closing of contact 61 energizes solenoid valve 67 to slowly vent the chamber through the small orifice 68. To preclude de-energization of coil 98 normally open contacts 98c are associated therewith in parallel with switch 61.

As shown in FIG. 5, the switch 61 is not actuated until the enclosure 21 is distended to become spaced substantially from the upper surface 100 of the meat product 11. This assures elimination of cohesion forces between the relatively sticky meat surface 100 and the plastic material of the enclosure and assures an accurate subsequent determination of the vacuum condition. More specifically, as the vacuum pressure is slowly released in chamber 30, the enclosure retracts to the position of FIG. 6 wherein the arm 49 is substantially horizontal. Thus, the magnet 60a closes the switch 62a thereby energizing relay coil 101. Energization of coil 101 opens normally closed contacts 101a associated therewith to deenergize solenoid valve 71 thereby holding the reading of the pressure on the gauge 73. It should be noted that the energization of coil 83 at the initiation of the operation closed its associated contacts 83b at that time to energize the solenoid valve 71 through the normally closed contacts 101a.

A set of normally open contacts 101b associated with relay coil 101 is closed by the energization thereof to complete the circuit to a pressure switch 102 which is closed whenever the pressure is less than approximately one inch of mercury absolute. When the determined pressure is less than the pressure setting of switch 102, the closing of both contacts 101b and contacts 102 energizes a relay coil 103 and a 2-second timer coil 81 in parallel. The energization of coil 103 closes normally open contacts 103a associated therewith, thereby energizing the reset coil 105a of a stepping relay 105 which is provided to indicate the total machine failures, and through selector switch 85 the reset coil 106a of a stepping relay 106 or the reset coil 107a of a stepping relay 107 depending on which of the two stations the package being tested was sealed in. After two seconds the normally closed contacts 81a associated with the two second timer coil 81 opens, thereby de-energizing coil 83 which

in turn effects successive deenergization of coils 96, 98, 101, 99 and 91.

In the event that the determined pressure is greater than the pressure setting of the switch 102 or switch 99a is closed as a result of the determination of a gross defect as discussed above, the two second timer coil 82 is energized as a result of a normally closed switch 109 remaining closed (switch 109 opening only when the pressure is less than approximately one inch of mercury absolute). Switches 102 and 109 may comprise a single double throw micro-switch. Thus, an alarm bell 110 is energized and rings for two seconds. The stepping coil 105b of stepping relay 105 is energized concurrently with coil 82 and bell 110 to advance the stepping relay 105 one step. Also concurrently, the counter coil 111 is energized. Depending upon the position of switch 85 either counter coil 112 and the stepping coil 106b of stepping relay 106 is energized or counter coil 113 and the stepping coil 107b of stepping relay 107 is energized. Whenever the stepping relay 106 or the stepping relay 107 advances one step, a lower moving contact 106c or 107c of the respective relays completes a circuit to an indicating lamp 114 or 115, respectively, associated therewith to indicate that the last one, two or three packages from that station were defective. However, if a satisfactory package is found from that station before three successive defective packages are found, the resetting coil 106a or 107a of the respective relay resets the relay to turn the light off.

If any of the three stepping relays 105, 106 or 107 advances the full three steps, a relay coil 116 is energized. Energization of relay coil 116 provides an indication of the successive determination of defective packages, herein this indication comprises an interruption of the operation of machine 10 by suitable interruption of the electrical power feed thereto, thus permitting inspection of the machine to determine the cause of the continuing defects. Conjunctively or alternatively, an audible or visual signal may be utilized. Thus, operation of the machine 10 is automatically discontinued whenever either a preselected number of consecutive defective packages, herein three, are received from the machine or a preselected number of consecutive defective packages, herein three, are received from a particular station of the machine.

After two seconds, the two second timer 82 opens its normally closed contact 82a thereby de-energizing relay coil 83 and successively de-energizing coils 96, 98, 101, 99 and 91 as occurs when contact 81a opens.

When relay coil 83 becomes de-energized, a normally closed contact 83c associated therewith closes to energize the vent solenoid valve 66 allowing the pressure inside chamber 30 to quickly reach atmospheric pressure and thereby release the sealing force against the door 28. A switch 117 actuated by the pressure of the door when a vacuum condition obtains in chamber 30 is released to open thereby de-energizing solenoid valve 66 and energizing door valve 94 stopping the vent operation and raising the door 28. When the door 28 is in its uppermost position, a switch 118 closes to energize solenoid valve 119 and operates a second pusher 25a to push the package 13 from the chamber back onto the conveyor 15. When the package 13 leaves the chamber, a switch 120 closes, energizing a release coil 93 of the latching relay of which coil 93a comprises the latching coil. Energization of coil 93 releases the latching relay to permit the contacts 93b thereof to open.

To permit resetting of the latching relays by the operator when desired, a reset push button switch 108 may be provided in parallel with contacts 103a.

A pressure switch 125 may be mounted in the chamber 30 and connected in parallel with contacts to energize coil 99 in the event that the pressure drops to a preselected low value, herein substantially lower than approximately one inch of mercury. Thus, the various stepping relays and indicating devices discussed above are ener-

gized and the testing cycle stopped in a manner similar to that discussed above relative to the closing of contact 97a.

Thus, in brief recapitulation, the invention comprehends an improved method of determining a vacuum condition within a flexible sealed package, such as plastic, foil, and laminated packages, tin cans, etc., by causing a distention of the enclosure to space a preselected portion thereof from the object packaged therein and incompletely retracting the distended enclosure to a preselected arrangement wherein the enclosure is close to but spaced from the object. The pressure determination is then made by determining the pressure condition within the chamber wherein the package is disposed at this time. The invention further comprehends an improved coordinated control of a forming machine wherein automatic testing of predetermined regular selected packages is effected, the results of the individual determinations being coordinated one with the other to effect an indication which as discussed above may comprise a visual alarm, an auditory alarm, or an automatic discontinuation of operation of the forming machine in the event that a preselected number of consecutive defects either from the machine as a whole or from a selected station are found.

Having described my invention as related to the embodiment shown in the accompanying drawing, it is my intention that the invention be not limited by any of the details of description, unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

I claim:

1. The method of determining the vacuum condition within a package having a sealed flexible enclosure, comprising the steps of: disposing the enclosure within a chamber; reducing the pressure within the chamber to substantially below the pressure within the package to distend the enclosure; increasing the pressure to permit a retraction of the enclosure toward the undistended arrangement; and determining the pressure within the chamber when the enclosure is in a preselected incompletely retracted arrangement.

2. The method of determining the vacuum condition within a package having a sealed flexible enclosure, comprising the steps of: disposing the enclosure within a chamber; reducing the pressure within the chamber to substantially below the pressure within the package to distend the enclosure; increasing the pressure to permit a retraction of the enclosure toward the undistended arrangement; and determining the pressure within the chamber when the enclosure has a configuration substantially corresponding to the configuration thereof when the pressure within and without the enclosure is atmospheric.

3. The method of determining the vacuum condition within a package having a sealed flexible enclosure enveloping an object and including a portion touching the object, comprising the steps of: disposing the enclosure and enveloped object within a chamber; reducing the pressure within the chamber to substantially below the pressure within the package to distend the enclosure and thereby space said portion of the enclosure from the object; increasing the pressure to permit a retraction of the enclosure; and determining the pressure within the chamber when said portion of the enclosure is closely juxtaposed to the object.

4. The method of determining the vacuum condition within a package having a sealed flexible enclosure, comprising the steps of: disposing the enclosure within a chamber; adjusting the position of the enclosure to dispose a portion thereof at a preselected plane; reducing the pressure within the chamber to substantially below the pressure within the package to distend the enclosure and thereby move said portion beyond said plane; increasing the pressure to permit a retraction of the enclosure to return said portion toward said plane; and determining the pressure within the chamber when said portion is

in a preselected position spaced from said plane.

5. The method of claim 4 wherein said plane is horizontal and said portion is disposed at said plane by raising the enclosure.

6. The method of claim 4 wherein the pressure is maintained constant for a preselected period of time when said portion is in said preselected position.

7. The method of determining the vacuum condition within a plurality of packages each having a sealed flexible enclosure, comprising the steps of: moving the packages seriatim in a preselected path; removing a first package from the path; disposing said first package within a chamber; reducing the pressure within the chamber to substantially below the pressure within the enclosure to distend the same; increasing the pressure to permit a retraction of the enclosure toward the undistended arrangement; and determining the pressure within the chamber when the enclosure is in a preselected incompletely retracted arrangement; removing said first package from the chamber; removing a second package from the path; disposing said second package within the chamber; reducing the pressure within the chamber to substantially below the pressure within the enclosure of said second package to distend the same; increasing the pressure to permit a retraction of the enclosure of the second package toward the undistended arrangement; determining the pressure within the chamber when the enclosure of the second package is in a preselected incompletely retracted arrangement; and removing said second package from the chamber.

8. The method of determining the vacuum condition within a plurality of packages each having a sealed flexible enclosure, comprising the steps of: moving the packages seriatim in a preselected path; removing a first package from the path; disposing said first package within a chamber; reducing the pressure within the chamber to substantially below the pressure within the enclosure to distend the same; increasing the pressure to permit a retraction of the enclosure toward the undistended arrangement; determining the pressure within the chamber when the enclosure is in a preselected incompletely retracted arrangement; removing said first package from the chamber; removing a second package from the path; disposing said second package within the chamber; reducing the pressure within the chamber to substantially below the pressure within the enclosure of said second package to distend the same; increasing the pressure to permit a retraction of the enclosure of the second package toward the undistended arrangement; determining the pressure within the chamber when the enclosure of the second package is in a preselected incompletely retracted arrangement; removing said second package from the chamber; removing a third package from the path; disposing said third package within the chamber; reducing the pressure within the chamber to substantially below the pressure within the enclosure of said third package to distend the same; increasing the pressure to permit a retraction of the enclosure of the third package toward the undistended arrangement; determining the pressure within the chamber when the enclosure of the third package is in a preselected incompletely retracted arrangement; removing said third package from the chamber; and providing an indication whenever the pressures determined are all above a preselected pressure.

9. The method of determining the vacuum condition within a plurality of packages each having a sealed flexible enclosure, comprising the steps of: moving the packages seriatim in a preselected path; removing a first package from the path; disposing said first package within a chamber; reducing the pressure within the chamber to substantially below the pressure within the enclosure to distend the same; increasing the pressure to permit a retraction of the enclosure toward the undistended arrangement; determining the pressure within the chamber when the enclosure is in a preselected incompletely retracted arrangement; removing said first package from the chamber; removing a second package from the path; disposing said second package within the chamber; reducing the pressure within the chamber to substantially below the pressure within the enclosure of said second package to distend the same; increasing the pressure to permit a retraction of the enclosure of the second package toward the undistended arrangement; determining the pressure within the chamber when the enclosure of the second package is in a preselected incompletely retracted arrangement; removing said second package from the chamber; removing a third package from the path; disposing said third package within the chamber; reducing the pressure within the enclosure of said third package to distend the same; increasing the pressure to permit a retraction of the enclosure of the third package toward the undistended arrangement; determining the pressure within the chamber when the enclosure of the third package is in a preselected incompletely retracted arrangement; and causing a discontinuation of the moving of said packages as a result of a determining of a pressure above a preselected pressure in each of said chamber-pressure-determining steps.

10. The method of determining the vacuum condition within a package having a sealed flexible enclosure, comprising the steps of: disposing the enclosure within a chamber; reducing the pressure within the chamber toward a preselected pressure substantially below the pressure within the package to distend the enclosure; and stopping the reducing of the pressure at a second preselected pressure lower than the first named preselected pressure in the event that the enclosure does not distend to a preselected degree as a result of the reducing of the pressure.

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