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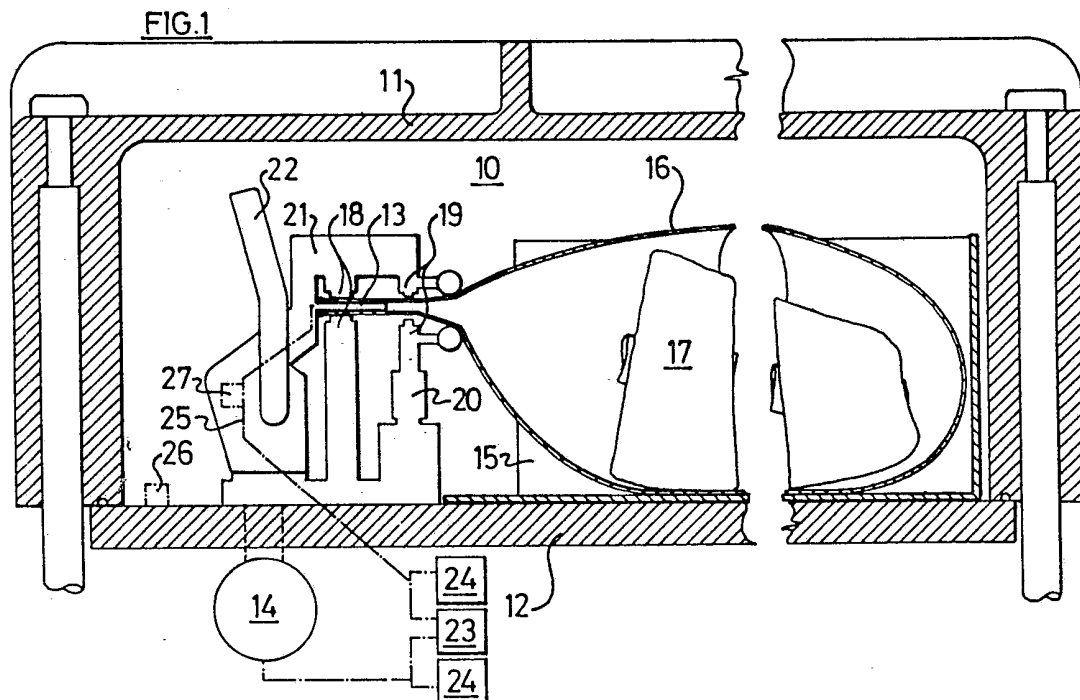
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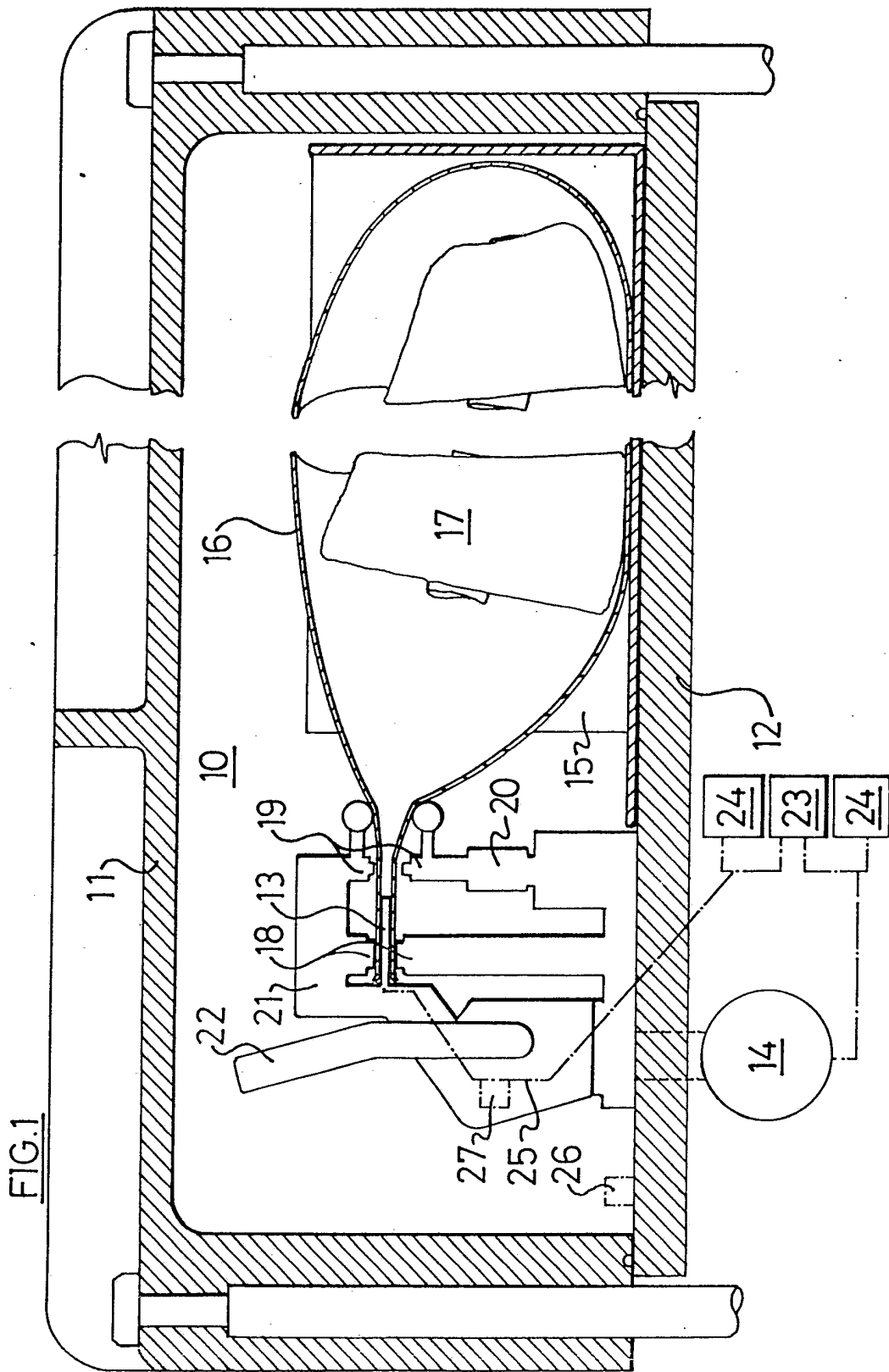
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(54) Packaging method and apparatus

(57) In the present method and apparatus for packaging products such as foodstuffs a product 17 is held in a flexible bag 16 inside a vacuum chamber 10, and the bag 16 is substantially evacuated and then filled with a gas such as carbon dioxide through a snorkel 13 about which the bag mouth in temporarily clamped, with pressure in the chamber 10 on the outside of the bag 16 being reduced during the evacuation to prevent entrapment of air in the bag.



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## SPECIFICATION

**Packaging method and apparatus**

## 5 DESCRIPTION

This invention relates to method and apparatus for packaging, and has particular application to the packaging of spoilable materials, eg. foodstuffs, plants, etc within a bag or the like.

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Previous methods of packaging spoilable material have involved packing the product within a plastic bag or the like, evacuating the bag, with the outside of the bag exposed to atmospheric pressure as the vacuum is applied, then injecting gas or gas mixture in place of the air.

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This has been carried out using vacuum packing machinery. An example of this is described in New Zealand Patent Specification 174118, in the name of C.V.P. SYSTEMS, INC. However, that method and other existing vacuum packing systems are not entirely satisfactory for all applications.

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A particular problem found with vacuum packing systems where the bag is exposed to atmospheric pressure, is that the moment that vacuum is drawn on the bag, whilst the neck of the bag is clamped about the "snorkel" or other connecting passageway, the bag rapidly collapses under the pressure differential between the atmosphere on the outside of the bag and the partial pressure within the bag. Pockets of air are often trapped within the bag and cannot be evacuated by the passageway, as the bag collapses between the pocket of air and the end of the passageway. Thus if a gas is injected into the bag prior to sealing, it will be mixed with a proportion of air remaining within the bag. This is undesirable, as the remaining air can expose the product, eg meat, to excess oxygen resulting in spoilage.

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This problem can be avoided to some extent by providing a snorkel which projects far enough into the bag to contact the product inside, such that the bag can not collapse between the mouth of the snorkel and the product. However, this does not prevent air entrapment at the far corners of the bag or between the bag and the product.

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Furthermore, the use of a long snorkel projecting this far into the bag can make sealing of the bag more complicated and time consuming.

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It is an object of this invention to provide an improved packaging method and/or apparatus, or one which will at least provide the food industry with a useful choice.

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In one aspect the invention provides apparatus for use in packaging a product, including a chamber capable of holding a flexible container with said product contained therein, said container being closed off with respect to said chamber to separate gas contained in said container from gas contained in said chamber,

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means for removing gases from said container, means for introducing gases to said container, and means for controlling pressure in said chamber.

70 Preferably the means for removing gases from the container includes a snorkel, which can in normal use be fitted through an opening in the container.

In another aspect the invention provides a method for packaging a product, including the steps of placing said product in a flexible container, said flexible container being substantially impermeable to oxygen in normal use, evacuation of substantially all gas from said container, release of a selected gas into said container, and sealing of said container to retain said selected gas in said container and substantially prevent infiltration of oxygen into said container, wherein said container is held in apparatus as described above during said evacuation, to provide control over external pressure on said container during said evacuation.

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Preferably external pressure on the container is lowered during the evacuation of the container.

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Preferably external pressure on the container is lowered to a predetermined level and held at that level, and evacuation of the container is continued beyond that predetermined level, such that the container is collapsed after being evacuated to at least that predetermined level.

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In another aspect the invention provides a method of packaging products, including placing the product within a closeable container such as a flexible bag, placing the bag and contents within a chamber, connecting the closeable container to a nozzle, clamping the closeable container about the nozzle to separate its contents from the contents of the chamber, sealing the chamber from the atmosphere, evacuating the container and the chamber to substantially remove all of the air or other gases from the chamber and the closeable container, ceasing evacuation of the chamber but continuing to evacuate the container, such that the container is collapsed, admitting a gas or gas mixture into the closeable container and simultaneously slowly venting the chamber to avoid stress on the container, and sealing the closeable container.

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Preferably the container is heat sealed.

Preferably the container can be sealed while connected to the nozzle.

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Preferably the chamber can be opened before the container is sealed.

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In another aspect, the invention provides apparatus suitable for the packaging method, such apparatus including a closeable chamber, a gas passageway communicating with the interior of the chamber and adapted to be connected to the mouth of a container held in the chamber, said gas passageway capable of being connected to a vacuum source and/or a gas source, means for clamping the neck of a

container about the outlet of the passageway, and means for permanently sealing the neck of a bag, further including a gas passageway communicating with the interior of the chamber, and means for controlling flow through said passageways, preferably including pressure switches.

These and other aspects, which should be considered in all its novel aspects will become apparent from the following description, which is given by way of example only, with reference to the accompanying drawings, in which:

*Figure 1* illustrates a schematic view of a preferred packaging apparatus.

This apparatus includes a chamber 10 defined by a removable cover 11 and a base 12. Gas passages are provided, connecting the apparatus to a vacuum source 23 and one or more gas sources 24. One passage 25 includes a snorkel 13 intended for connection with a container held in the chamber 10, as detailed below, and a second passage 14 provides access to the chamber 10 itself. In some applications, it may be desirable to provide pairs of passageways, one connected to the vacuum source and one to a gas source. Alternatively, as shown single passageways may be used with appropriate valves to switch the passageway between the two functions.

Preferably the chamber 10 is of a size able to comfortably accommodate a box 15 and heat sealable bag 16 with its contents 17.

In its preferred form the apparatus includes clamping and sealing apparatus for the bag 16, inside the chamber 10, separate and independently moveable from the cover 11. This apparatus includes clamping bars 18 mounted around the snorkel 13 for temporarily clamping the mouth of the bag around the snorkel 13, and sealing bars 19 positioned beyond the snorkel 13 for sealing the mouth of bag 16 between the snorkel and the product 17. One or both sealing bars 19 are moveable, preferably by the use of a pneumatic cylinder 20, such that the mouth of the bag can be left open or sealed shut between the snorkel 13 and the product 17. The upper clamping bar 18 and sealing bar 19 can be mounted on a pivotable jaw 21 with a handle 22 by which it may be moved up or down. All this apparatus is contained in the chamber 10 along with the product 17 and its packaging, and is covered by the lid 11. An airtight seal is formed between the lid 11 and the base 12 in normal use.

It is preferable for the clamping bars 18 to be positioned behind the sealing bars 19 as shown, rather than in front of them. If the clamping bars 18 were positioned in front of the sealing bars 19 with the snorkel 13 protruding through them, it would be necessary to withdraw the snorkel before sealing the bag, and furthermore a small pocket of air would inevitably be trapped between the

clamping bars and the seal, and would be released into the bag upon removal of the clamping bars. With the arrangement of the present invention the snorkel is not required to move, and there is no air entrapment at the mouth of the bag.

In use, the product 17 to be packed is placed within a heat sealable bag 16 and box 15, and is then placed within the chamber 10. The chamber has appropriate seals about its edge, so that the chamber itself can be evacuated as well as the bag. The bag is placed within the chamber 10 and the mouth of the bag 16 fitted over the snorkel 13. The bag is then clamped off across the snorkel with the pair of clamp bars 18.

The chamber 10 and the bag 16 are evacuated, preferably simultaneously, so that the bag is completely emptied. By controlling the pressure within the chamber as the bag is evacuated, the bag can be controlled so that it does not collapse too soon, cutting off communication between contents and the snorkel 13. Preferably both the chamber and the bag are evacuated from the same source, but the snorkel 13 is narrower than the passageway 14. This means that the chamber is evacuated faster than the bag, and the bag expands inside the chamber as it is emptied, rather than collapsing. This prevents air being trapped in pockets in the bag. Alternatively, the bag and the chamber could be evacuated at the same rate. Even if the bag empties slightly faster than the chamber and collapses as a result, the difference between the air pressure in the bag and the air pressure around it will not be great enough to trap air inside.

When a desired vacuum level in the chamber is achieved, a vacuum pressure switch 26 stops the evacuation and holds the chamber at that vacuum level. The evacuation of the bag continues through the nozzle 13, and the bag collapses as a result. When the desired vacuum level in the bag is reached a second pressure switch 27 is activated. The chamber and the bag are then refilled. The use of pressure switches to turn the system on and off allows the vacuum level to be accurately determined and achieved without undue stress being put on the bag in the process. By using the same vacuum source to evacuate both chamber and bag it is easy to avoid having any great difference between the pressures in each.

To speed up the last stages of evacuation of the bag, it may be found desirable to refill the chamber slightly after activation of the first pressure switch and initial collapse of the bag, to put greater pressure on the bag and squeeze the last of the air out. Such collapsing of the bag could result in entrapment of air, but because the bag is already substantially evacuated at this stage this will in general not be a problem.

The system of the present invention also allows visual checking, in that the bag can be seen to inflate and collapse within the chamber (given one or more windows in the chamber lid or walls) at different times in the process. If, for example, the proper vacuum is not achieved in the bag for any reason, it will not collapse even if a partial reduction of pressure has occurred, because the internal pressure will still be greater than that in the chamber.

When the bag is fully empty, or as empty as the vacuum pump can make it within the desired cycle time, the chamber and the bag are refilled, preferably at the same rate. This time the bag is filled with a selected gas or gas mixture introduced through the nozzle 13. In the case of packaging meat the gas is commonly carbon dioxide, although other gases or gas mixtures may be used. Depending upon the nature of the contents of the bag other gas mixtures may be used to control the storage, ripening, or other qualities of the item stored within the bag.

While the bag is being filled with a gas or gas mixture, the chamber is also filled, most conveniently with air, although other gases could be used. By filling the chamber at a controlled rate at the same time as filling the bag, it is possible to balance the pressure between the gas within the bag, and the air within the chamber. This allows the bag to be filled accurately with a metered quantity of gas, and also avoids undue pressure being placed on the bag.

When atmospheric pressure has been reached in the chamber, the cover 11 of the chamber can be removed, and the sealing bars 19 brought together to seal the bag 16. If two chambers are used together, the cover 11 can be shifted to the second chamber at this stage, and evacuation of another bag commenced while the first is being sealed. When the bag is sealed, the clamping bars 18 can be released and the bag removed from the chamber.

The invention has the advantage that the bag can be well evacuated to leave a very low amount of residual air, and then accurately filled with a known quantity of gas, and avoids the disadvantages of prior vacuum packaging methods in which the bag is exposed to atmospheric pressure during the vacuum and gas flushing operations. The invention also has the advantage that only the bag is filled with the required amount of gas, and no gas is allowed to escape into the chamber. It is also believed that the bags are less likely to be damaged in the operation as there can be little or no stress on the bag during filling.

Finally, it will be appreciated that various alterations or modifications may be made to the foregoing without departing from the spirit or the scope of this invention, as exemplified by the following claims:

#### CLAIMS

1. Apparatus for use in packaging a product, including a chamber capable of holding a flexible container with said product contained therein, means for closing off said container with respect to said chamber, to separate gas contained in said container from gas contained in said chamber, means for removing gases from said container, means for introducing gases to said container, and means for controlling pressure in said chamber.

2. Apparatus as claimed in claim 1, wherein said means for removing gases form said container includes a snorkel, which can in normal use be fitted through an opening in said container.

3. Apparatus as claimed in claim 2, wherein said means for closing off said container includes clamping means which can in normal use temporarily close said opening in the container around said snorkel, and sealing means to seal said opening in the container beyond the end of said snorkel.

4. Apparatus substantially as herein described with reference to the accompanying drawing.

5. A method for packaging a product, including the steps of placing said product in a flexible container, said flexible container being substantially impermeable to oxygen in normal use, evacuation of substantially all gas from said container, release of a selected gas into said container, and sealing of said container to retain said selected gas in said container and substantially prevent infiltration of oxygen into said container, wherein said container is held in apparatus as claimed in claim 1 during said evacuation, to provide control over external pressure on said container during said evacuation.

6. A method as claimed in claim 5, wherein external pressure on said container is lowered during said evacuation of the container.

7. A method as claimed in claim 6, wherein said external pressure is lowered during said evacuation of the container at an equal to faster rate than said evacuation of the container.

8. A method as claimed in claim 6 or claim 7, wherein external pressure on said container is lowered to a predetermined level, and wherein said evacuation of the container is continued beyond said predetermined level, such that said container is collapsed after being evacuated to at least said predetermined level.

9. A method as claimed in claim 8, wherein external pressure on said container is raised after said container is collapsed, to assist evacuation, prior to said release of a selected gas into said container.

10. A method as claimed in any one of claims 6 to 9, wherein external pressure on

said container is raised during said release of a selected gas into said container.

11. A method as claimed in any one of claims 5 to 10, further including the step of  
5 opening said chamber, after said release of a selected gas into said container, and prior to sealing of said container.

12. A method substantially as herein described with reference to the accompanying  
10 drawing.

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