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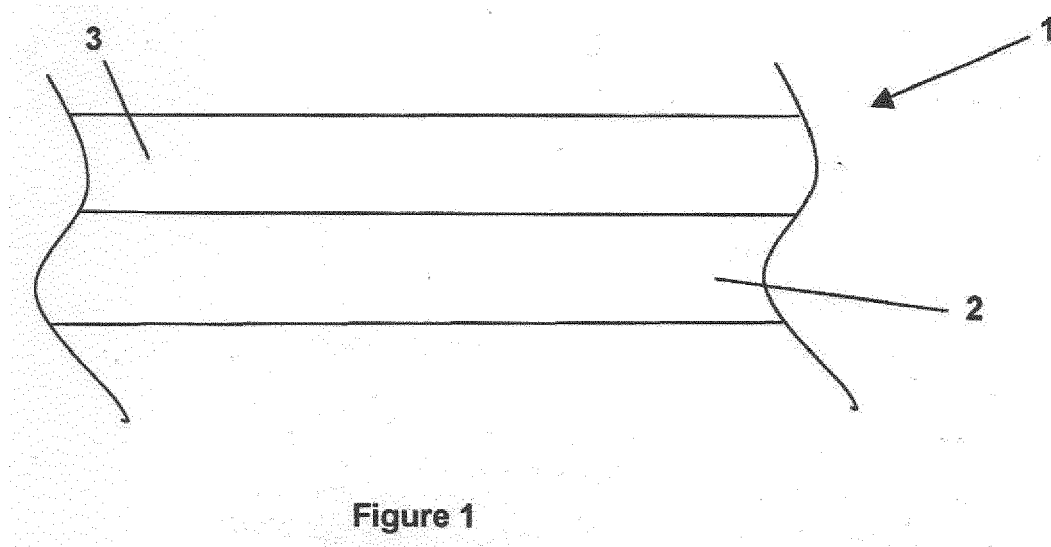
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(54) **METHOD FOR COOLING AND MAINTAINING FOODSTUFFS AT A LOW TEMPERATURE**

(57) A cooling medium for cooling and maintaining food stuffs at a low temperature, the cooling medium including a polymer capable of being cooled and a low

temperature medium in contact with the polymer to thereby cool the polymer; and a method of using and making the same.



Description

Field of the Invention

[0001] The present invention relates to a method for cooling and maintaining foodstuffs at a low temperature. More particularly, the present invention relates to a method for cooling and maintaining foodstuffs at a low temperature and constant humidity.

Background

[0002] In certain sectors of the food and hospitality industry it is desirable to have foodstuffs openly displayed, for purchase and/or consumption. Foodstuffs exposed or displayed in this manner can rapidly lose their freshness, for example by drying out, and become much less appealing.

[0003] One common method, for example used in the fish sector, is to display fish and seafood on a bed of water ice to keep them cool and maintain them in a fresh state. However, when cooling is provided in this manner, contact between the ice and the product can cause deterioration of the product through direct contact with the ice, and in particular the organoleptic properties. Another problem is the ongoing transformation of the ice into water with time, no longer ensuring its role in cooling the product.

Prior Art

[0004] Accordingly a number of patent applications have been filed in an attempt to resolve the problem or similar, including the following:

[0005] US6948334 describes and shows a food serving container for keeping food articles chilled while being served. The food serving container includes an exterior bowl member designed for being positioned on a support surface. A cooling member is selectively positioned against an interior surface of the exterior bowl member. The cooling member is designed for being frozen. An interior bowl member is selectively coupled to the exterior bowl member whereby the cooling member is positioned between the interior bowl member and the external bowl member when the cooling member is positioned against the exterior bowl member and the interior bowl member is coupled to the exterior bowl member. The interior bowl member is substantially concave whereby the interior bowl member is designed for receiving the food articles. The cooling member is designed for cooling the food articles in the interior bowl member to inhibit spoiling of the food articles positioned in the interior bowl member.

[0006] GB400658 describes and shows an apparatus for preserving fish in a mixed atmosphere of air and carbon dioxide in a heat-insulated chamber cooled by the evaporation of solid carbon dioxide supported upon a metal plate, the evolved vapour passing through an injector, having a valve controlled air inlet to the interior of

the chamber which is provided with an outlet. The quantity of vapour passing to the injector is controlled by valves.

[0007] US4206616 describes and shows a container for refrigerating goods with dry ice comprising an enclosed interior space subdivided by partition walls into a plurality of compartments which include one refrigerant compartment adapted to be charged with dry ice refrigerant and at least one chillroom compartment adapted for the containment of the goods to be refrigerated. The refrigerant compartment communicates with the chillroom compartment by openings which allow evaporating carbon dioxide from the dry ice to enter the chillroom compartment. The container also includes storage means of water located between the refrigerant compartment and the chillroom compartment in a sufficient quantity that at the beginning of the evaporation of the dry ice, the temperature in the chillroom compartment does not become substantially below -78°C. Also disclosed is a method for refrigerating goods utilizing dry ice and storage means of water in the above mentioned container.

[0008] In contrast the present invention provides a simple and effective apparatus and method by which food can be displayed and cooled, and where there is no direct contact with ice or another cooling medium that could potentially cause the deterioration of the product through direct contact, and in particular the organoleptic properties.

Summary of the Invention

[0009] According to the present invention in a first aspect there is provided a method for cooling and maintaining foodstuffs at a low temperature comprising the steps of: providing a polymer layer on top of a low-temperature medium; locating the foodstuff on top of the polymer layer.

[0010] The foodstuff is indirectly cooled via the polymer, which helps to prevent damaging the product through contact with a negative temperature body.

[0011] In an embodiment, in the step of providing a polymer layer, the layer is formed with a thickness of substantially 3cm. This has been found to be an optimal thickness for helping to prevent damaging the product through contact with a negative temperature body, while providing a suitable cooling effect.

[0012] In an embodiment, in the step of providing a polymer layer the polymer is formed as a loose material. This allows a user to use the correct amount of polymer for a particular purpose, and to shape this as required.

[0013] In an embodiment, the polymer is formed as one or more of flakes, a powder, a film or films, fibers, crystals, spheres or beads. These shapes and configurations have been found to be suitable for producing the cooling effect.

[0014] In an embodiment, the polymer is configured to be colourable with food colourings. This allows a user to add colour decoratively to a display if required.

[0015] In an embodiment, the polymer is configured to act as a light-conductor/receptor. This allows a user to illuminate a display if required.

[0016] In an embodiment, in the step of providing a polymer layer, the polymer chosen is a polymer of natural origin.

[0017] In an embodiment, in the step of providing a polymer layer, the polymer chosen is a polymer of synthetic origin.

[0018] In an embodiment, the polymer chosen comprises one or more of: a polymer formed from acrylic units; (meth) acrylate; hydroxyethyl methacrylate; vinyl alcohol; acrylamide; vinyl acetate; hydroxyethyl acrylate; diethylene glycol monoacrylate; diethylene glycol monomethacrylate; acrylate, 2-hydroxypropyl; methacrylate, 2-hydroxypropyl; acrylate, 3-hydroxypropyl; methacrylate, 3-hydroxypropyl; dipropylene glycol monomethacrylate; vinylpyrrolidone; methacrylamide; N-propylacrylamide; N-isopropylmethacrylamide; N-methylacrylamide; and / or N-2-hydroxyethyl methacrylamide; a polyurethane hydrogel formed of lightly crosslinked polymers of isocyanate terminated prepolymers which are the reaction products of a poly(alkyleneoxy) polyol with a lightly crosslinked organic diisocyanate with water or an organic polyamine; ethylenically unsaturated monomers of the copolymers of acrylates and methacrylates and hydroxyalkyl acrylates and methacrylates alkoxyalkyleneglycols.

[0019] In an embodiment, the polymer is one or more of: photochromic, thermochromic, hydrochromic and piezochromic, and may use both organic and inorganic compounds.

[0020] In an embodiment, the method further comprises the initial step of providing a lower layer of dry ice to act as the low-temperature medium. This frees a user from the requirement to use mechanical cooling, and allows the user to carry out the method in a greater variety of locations, with greater flexibility of set-up.

[0021] In an embodiment, the layer of dry ice is formed with a thickness of substantially 4cm. This has been found to be an optimal thickness for helping to prevent damaging the product through contact with a negative temperature body, while providing a suitable cooling effect.

[0022] In a second aspect, the invention may broadly be said to consist in an apparatus suitable for containing the materials of the method outlined in any one of the preceding steps. This allows a user to carry out the method in a greater variety of locations, with greater flexibility of set-up.

Brief Description of Figures

[0023] Figure 1 shows a cutaway schematic side view of an embodiment of the present invention, comprising a lower layer of dry ice and an upper layer of polymer 3, with a foodstuff able to be positioned on top of the polymer for preservation, the dry ice cooling the polymer so that the foodstuff is indirectly cooled.

Detailed Description

[0024] In an embodiment, the apparatus 1 of the invention comprises a first or lower layer of dry ice 2 and a second or upper layer of a hydro-retaining polymer 3 in swollen form that is laid over the top of the dry ice 2. In use, a product to be displayed is positioned on top of the hydro-retaining polymer 3. The polymer 3 acts to allow thermal transition between the dry ice 2 and the product, cooling the product, without damaging the product through contact with a negative temperature body. That is, the product is indirectly cooled, and the arrangement replaces the need for a cooling medium such as water ice.

[0025] In the preferred embodiment, the proportions of the two layers are substantially a 4cm thickness of dry ice 2, and a 3cm thickness of hydro retaining gel 3.

[0026] The hydro retaining polymer 3 is formed as a loose material enabling the products to be directly positioned over it. Examples of suitable forms of polymer include flakes, powders, films, fibers, crystals, spheres or "beads". These are obtained by crosslinking the macromolecules.

[0027] The polymer 3 is colourable with food colourings for ornamenting, or can be formed as a light-conductor/receptor.

[0028] The dry ice 2 produces no water flow, and sublimates into gas at room or use temperatures. The polymer 3 commences use in a frozen state due to the direct contact during storage or non-use with the dry ice, and the continuing contact with the dry ice 2 during use as the dry ice 2 sublimates maintains the polymer in a cool or cold state, prolonging cooling of the product. It will be appreciated that the cooling medium is not limited to dry ice, but may be any other suitable medium or article.

[0029] It has advantageously been found that any superabsorbent polymer is suitable for use as the polymer layer 3. Materials of this type are more generally known under the abbreviation SAP ("superabsorbent polymer"). Polymers of this type form a hydrogel capable of absorbing large amounts of water in the macromolecular network.

[0030] Suitable examples of superabsorbent polymers of natural origin for use with the present invention include for example those described in patents US3,589,364, US1,693,890, US3,846,404, US3,935,099, US3,661,815 (polyacrylonitrile grafted starch) and FR2,305,452 (acrylic acid grafted starch).

[0031] Suitable examples of superabsorbent polymers of synthetic origin for use with the present invention include for example polymers formed from acrylic units; (meth) acrylate; hydroxyethyl methacrylate; vinyl alcohol; acrylamide; vinyl acetate; hydroxyethyl acrylate; diethylene glycol monoacrylate; diethylene glycol monomethacrylate; acrylate, 2-hydroxypropyl; methacrylate, 2-hydroxypropyl; acrylate, 3-hydroxypropyl; methacrylate, 3-hydroxypropyl; dipropylene glycol monomethacrylate; vinylpyrrolidone; methacrylamide; N-propylacrylamide; N-isopropylmethacrylamide; N-methylacrylamide; and

/ or N-2-hydroxyethyl methacrylamide; and polyurethane hydrogels formed of lightly crosslinked polymers of isocyanate terminated prepolymers which are the reaction products of a poly (alkyleneoxy) polyol with a lightly crosslinked organic diisocyanate with water or an organic polyamine, as described in US3,939,105; ethylenically unsaturated monomers of the copolymers of acrylates and methacrylates and hydroxyalkyl acrylates and methacrylates alkoxyalkyleneglycols, as described in US4,038,264 and other superabsorbent polymers known to the skilled in the art.

[0032] The polymer could be photochromic, thermochromic, hydrochromic and piezochromic using both organic and inorganic compounds.

[0033] A method as outlined above maintains the humidity of a foodstuff such as for example fresh fish displayed or stored on top of the layer of polymer 3, as well as maintaining the foodstuff in a fresh state without deterioration of the product properties (in particular the organoleptic properties) through direct contact with a cooling medium.

[0034] As outlined above, the system and method described do not use a mechanical cooling system or hydraulic ice. However, instead of putting a layer of dry ice under the polymer, the polymer can be laid directly over a refrigerated display/surface, to create the same or a similar effect.

[0035] It is preferred that the product/method is used for buffet food displays or similar. However the product/method can also be used for product conservation during carriage/shipping. A further possible use for the product or method of the present invention is to cool products on a refrigerated table, such as may be found in a fishmongers. Instead of using ice the polymer may be used instead. In this way the refrigerated table acts as the cooling means or the low temperature medium.

[0036] The invention has been described by way of examples only and it will be appreciated that variation may be made to the above-mentioned embodiments without departing from the scope of invention. Firstly it will be understood that any features described in relation to any particular embodiment may be featured in combinations with other embodiments.

[0037] With respect to the specification therefore, it is to be realised that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

[0038] Therefore, the foregoing is considered as illustrative only of the principles of the invention, with variation and implementation obvious and clear on the basis of either common general knowledge or of expert knowledge in the field concerned. Further, since numerous modifications and changes will readily occur to those

skilled in the 5 art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as set out in the accompanying claims.

Claims

1. A method for cooling and maintaining foodstuffs at a low temperature comprising the steps of:

providing a polymer layer on top of a low-temperature medium; locating the foodstuff on top of the polymer layer.

2. A method for cooling and maintaining foodstuffs as claimed in claim 1, wherein in the step of providing a polymer layer, the layer is formed with a thickness of substantially 3cm.

3. A method for cooling and maintaining foodstuffs as claimed in claim 1 or claim 2, wherein in the step of providing a polymer layer the polymer is formed as a loose material.

4. A method for cooling and maintaining foodstuffs as claimed in any preceding claim, wherein the polymer is formed as one or more of flakes, a powder, a film or films, fibers, crystals, spheres or beads.

5. A method for cooling and maintaining foodstuffs as claimed in any one of claims 1 to 4, wherein the polymer is configured to be colourable with food colourings.

6. A method for cooling and maintaining foodstuffs as claimed in any one of claims 1 to 5, wherein the polymer is configured to act as a light-conductor/receptor.

7. A method for cooling and maintaining foodstuffs as claimed in any one of claims 1 to 7, wherein in the step of providing a polymer layer, the polymer chosen is a polymer of natural or synthetic origin.

8. A method for cooling and maintaining foodstuffs as claimed in any preceding claim, wherein the polymer chosen comprises one or more of: a polymer formed from acrylic units; (meth) acrylate; hydroxyethyl methacrylate; vinyl alcohol; acrylamide; vinyl acetate; hydroxyethyl acrylate; diethylene glycol monoacrylate; diethylene glycol monomethacrylate; acrylate, 2- hydroxypropyl; methacrylate, 2- hydroxypropyl; acrylate, 3 - hydroxypropyl; methacrylate, 3 - hydroxypropyl; dipropylene glycol monomethacrylate; vinylpyrrolidone; methacrylamide; N- propylacrylamide; N- isopropylmethacrylamide; N -meth-

ylacrylamide; and / or N-2- hydroxyethyl methacrylamide; a polyurethane hydrogel formed of lightly crosslinked polymers of isocyanate terminated prepolymers which are the reaction products of a poly (alkyleneoxy) polyol with a lightly crosslinked organic diisocyanate with water or an organic polyamine; ethylenically unsaturated monomers of the copolymers of acrylates and methacrylates and hydroxyalkyl acrylates and methacrylates alkoxyalkyleneglycols.

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9. A method for cooling and maintaining foodstuffs as claimed in any preceding claim, wherein the polymer is one or more of: photochromic, thermochromic, hydrochromic and piezochromic, and may use organic or inorganic compounds. 15
10. A method for cooling and maintaining foodstuffs as claimed in any preceding claim, comprising the initial step of providing a lower layer of dry ice to act as the low-temperature medium, wherein the layer of dry ice is formed with a thickness of substantially 4cm. 20
11. An apparatus suitable for containing the materials of the method of any preceding claim. 25
12. A cooling medium for cooling and maintaining food stuffs at a low temperature, the cooling medium including a polymer capable of being cooled and a low temperature medium in contact with the polymer to thereby cool the polymer. 30
13. The cooling medium of claim 12, wherein the polymer is formed as a loose material and comprises one or more of flakes, a powder, a film or films, fibers, crystals, spheres or beads. 35
14. The cooling medium of claim 12 or 13, wherein the polymer is configured to be colourable with food colourings. 40
15. The cooling medium of any of claims 12 to 14, wherein the polymer is configured to act as a light-conductor/receptor. 45

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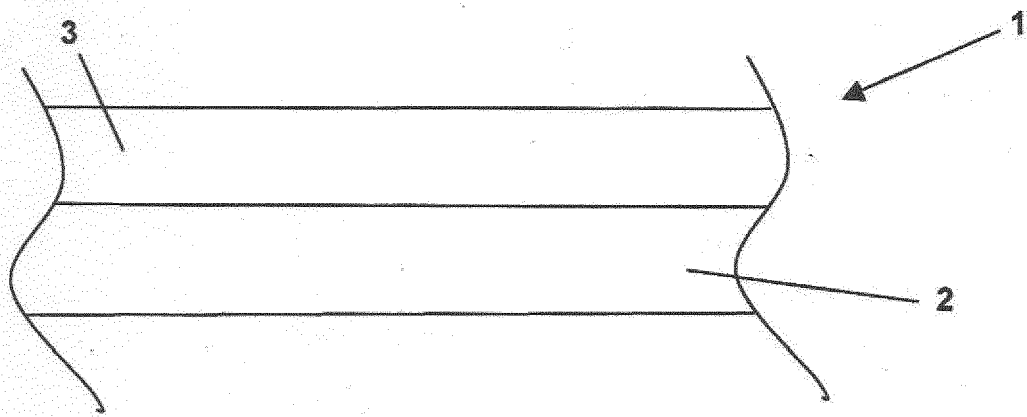


Figure 1



EUROPEAN SEARCH REPORT

Application Number
EP 16 30 5172

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Place of search The Hague		Date of completion of the search 2 June 2016	Examiner Kuljis, Bruno
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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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