May 9, 1950 S. BERGSTEIN 2,506,769

METHOD OF FILLING AND SEALING A CONTAINER PUNCTURED AT TWO SPACED POINTS FOR INTRODUCTION OF INERT GAS AND DISCHARGE OF INTERNAL AIR

Filed Sept. 9, 1944 2 Sheets-Sheet 1

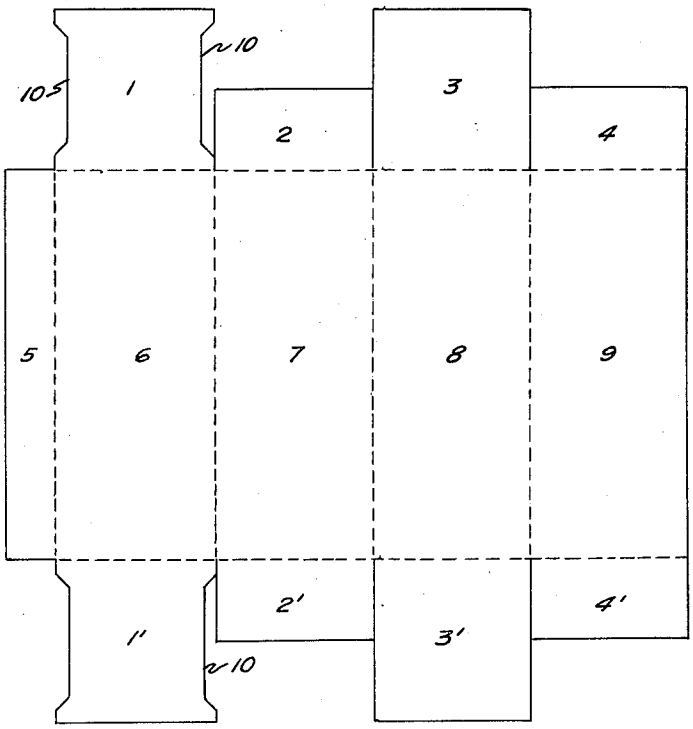


FIG. 1.

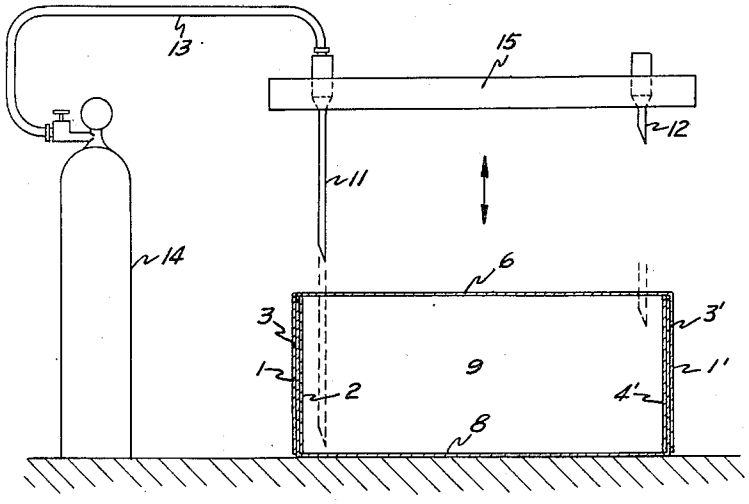


FIG. 2.

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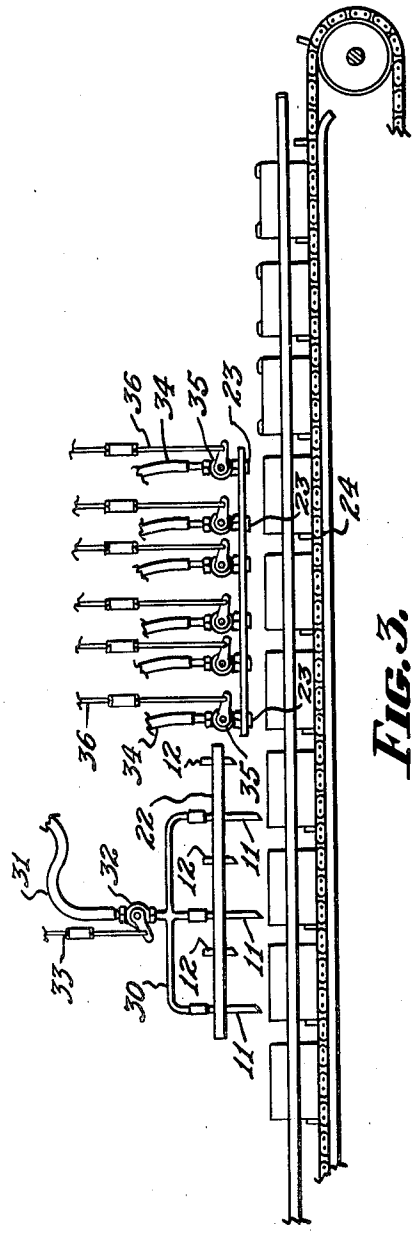


FIG. 3.

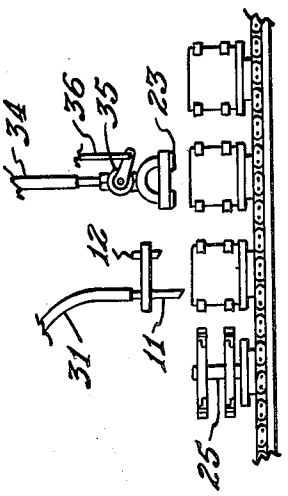


FIG. 4.

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METHOD OF FILLING AND SEALING A CONTAINER PUNCTURED AT TWO SPACED POINTS FOR INTRODUCTION OF INERT GAS AND DISCHARGE OF INTERNAL AIR

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Application September 9, 1944, Serial No. 553,374

6 Claims. (Cl. 226—19)

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My invention lies in the field of hermetically sealed, gastight containers, holding, along with the contents, a protective gas other than atmospheric air.

It is an object of this invention to provide such gas filled packages by a simple and inexpensive procedure which is adapted to hand, semi-automatic or fully automatic operation.

The principal specific object of this invention is the provision of an improved gas exchange process adapted to such containers, and particularly to flexible-walled containers.

These and other objects of the invention which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications, I accomplish by that certain procedure and mechanism of which I shall now describe an exemplary embodiment. Reference is made to the drawings wherein:

Figure 1 is a plan view of a carton blank for a package made in accordance with my invention.

Figure 2 shows a package in cross section together with a diagrammatic illustration of mechanism for gassing it.

Figure 3 is a diagrammatic elevational view of an operation in which containers are moved along on a conveyor.

Figure 4 is a diagrammatic elevational view of an operation in which containers are engaged in cages.

In a co-pending application, entitled a Method of making gas-filled flexible containers, Serial No. 557,984, filed October 10, 1944, now Patent No. 2,442,161, dated May 25, 1948, I have taught a process of producing flexible walled, gas filled packages, which comprises enclosing the desired contents in a suitable container of that class, forming a gas-tight skin continuously over the whole outer surface of the container, puncturing both the skin and the package wall, effecting an exchange of the air in the package for a desired protective gas, and afterward repairing the puncture in the gas-tight skin. The present invention is applicable to such a process and relates primarily to the means and method for effecting gas exchange.

As in the said co-pending application, the nature of a flexible walled package itself may be considerably varied. It may be a paper-board carton, or a bag, or combination of the two, or any of various plural walled packages. It may be a paper-board carton having an exterior wrapping of cellophane or other non-felted film

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to assist in rendering the package gas-tight and in the formation of the gas-tight skin.

The gas-tight skin is primarily formed by dipping the package in thermo-plastic material having good film forming characteristics and good resistance to the passage of gas, moisture, vapors, and the like. A suitable film forming substance is set forth in my said co-pending application.

When gas exchange has been effected, the resealing is accomplished by repairing the skin with a similar or compatible film forming substance, by applying such a substance directly over the perforation.

These structures and procedures lie in the field to which this invention is addressed, but otherwise do not form a limitation on it. For a fuller description of them reference is made to aforesaid patent.

In the present invention I accomplish the gassing of such, and other gas-tight packages without the use of gassing chambers, vacuum, or any procedure which subjects the flexible walls of my packages to distorting pressures. I also accomplish gas-exchange with a minimum of apparatus.

Briefly in the exemplary practice of my invention, I puncture the skin and wall of a flexible, gas-filled package in such manner as to provide both an inlet for the desired protective gas and an outlet for the initial atmosphere. Two punctures may be made, one being for each purpose. In other instances the means for introducing the gas is of such character that an escape route is provided for the internal atmosphere, suitably isolated from the inlet route for the protective gas, but requiring only one perforation.

I introduce the protective gas at a point in the container as far as possible from the point of escape for the atmosphere; and I have found that when this is done, the gas may be introduced rapidly so as to effect a complete gas exchange without subjecting the flexible walls of the container to any substantial internal pressure. The means used to introduce the gas are long, narrow, pointed, hollow needles which may likewise be used for puncturing both the skin and the container walls. One such hollow needle is connected with a supply of the desired protective gas, controlled by suitable valve means.

As shown in Figure 1, in forming one of my packages, I may provide a carton blank such as that described in my co-pending application entitled Cartons for sealing by immersion, Serial No. 538,764, filed June 5, 1944, now Patent No. 2,412,031, dated December 3, 1946, and comprising en-

closing body walls 6, 7, 8 and 9 in articulation together with a glue flap 5. End closure flaps indicated at the top at 1, 2, 3 and 4 and at the bottom by the same numbers primed, are articulated to the body walls. Such a carton blank may be tubed in the ordinary way by gluing the flap 5 to the edge of the wall 9. When squared up, it may be closed upon one end by folding over flaps 2 and 4, then flap 1 and finally flap 3 with the interposition of adhesive therebetween. The carton may then be filled with the desired contents and closed upon the other end in like manner.

This carton is one especially useful for sealing by immersion because the relieved portions shown at 10 of the intermediate flaps 1 and 1', form grooves which become filled with plugs of the sealing substance bridging the gap between the inner and outer flaps.

After a coating or skin has been formed on the package, the next step in the form illustrated in Figure 2, is to make two spaced apertures or openings in the hermetically sealed package. These may be made by means of hollow needles 11 and 12, the first of which is connected by a suitable flexible tubing 13 or other means, to a source of supply of the desired inert gas, which for example, may be a metal tank 14 of carbon dioxide or nitrogen, and is provided with the usual valve controls for regulating the flow of gas through the tubing and for controlling the pressure. The needle 12 forms another aperture which is open to the outside air through the hollow of the needle 12. The inert gas under pressure is introduced into the interior of the package through the hollow needle 11 and the flow of gas is allowed to continue until it has forced out through the other needle all of the air within the package.

It will be noted in Figure 2 that the openings have been spaced widely apart but are on the same panel or surface of the container.

However, I have found that arranging to have the inlet of the inert gas at as great a distance as possible from the outlet (in terms of the path of gas flow) provides a more thorough and more rapid removal of the internal air.

In Figure 2 the hollow needle 11 projects sufficiently into the package so that its opening is located almost at the base of the package, whereas the needle 12 making its opening at the opposite end of panel 6 enters the package only slightly. The path of gas flow therefore is from a low point at one end of the package to a high point at the opposite end, and extends almost the maximum distance possible within the confines of the package.

My procedure may be modified, depending upon the nature of the contents of the package. When the package contains loose or granular contents, for example cereals, I have found that the needles may be used without difficulty and without injury to the contents. There are interstices between the granules or such substances, and an arrangement providing the maximum possible distance between the inlet and outlet points makes for the most rapid circulation of the inert gas and consequently for the most rapid evacuation of the internal air. With packages the size of the average cereal container, the removal of the internal air under the pressure of the entering inert gas takes place readily in a matter of seconds. There is a direct relationship between the cubic volume of the package, the nature of the contents and the volume and pressure of the inert gas introduced. It is not difficult, however, to determine experimentally the time cycle required to achieve the desired concentration of the inert gas within the package; and then the cycle can be repeated with exactly duplicating results.

For other types of contents it may be necessary to introduce the needles at particular points to avoid injury to the contents; and again, with types of contents permeated with air, but not providing ready paths for gas circulation, a longer treatment may be required, or even several treatments to allow diffusion to play its part in the removal of the internal atmosphere.

For purposes of illustration, the invention has been shown in a simple form in Figure 2; but the process is capable of ready mechanization on packaging lines. I have shown the needles 11 and 12 mounted on a common bar or support 15, which may be made movable in the directions of the arrow. When a package (moving or stationary) is brought into proper relation with the support, it may be lowered mechanically, forming the two openings in predetermined positions. The packages may be moved on a conveyor 24 in Fig. 3 or engaged within cages 25 in Fig. 4 as is customary in the packaging art for closing and sealing. Large groups of packages may be treated simultaneously, i. e., a number of package units may be brought under a framework 22 in Fig. 3 containing a suitable number of the needles, as will be readily understood. The needles 11 in Figure 3 are shown mounted in a gang, supplied with gas through the conduit 31, valve 32 controlled by linkage 33, and the branch fitting 30.

After the package has been filled with inert gas, the two openings are resealed hermetically as has been described above. The methods of resealing may be those described in my co-pending application to which reference has been made above, or there may be other methods appropriate to the nature of the container. Where two apertures are employed the location of them on one panel or one surface simplifies the resealing operation, as will be clear. In Figure 3 the nozzles 23 are supplied from the conduits 34 through the valves 35, controlled by the linkages 36. Similar elements are given corresponding reference numerals in Figure 4.

In the adaptation of the invention to packaging procedures wherein the containers are brought successively into position for operation, the reclosure of the apertures can readily be carried out as part of the same series of operations. Whether the packages are treated in single units or in groups of units, spaced nozzles 23 in Figures 3 and 4 may be provided to eject the sealing medium to cover the aperture or apertures.

The perforation or perforations in the container may, if desired, be preformed by other means than the needles themselves.

It will be apparent from the foregoing description that my invention can be carried out with a minimum of apparatus and with the highest efficiency at extremely low cost. In the metal can industry for example, it has been common practice to achieve the desired internal concentration of inert gas by first vacuumizing the can and thereafter permitting the inert gas to flow into it. In many cases it is necessary to repeat these operations in order to attain the desired high concentration of inert gas. It is impossible to accomplish gassing under these circumstances without the use of a completely closed chamber unless the can is made of exceptionally heavy material to withstand the pressures and to prevent

collapse. Flexible packages, because of the tendency to collapse when vacuumized, cannot be successfully treated in this manner at all without the use of a vacuum chamber. Vacuum chambers represent considerable expense and complication in packaging the lines. Furthermore, the highest vacuum that can normally be drawn in commercial practice is around 29 inches. This leaves a substantial percentage of air remaining in the package. By my invention, not only is the vacuum chamber apparatus eliminated, but I have found by test that I achieve a higher concentration of inert gas within the package.

Modifications may be made in my invention without departing from the spirit of it.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A method of packaging which includes providing a flexible-walled sealable container, enclosing contents therein, rendering the container gas-tight, thereafter forming two apertures therein, and introducing inert gas under pressure through one of the apertures until the internal air has been substantially removed through the other of said apertures, and thereafter hermetically sealing both apertures.

2. The method of claim 1 wherein the inert gas is introduced through a hollow needle-like means inserted through one of said apertures in such a manner as to provide a longer path between the gas introduction and air removal points.

3. A method of packaging which includes enclosing contents in a flexible walled container, rendering said container gas-tight, puncturing said container by means of spaced hollow needles, injecting an inert gas through one of said needles while permitting the escape of internal air through the other, withdrawing said needles and thereafter resealing the opening formed thereby.

4. The method claimed in claim 3 wherein one of said needles is introduced into the container a greater distance than the other whereby to increase the path of gas travel.

5. A process of packaging which includes enclosing contents in a flexible walled container, forming about said container a continuous gas-tight skin, puncturing said skin and said container to form an opening for the entrance of inert gas, and an opening for the exit of internal atmosphere, introducing gas into said container through said first mentioned opening while permitting escape of internal air through the other opening and, after effecting gas exchange, resealing said container by repairing said skin over any perforation therein.

6. A method of packaging which comprises providing a flexible-walled sealable container, enclosing contents therein, sealing the container in a gas-tight condition, forming a pair of apertures therein by puncturing a wall with hollow needle-like means, and introducing inert gas under pressure through one of said apertures so as to drive out the internal air through the other, while causing the point of introduction of the gas to be spaced within the container from the point of removal of the air, and thereafter hermetically sealing both apertures in said container

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