

Oct. 29, 1963

F. B. SHAW ETAL
METHOD OF PACKAGING FOOD

3,108,881

Filed March 5, 1959

FIG. 1

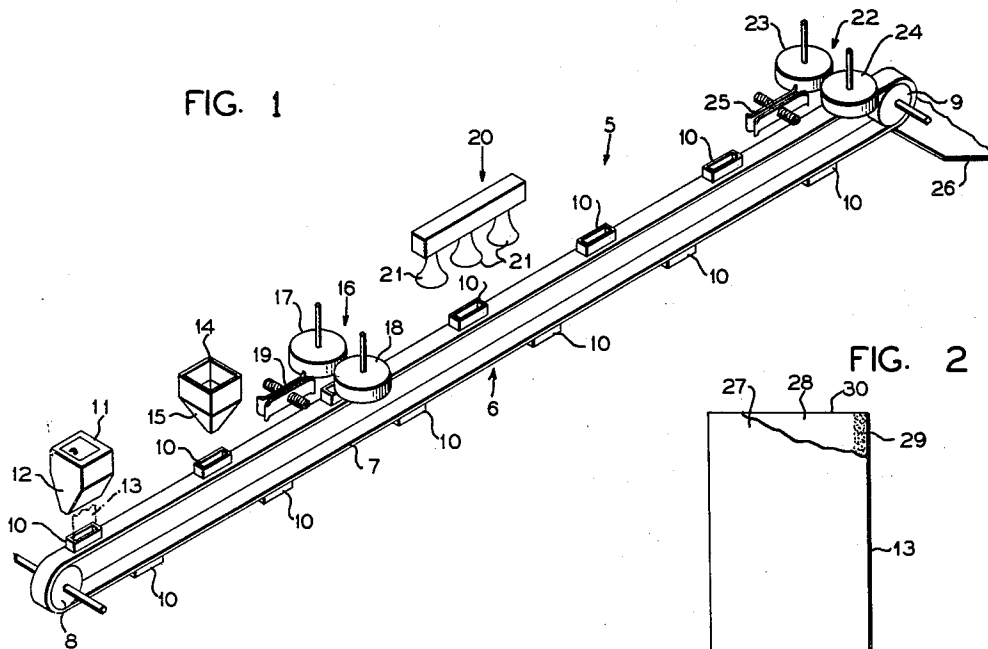


FIG. 2

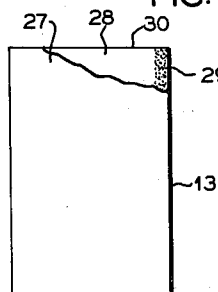


FIG. 3

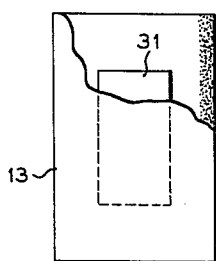


FIG. 4

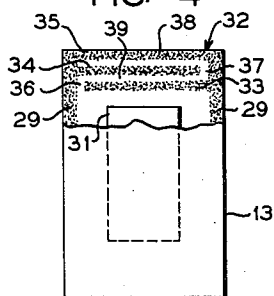


FIG. 5

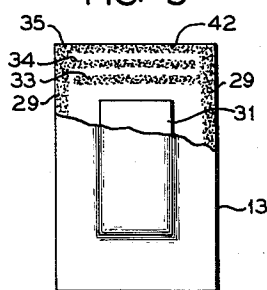
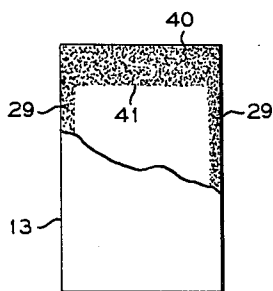


FIG. 6



FRED B. SHAW
FLORREN E. LONG
ROBERT A. ROOF
INVENTORS

BY
Max. Porter, Allen & Stewart
ATTORNEYS

1

3,108,881

METHOD OF PACKAGING FOOD

Fred B. Shaw, Mount Vernon, and Florren E. Long,
Fredericktown, Ohio, and Robert A. Roof, Whittier,
Calif., assignors to Continental Can Company, Inc.,
New York, N.Y., a corporation of New York
Filed Mar. 5, 1959, Ser. No. 797,527
11 Claims. (Cl. 99—171)

The invention relates generally to the art of packaging food and primarily seeks to provide a novel method of packaging foods in flexible bags in a manner wherein the food is sealed in the bag against contamination and air has been purged from the bag prior to sealing.

At the present time commercially vacuum packaging in flexible containers is accomplished primarily by one or the other of two basic methods. In the first of these methods, the product is placed in an open mouth flexible container after which the container, which is normally in the form of a pouch or bag, has the mouth thereof mechanically gripped and closed about an inserted hollow probe or snorkle. The hollow probe or snorkle is attached to a pumping system which evacuates the gases, including air, from the container. A heat seal is then applied to the mouth of the container as the probe is withdrawn, in such a manner and with such timing as not to allow leakage of air back into the container. The sealed filled container is then essentially free of any gaseous content and, commercially, the interior of the container is considered to be a vacuum where not occupied by solid, liquid or both.

In the other commercial vacuum packaging method, open mouth flexible containers are first filled and then with their mouths unsealed, one or more filled containers are placed in a receptacle. The receptacle is then sealed and evacuated by mechanical means. When the total volume of the receptacle has been reduced to a commercial vacuum, the evacuated containers are then sealed by a sealing device contained within the evacuated receptacle, but remotely controlled. After all of the containers have been sealed, the vacuum in the receptacle is then broken and the sealed, filled containers are removed.

In neither of the above outlined methods of vacuum packaging is heat applied to the contents of the containers during the sealing operation. For that reason, if it is desired to either pasteurize or sterilize the contents of the containers a further heating or irradiation step is required.

It is therefore the primary purpose of the invention to provide a novel commercially feasible method of vacuum packaging products in flexible containers wherein the packaging may be quickly accomplished utilizing extremely simple equipment thus eliminating presently required costly equipment and time consuming operations.

Another object of the invention is to provide a commercially feasible method of vacuum packaging products in flexible containers, the packaging steps of the method being of such a nature whereby they may be automatically carried out on a conveyor line basis thereby making the method of packaging one feasible for mass production operations.

Still another object of the invention is to provide a simple and effective method of vacuum packaging products in pliable or flexible bags, the method of packaging being of a nature whereby the bags may be seated on a conveyor or suspended from a conveyor, either by means of a clamp or a hook which may be passed through an aperture in each bag, and while the bags are so supported the desired fill may be placed into the bags, air purged from the bags and the bags completely sealed with the interiors of the bags being a vacuum except for the product contained in the bags.

A further object of the invention is to provide a novel

2

and extremely simple method of vacuum packaging products such as food in a flexible plastic bag, the method of packaging including a single heating step wherein the product, if desired, is pasteurized and air purged from the bag, the heating step being of such a nature whereby it may be readily accomplished in numerous simple ways including the passage of the filled bag past a battery of infra-red lamps and the passage of the filled bag through an oven.

In accordance with the invention it is proposed to provide a novel method of packaging products in flexible plastic pouches or bags wherein a product to be packaged is placed in the bag through an open mouth of the bag, together with such liquid as may be required to fill the bag with vapor, after which the mouth of the bag is partially sealed to define a tortuous vent passage. Then the bag and its contents are heated to vaporize the liquid thus purging air from the bag after which the bag is permitted to cool with the result that atmospheric pressure acting on the vapor condensate through the resilient wall of the container will close the vent passage and temporarily seal the bag. Finally, the bag is completely sealed. In view of the fact that the bag is formed of a suitable plastic such as a polyester resin film sold under the trade name "Mylar," polyolefin laminate, etc. the heat sealing of the bag may be readily and quickly accomplished. Since the filling operation may be carried forth in the customary manner and since the heating of the bag and its contents may be accomplished in a continuous operation or in an oven, as desired, it will be readily apparent that there has been devised a commercially feasible method of vacuum packaging products of all types, including food-stuff, on an assembly line basis at very low expense both in providing the original equipment and in the packaging operation.

A still further object of the invention is to provide a flexible plastic bag for use in vacuum packaging products including food-stuffs, the plastic bag having a partial seal defining a vent passage, the vent passage being tortuous so as to permit air to escape from the bag under pressure and at the same time be conducive to the formation of vapor condensate therein to automatically temporarily seal the bag.

With the above, and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawing.

In the drawing:

FIGURE 1 is a schematic view showing an apparatus for carrying forth the vacuum packaging of a product on a continuous conveyor line basis in accordance with the invention.

FIGURE 2 is a plan view on an enlarged scale of the bag used in the vacuum packaging method with portions of the bag broken away.

FIGURE 3 is a plan view similar to FIGURE 2 of the bag with the product to be packaged disposed within the bag.

FIGURE 4 is a plan view similar to FIGURE 2 of the bag after the open mouth thereof has been for the most part closed by a partial seal to define a tortuous vent passage.

FIGURE 5 is a plan view similar to FIGURE 2 of the bag after the mouth of the bag has been permanently completely sealed.

FIGURE 6 is a plan view similar to FIGURE 4 and shows a bag identical to that of FIGURE 2, but with a modified form of partial seal defining a differently shaped vent passage.

In the example of embodiment of the invention herein disclosed, the vacuum packaging operation is practiced on a conveyor line basis, as is best illustrated in FIG-

3

URE 1, by utilizing an apparatus which is referred to in general by the reference numeral 5. The apparatus 5 includes a suitable endless conveyor 6 which is formed of an endless belt member 7 entrained over a pair of spaced rollers 8 and 9. For descriptive purposes, the roller 8 may be considered a drive roller and the roller 9 a driven roller. The roller 8, of course, may be driven in any desired manner. Suitably secured to the endless belt member 7 are spaced bag holders 10 which are illustrated in the form of cups.

Overlying the conveyor 6 at the left end or receiving end of the conveyor is a bag dispenser 11 which is provided with a chute 12 for directing individual containers in the form of bags or pouches 13 into each of the bag holders 10 as the individual bag holder passes beneath the bag dispenser 11. The bag dispenser 11 may be of any desired type and will be operated in timed relation to the operation of conveyor 6.

Positioned to the right of the bag dispenser 11 is a product or article dispenser 14 having a delivery chute or spout 15 for directing a desired quantity of the product to be packaged into the individual bags 13 as they pass under the product dispenser 14. The construction of the product dispenser 14 will vary depending upon the nature of the product or article to be packaged. It is, however, desired that the construction of the product dispenser 14 be such that it is automatically operated in timed relation to the operation of the conveyor 6.

Positioned next to the article dispenser 14 along the conveyor 6 is a bag sealing apparatus which is referred to in general by the reference numeral 16. For purposes of illustration, the bag sealing apparatus 16 is of the heat sealing type and includes a pair of opposed heat sealing rolls 17 and 18 which coact. The rolls 17 and 18 are horizontally disposed and are mounted on opposite sides of the center of the path of the bag holders 10 whereby the upper parts of bags 13 will pass between the rolls 17 and 18. In order to assure the passage of the upper part of each bag 13 between the rolls 17 and 18, the bag sealing apparatus includes a bag guide 19 disposed in advance of the rolls 17 and 18 for directing the upper portion of each bag into alignment with the rolls 17 and 18.

The apparatus 5 also includes a suitable heating unit which is referred to in general by the reference numeral 20. The heating unit 20 is illustrated as being in the form of a battery of infra-red lamps 21 which will apply sufficient heat to the bags 13 and the contents thereof as the bags pass the heating unit 20. Although the heating unit 20 has been illustrated as being in the form of a battery of infra-red lamps, the heating unit may be in the form of an oven or other means of heat source which does not utilize a direct flame or other type of heating element which would damage the bags 13.

After the bags 13 pass the heating unit 20, the bags and the contents of the bags are cooled. The cooling operation may be accomplished either by permitting the bags 13 and the contents thereof to cool in the open or by passing the bags through a desirable type of conventional cooling chamber (not shown).

Disposed adjacent the right hand end or discharge end of the conveyor 6 is a final bag sealing apparatus which is referred to in general by the reference numeral 22. Like the bag sealing apparatus 16, the bag sealing apparatus 22 is of the heat sealing type and includes a pair of opposed heat sealing rolls 23 and 24 which coact. The rolls 23 and 24 are horizontally disposed and are mounted on opposite sides of the center of the path of the bag holders 10 whereby the upper parts of the bags 13 will pass between the rolls 23 and 24. In order to assure the movement of the upper part of each bag 13 between the rolls 23 and 24, the bag sealing apparatus also includes a bag guide 25. The bag guide 25 is disposed in advance of the rolls 23 and 24 for engaging

4

and directing the upper portion of each bag between the rolls 23 and 24.

A suitable bag receptacle has been illustrated at the right hand end or discharge end of the conveyor 6. The bag receptacle has been illustrated as a chute 26 upon which the filled and vacuum sealed bags are deposited by the conveyor 6. However, it is to be understood that the bag receptacle will vary in construction depending upon the particular requirements of the operation.

Referring now to FIGURE 2, it will be seen that there is illustrated a typical bag 13 which is formed of two sheets 27 and 28. The sheets 27 and 28 are preferably formed of flexible plastic material which may be heat sealed such as "Mylar," polyolefin laminate or "Mylar" film coated with "Saran," "Saran" being a polyvinylidene chloride film, although other materials will suffice. The sheets 27 and 28 are sealed together by a peripheral bond 29 which extends about three sides of the sheets and leaves an open end or mouth 30 through which the desired fill is placed in the bag 13.

Operation

Although the invention is adaptable to the packaging of all types of products, since the invention is particularly well adapted to the packaging of foods, the method of packaging will be described with respect to a food type product.

The bags 13 are so placed in the bag dispenser 11 whereby the bags will be deposited in the individual bag holders 10 with the open mouths 30 disposed uppermost. The conveyor 6 then moves the individual bag holder 10 and its associated bag 13 to a position beneath the product dispenser 14 where the desired fill, which will be referred to by the reference numeral 31, is directed into the bag. The fill 31, if it is a food product, may contain liquid which, when heated, will produce sufficient vapor to fill the bag 13 and thus purge the air from the bag. In the event the product forming the fill either does not include vaporizable liquid or includes insufficient liquid to produce the desired vapor, the fill will include in addition to the product a small quantity of liquid, such as water, sufficient to produce the necessary vapor.

Following the placing of the fill into the bag, the bag is moved into engagement with the bag sealing apparatus 16 and the upper portion of the bag is passed between the heat sealing rolls 17 and 18. The rolls 17 and 18 are so designed whereby they form an incomplete seal across the bag mouth which leaves a narrow and tortuous vent passage for communicating the interior of the bag with the atmosphere. A typical incomplete seal 32 is illustrated in FIGURE 4. As is clearly shown in this view, the seal 32 is formed of three separate parallel bond lines 33, 34 and 35. The bond line 33 is disposed lowermost and is discontinued as at 36 adjacent the left edge of the bag. The bond line 34 is disposed adjacent the bond line 33 and is discontinued as at 37 adjacent the right edge of the bag. On the other hand, the bond line 35, which is disposed uppermost, extends to the opposite edges of the bag, but is interrupted in the central part thereof as at 38. It will thus be apparent that the seal 32 defines a tortuous vent passage 39 which is of the maze type.

Referring now to FIGURE 6 in particular, the bag 13 shown there is illustrated as having a modified form of incomplete seal for the mouth of the bag, the seal being referred to by the reference numeral 40. The seal 40 is in the form of a relatively wide bond line which has the central portion thereof interrupted to define a tortuous vent passage 41 which is sinusoidal in outline. The vent passages 39 and 41 are, of course, only two of many designs of tortuous vent passages which may be utilized in practicing the invention.

The filled bag, after being partially sealed by the bag sealing apparatus 16 to define a tortuous vent passage, is

5

next moved to the heating unit 20 where heat is applied to the fill 31 with the result that the liquid of the fill, either that of the product being packaged or the added liquid, is vaporized with the vapor filling the bag around the fill and purging all air from the bag through the tortuous vent passage. In applying heat to effect vaporization of the liquid, the heat may be such as to result in the pasteurization or sterilization of the fill.

After a suitable period of time which will depend on the volume of vapor and other system components involved, the bag is allowed to cool, whereupon the vapor in the bag condenses with one or more droplets of the vapor condensate being disposed in the tortuous vent passage and confined there by virtue of atmospheric pressure acting on the resilient film, thus blocking the vent passage against the ingress of outside air. The blocking of the vent passage by the vapor condensate is only a temporary condition and soon after the bag and the fill have cooled to approximately room temperature, and the bag has collapsed around the fill because of outside atmospheric pressure, a permanent seal across the mouth of the bag should be made.

In order to apply the necessary complete seal, after the cooling step, the bag 13 moves into engagement with the bag sealing apparatus 22 where the complete seal is applied by passing the upper portion of the bag between the heat sealing rolls 23 and 24. In FIGURE 5, the complete seal is referred to by the reference numeral 42 and is illustrated as being in alignment with the bond line 35. However, no such alignment is required and the seal 42 may be anywhere across the upper portion of the bag.

Although an endless belt type conveyor has been illustrated, the invention is equally as well adaptable to an overhead conveyor from which the bags may be suspended either by means of suitable clamps or by means of hooks passing through apertures in the bags. Also, it is not necessary that the heating and cooling steps be parts of a continuous conveyor operation since the invention readily adapts itself to the placing of a large number of filled and incompletely sealed bags on trays and then placing the bags in an oven while on such trays for heat purging, after which the trays are removed from the oven and the bags and their contents are permitted to cool prior to the final sealing of the bags.

While one form of the apparatus for carrying forth the invention has been shown for purposes of illustration, it is to be clearly understood that various changes in the details of construction and arrangement of parts of the apparatus may be made without departing from the scope of the invention as defined in the appended claims.

We claim:

1. A method of packaging food comprising the steps of providing a pliable heat sealable substantially water impervious plastic bag having an open end, placing the food in the bag together with such liquid as required to fill the bag with vapor when heated, heat sealing a portion of the bag adjacent the open end to partially permanently close the bag and to define a vent passage, heating in air the bag and the contents of the bag to vaporize the liquid within the bag and thus purge air from within the bag through the vent passage, cooling the contents of the bag to condense the vapor within the bag with a portion of the vapor condensate temporarily sealing the vent passage and a resultant collapsing of the bag about the food, and then further heat sealing the bag to completely close the open end while the bag remains temporarily sealed.

2. A method of packaging food comprising the steps of providing a pliable heat sealable substantially water impervious plastic bag having an open end, placing the food in the bag together with such liquid as required to fill the bag with vapor when heated, heat sealing a portion of the bag adjacent the open end to partially permanently close the bag and to define a tortuous vent passage, heating the bag and the contents of the bag to

6

vaporize the liquid within the bag and thus purge air from within the bag through the vent passage, cooling the contents of the bag to condense the vapor within the bag with a portion of the vapor condensate temporarily sealing the vent passage and a resultant collapsing of the bag about the food, and then further heat sealing the bag to completely close the open end while the bag remains temporarily sealed.

3. A method of packaging a dry food comprising the steps of providing a pliable heat sealable substantially water impervious plastic bag having an open end, placing the dry food into the bag, adding to the dry food in the bag a small quantity of liquid sufficient to fill the bag with vapor when heated, heat sealing a portion of the bag adjacent the open end to partially permanently close the bag and to define a tortuous vent passage, heating in air the bag and the contents of the bag to vaporize the liquid within the bag and thus purge air from within the bag through the vent passage, cooling the contents of the bag to condense the vapor within the bag with a portion of the vapor condensate temporarily sealing the vent passage and a resultant collapsing of the bag about the food, and then further heating sealing the bag to completely close the open end while the bag remains temporarily sealed.

4. A method of packaging a dry fill comprising the steps of providing a pliable heat sealable substantially water impervious plastic bag having an open end, placing the dry fill into the bag, adding to the dry fill in the bag a small quantity of liquid sufficient to fill the bag with vapor when heated, heat sealing a portion of the bag adjacent the open end to partially permanently close the bag and to define a tortuous vent passage, heating in air the bag and the contents of the bag to vaporize the liquid within the bag and thus purge air from within the bag through the vent passage, cooling the contents of the bag to condense the vapor within the bag with a portion of the vapor condensate temporarily sealing the vent passage and a resultant collapsing of the bag about the fill, and then further heat sealing the bag to completely close the open end while the bag remains temporarily sealed.

5. A method of packaging a dry fill comprising the steps of providing a bag formed of a substantially water impervious material and having an open end, placing a dry fill into the bag, adding to the fill in the bag a small quantity of liquid sufficient to fill the bag with vapor when heated, partially sealing the open end of the bag to define a tortuous vent passage, heating in air the fill and liquid to vaporize the liquid within the bag and thus purge air from the bag, cooling the bag and its contents to condense the vapor within the bag with a portion of the vapor condensate temporarily sealing the vent passage and a resultant collapsing of the bag about the fill, and then permanently completely sealing the open end of the bag.

6. A method of packaging a fill comprising the steps of providing a bag formed of a substantially water impervious pliable material and having an open end, placing a fill having a liquid content into the bag, partially permanently sealing the open end of the bag to define a tortuous vent passage, heating the bag and its contents to vaporize the liquid within the bag and thus purge air from within the bag through the vent passage, cooling the bag and its contents to condense the vapor within the bag with a portion of the vapor condensate temporarily sealing the vent passage and a resultant collapsing of the bag about the fill, and then permanently completely sealing the open end of the bag.

7. A method of packaging a fill comprising the steps of providing a bag formed of a substantially water impervious pliable material and having an open end, placing the desired fill in the bag together with such liquid as required to fill the bag with vapor when heated, partially permanently sealing the open end of the bag to define a tortuous vent passage, heating the bag and its contents to vaporize the liquid within the bag and thus purge air from within

7

the bag through the vent passage, cooling the bag and its contents to condense the vapor within the bag with a portion of the vapor condensate temporarily sealing the vent passage and a resultant collapsing of the bag about the fill, and then permanently completely sealing the open end of the bag.

8. A method of packaging a fill comprising the steps of providing a bag formed of a pliable substantially water impervious material and having an open end, placing a fill having a liquid content into the bag, partially sealing the open end of the bag to define a tortuous vent passage, heating in air the bag and the fill to vaporize the fill liquid and thus purge air from the bag, cooling the bag and its contents to condense the vapor within the bag with a portion of the vapor condensate temporarily completely sealing the vent passage and a resultant collapsing of the bag about the fill, and then permanently completely sealing the open end of the bag while the bag remains temporarily completely sealed.

9. A method of packaging food comprising the steps of providing a pliable heat sealable substantially water impervious plastic bag having an open end, placing the food in the bag together with such liquid as required to fill the bag with vapor when heated, heat sealing a portion of the bag adjacent the open end to partially permanently close the bag and to define a tortuous vent passage, heating the contents of the bag to vaporize the liquid within the bag and thus purge air from within the bag through the vent passage, cooling the contents of the bag to condense the vapor within the bag with a portion of the vapor condensate temporarily sealing the vent passage and a resultant collapsing of the bag about the food, and then further heat sealing the bag to completely close the open end.

10. A method of packaging a dry fill comprising the steps of providing a bag formed of a substantially water impervious material and having an open end, placing a dry fill into the bag, adding to the fill in the bag a small

8

quantity of liquid sufficient to fill the bag with vapor when heated, partially sealing the open end of the bag to define a tortuous vent passage, heating the fill and liquid to vaporize the liquid within the bag and thus purge air from the bag, cooling the bag and its contents to condense the vapor within the bag with a portion of the vapor condensate temporarily sealing the vent passage and a resultant collapsing of the bag about the fill, and then permanently completely sealing the open end of the bag.

11. A method of packaging food comprising the steps of providing a pliable heat sealable substantially water impervious plastic bag having an open end, placing the food in the bag together with such liquid as required to fill the bag with vapor when heated, heat sealing a portion of the bag adjacent the open end to partially permanently close the bag and to define a tortuous vent passage, heating in air the bag and the contents of the bag to vaporize the liquid within the bag and thus purge air from within the bag through the vent passage, cooling the contents of the bag to condense the vapor within the bag with a portion of the vapor condensate temporarily sealing the vent passage and a resultant collapsing of the bag about the food, and then further heat sealing the bag to completely close the open end while the bag remains temporarily sealed.

References Cited in the file of this patent

UNITED STATES PATENTS

2,160,367	Maxfield	May 30, 1939
2,361,344	Yates	Oct. 24, 1944
2,380,134	Waters	July 10, 1945
2,555,230	Ford	May 29, 1951
2,679,969	Richter	June 1, 1954

OTHER REFERENCES

Food Engineering, January 1956, pp. 92, 93, 140 and 141. (Copy in Sci. Library.)