



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : C08J 9/12, B65B 25/00, 31/02	A1	(11) International Publication Number: WO 93/05104 (43) International Publication Date: 18 March 1993 (18.03.93)
(21) International Application Number: PCT/US91/06581 (22) International Filing Date: 11 September 1991 (11.09.91) (71) Applicant: PLAN B, INC. [US/US]; 11320 West Watertown Plank Road, Wauwatosa, WI 53226 (US). (72) Inventors: LOCKE, Ralph, J. ; 03852 Hilltop Drive, Charlevoix, MI 49720 (US). NETHERTON, David, C. ; 30 Witt Road, Barrington, IL 60010 (US). (74) Agent: BASILE, Andrew, R.; Basile and Hanlon, 1650 West Big Beaver, Suite 210, Troy, MI 48084 (US). (81) Designated States: AU, BR, CA, DK, FI, NO, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, NL, SE).		Published <i>With international search report.</i>
(54) Title: PROCESS AND COMPOSITION FOR PROTECTING AND CUSHIONING PROTRUSIONS (57) Abstract A process for packaging a product, particularly one with sharp protrusions such as cuts of meat, a composition for cushioning the sharp protrusions during packaging and shipping and a foamed material prepared therefrom, the process including the steps of applying a foamed composition to the product to be packaged, and encasing the product in an outer package. The foamed material can be applied in liquid or semi-liquid form at a point-of-contact temperature less than about 130 °F with solidification occurring substantially on contact. The foamed material is, preferably, applied selectively to cover the sharp protrusions and contains a chemical substrate which includes a polymer selected from the group consisting of polyethylene, ethylene vinyl acetate and mixtures thereof, an aliphatic hydrocarbon and an antioxidant stabilizer. A suitable gas is encapsulated within the chemical substrate.		

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FI	Finland	MN	Mongolia
AU	Australia	FR	France	MR	Mauritania
BB	Barbados	GA	Gabon	MW	Malawi
BE	Belgium	GB	United Kingdom	NL	Netherlands
BF	Burkina Faso	GN	Guinea	NO	Norway
BG	Bulgaria	GR	Greece	NZ	New Zealand
BJ	Benin	HU	Hungary	PL	Poland
BR	Brazil	IE	Ireland	PT	Portugal
CA	Canada	IT	Italy	RO	Romania
CF	Central African Republic	JP	Japan	RU	Russian Federation
CG	Congo	KP	Democratic People's Republic of Korea	SD	Sudan
CH	Switzerland	KR	Republic of Korea	SE	Sweden
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovak Republic
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CS	Czechoslovakia	LU	Luxembourg	SU	Soviet Union
CZ	Czech Republic	MC	Monaco	TD	Chad
DE	Germany	MG	Madagascar	TG	Togo
DK	Denmark	ML	Mali	UA	Ukraine
ES	Spain			US	United States of America

PROCESS AND COMPOSITION FOR PROTECTING AND
CUSHIONING PROTRUSIONS

BACKGROUND OF THE INVENTION

5 Field of the Invention

This invention relates to packaging processes, particularly those relating to the packing of items having sharp protrusions and to packing of edible products such as subprimal cuts of meat. Additionally, this invention
10 relates to foamed polymeric materials suitable for use in such processes and compounds useful in the production of such foamed materials.

Description of the Relevant Art

In a variety of areas it is necessary to package
15 products in such a manner which cushions sharp protrusions or particularly fragile portions. This is particularly necessary in food industries such as meat packing where products are wrapped in air-tight polymeric films.

When animal carcasses are prepared for shipping,
20 they are often subdivided into portions and individually wrapped in an outer wrapper for preservation and protection during shipping and handling. The preferred outer wrap is an air-tight polymeric material in which the cut of meat may be vacuum packed and sealed. The size of the cuts of
25 meat vary from smaller consumer-sized portions to very large "primal cuts" weighing many pounds.

Most meat portions are irregularly shaped and contain bones which protrude at one or more places on the cut. The protrusions, which can be relatively sharp, tear
30 and pierce the outer polymeric wrap in which the meat is encased. During storage and shipment from packing plant to warehouse, retailer or user, the cut is handled several times, further increasing the chances of puncture or tearing of the outer wrap. Puncture is particularly
35 possible at the points of contact between the bag and any protruding bone. Vacuum packaging, which increases storage life, also increases the risk of the outer wrap tearing. In vacuum packaging, the wrap is forced to conform to the

contours of the meat during the evacuation process. This can cause stretching and strain over the protruding areas.

Various approaches have been tried to overcome the problems associated with torn or leaking outer
5 wrappers. For example, the outer wrapper material may be strengthened to resist puncture. This would entail modification to the material content or thickness uniformly throughout the wrapper and would be expensive and unnecessary in view of the fact that the areas likely to be
10 punctured are relatively limited.

Specialized containers have been proposed, such as the one disclosed in U.S. Patent Number 4,136,205 to Quattlebaum. Such containers or bags are generally reinforced with suitable cloth or strengthening material at
15 points in the bag which roughly correspond to the protrusions. These containers are relatively expensive and require accurate placement of the meat cut within them if they are to function satisfactorily. Many configurations of these types of containers in many sizes may be necessary
20 to package different cuts of meat as the various cuts have different contours and protrusions. Additionally, the carcasses of a particular type of animal may vary greatly in size and weight necessitating even more variations in container size and shape.

25 Currently, the common practice in the meat packing industry is to swath the cut of meat in a large piece of a wax-impregnated, non-absorptive fabric prior to insertion in the outer wrapper. The fabric is interposed between the wrapper and the meat at puncture prone areas
30 such as bone ends. Examples of such material are found in U.S. Patent Numbers 2,891,870 and 3,653,927. In order to insure that the protrusions are adequately covered during insertion in the outer wrap, large amounts of the fabric must be used covering major portions of the meat cut. This
35 process is laborious, time-consuming, expensive and generates a great deal of waste material and labor when the wrap is removed.

Because of these drawbacks, other methods of cushioning sharp protrusions have been proposed. Attempts have been made to cushion meat cuts in a variety of preformed foam materials positioned between the meat and wrapper. As indicated in U.S. Patent No. 4,136,203 to Murphy, generally these attempts have not been satisfactory due to discoloration of meat in contact with the foam as a result of residual oxygen present in the foam. In order to overcome this problem, the Murphy reference proposes the use of an oxygen impervious wrapper film between the meat and foam. Even so, the mass and volume of the foam and wrapper employed in Murphy created transportation problems, adding weight and volume to each carcass and increasing transport costs. It is readily apparent that this solution does not promote packing efficiency or economy.

Direct application of liquified, contact-hardening cushioning materials, either foamed or non-foamed, to the meat has met with several drawbacks. Heretofore, all such materials available had to be applied at a temperature so high as to cause scalding and discoloration of the meat at the point of contact. In addition, many known cushioning materials were inappropriate for use with edible products. Others did not set rapidly enough to provide suitable coverage and protection.

Thus, it is desirable to provide a process for packaging products, particularly edible products such as meat, which reduces the chance of package rupture. It is desirable that this process employ a polymeric material which can be easily and selectively applied to protrusions without causing discoloration or blemishing of the meat. It is also desirable to provide a process in which a foamed material can be produced at the use site and dispatched at low temperatures. Finally, it is desirable to produce a foamed polymeric material which can be employed in a variety of packaging and other applications.

SUMMARY OF THE INVENTION

The present invention involves a process for packaging a product, particularly a product having sharp protrusions such as cuts of meat, in which a foamed material is applied selectively to the product and the product is enclosed in an outer wrapping. The foamed material contains a polymer material having a molecular weight between about 1,800 molecular weight units (Mw) and about 25,000 molecular weight units (Mw), selected from the group consisting of polyethylene, copolymers of ethylene vinyl acetate and mixtures thereof.

Also included in the foamed material is a suitable aliphatic hydrocarbon selected from the group consisting of polyterpenes, hydrogenated glycerol esters, and mixtures thereof. Also present in the foamed material is a suitable anti-oxidant stabilizer. The foamed material is produced by admixture of a polymeric substrate of the above-listed components in a liquid or semi-liquid state with a suitable gaseous blowing agent. The material can be selectively applied to sharp protrusions on a product such as a cut of meat at a point-of-contact temperature between about 80°F and about 130°F.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

This invention is predicated on the unexpected discovery that newly formulated foamed materials can be successfully applied at low temperatures on edible products such as cuts of meat without adversely affecting the quality of the product. Selective application of these foamed materials on sharp protrusions provides a protective cushion against rupture or tearing of the outer wrapping surrounding the cut of meat during shipping and storage.

Specifically, this invention encompasses a process for packing products, particularly those having sharp protrusions, as well as a foamed material that can be used therein. Other uses and applications of this invention will become apparent to one skilled in the art upon reading this disclosure.

In the particular process of the present invention, fresh primal, subprimal or consumer-ready cuts of beef, pork, lamb or veal, as well as poultry and fish, having exposed surfaces with sharp jagged edges which would normally puncture a bag or similar package, can be safely packaged. A foamed material is applied selectively to bag puncturing protrusions in the meat cut by a conventional means to permit suitable adhesion between the foamed material and the surface of the cut of meat. The meat can, then, be encased by an outer wrapping such as a plastic bag.

The foamed material employed consists essentially of a polymeric substrate in which a suitable gaseous material is admixed and contained. The polymeric substrate consists essentially of:

- a) a polymer having a molecular weight between about 1,800 molecular weight units (Mw) and 25,000 molecular weight units (Mw), selected from the group consisting of polyethylene, copolymers of ethylene vinyl acetate and mixtures thereof;
- b) a hydrocarbon selected from the group consisting of polyterpenes, hydrogenated glycerolesters and mixtures thereof; and
- c) a stabilizer capable of preventing oxidation of the constituents of the polymer and surrounding materials.

The polymeric substrate may also contain optional waxes, microcrystalline waxes, spoilage inhibitors and other components routinely employed in the meat-packaging or food-packaging industry.

The polymeric substrate is prepared by the admixture of polymer, hydrocarbon, stabilizer and optional components with sufficient heating to achieve liquification of substrate. The substrate is then admixed with a suitable gas to achieve foaming. In the preferred embodiment, liquid polymeric substrate is heated and maintained at a temperature between about 265°F and about 375°F and is, then, combined with a stream of gas in a

ratio of gas to substrate between about 1:1 and about 1:10 immediately prior to dispensing and application of the material. Solidification of the foamed material begins to occur at temperatures below about 250°F with complete
5 solidification occurring at temperatures between about 80°F and 130°F. Temperatures below 250°F are reached when the foamed material is dispensed from the suitable applicator.

It has been found that the foamed material can be successfully applied to various meat products using
10 applicators, such as the type employed in systems described in U.S. Patent Nos. 4,059,466 and 4,059,714 which are incorporated by reference herein. Suitable applicators are commercially available from Nordstrom Inc. under the trade name FOAMELT 150. By employing such devices in meat
15 packaging installations, point-of-contact temperatures between about 80°F and 130°F can be achieved. It is to be understood that the temperatures in such meat packaging installations are maintained at a level no greater than 40°F. It has been found, quite unexpectedly, that the
20 foamed material of the present invention is sufficiently formable and retains sufficient adhesive qualities at temperatures between about 80°F and 130°F for sufficient time to be applied to the meat product and to adhere readily thereto.

25 As generally practiced in this invention, the polymeric substrate contains between 40% and about 90% by weight polymer, between about 10% and about 60% by weight hydrocarbon, and between about 0.01% and about 0.5% by weight stabilizer. In preferred embodiments, the polymeric
30 substrate contains between about 75% and about 90% by weight polymer, between about 3 and about 25% by weight hydrocarbon and between about 0.1 and about 0.3% by weight stabilizer.

In the first embodiment of the present invention,
35 the polymer is selected from the group consisting of polyethylene, copolymers of ethylene vinyl acetate, and mixtures thereof. The polymer employed has a molecular weight between about 1,800 molecular weight units and about

25,000 molecular weight units, with a molecular weight between about 17,000 and 19,000 being preferred. Suitable polyethylene materials are commercially available from Eastman Chemical Corporation under the trademark EPOLENE.

5 Suitable ethylene vinyl acetate materials are commercially available from E.I. DuPont Corporation under the trademark ELVAX.

In the second embodiment, a polymer composition selected from the group consisting of polyethylene,

10 ethylene vinyl acetate and mixtures thereof is employed with the average molecular weight (Mw) of the polymer being between about 7,000 and about 11,000. In this embodiment it is preferred that a mixture of higher molecular weight polymer composition having a molecular weight between about

15 17,000 and 20,000 and lower molecular weight polymer composition having a molecular weight between about 6,000 and about 9,000 be admixed. The ratio of high molecular weight component to low molecular weight component is preferably a ratio between about 1:14 and about 1:17. The

20 admixture thus prepared, preferably, has a molecular weight between about 7,000 and 11,000. Suitable polyethylene materials are commercially available from Eastman Chemical Corporation under the trademark EPOLENE. Suitable copolymers of ethylene vinyl acetate are commercially

25 available from E.I. DuPont Corporation under the trademark ELVAX.

The hydrocarbon employed in the present invention is preferably an aliphatic hydrocarbon selected from the group consisting of polyterpenes, hydrogenated glycerol

30 esters, various five-carbon molecules and mixtures thereof. Suitable polyterpenes are commercially available from Goodyear Corporation of Akron, Ohio under the trademark WINGTACK and Hercules Corporation of Wilmington, Delaware under the trademark PICOTACK B-H-T. Suitable hydrogenated

35 glycerol esters are commercially available from Hercules Corporation of Wilmington, Delaware under the trademark FORAL.

It has been found, quite unexpectedly, that foamed materials of the present invention exhibit improved adhesion characteristics when applied to products such as meat. Furthermore, foamed materials containing
5 hydrogenated glycerol esters exhibit marked improvement in basic adhesion to the outer wrapper after conventional packing and at least one freeze-thaw cycle.

The stabilizer is preferably a material such as tetrakis [methylene (3,5-di-tert-butyl-4-hydroxy
10 hydrocinnamate)] methane. Suitable material is commercially available from Ciba-Geigy Corporation under the trademark IRGANOX.

Various other additives can also be included in the formulation. These can include waxes such as
15 microcrystalline waxes, antioxidants, preservatives and the like. Such optional additives can comprise up to about 40% by weight of the polymeric substrate without adversely affecting the performance characteristics of the material.

The gaseous material employed can be any which,
20 when combined with the polymeric substrate, causes foaming. In the preferred embodiment, the gas is a non-oxidative, biologically inert material. The gas may be selected from the group consisting of carbon dioxide, nitrogen, helium, hydrogen, argon and mixtures thereof with preferred
25 biologically inert materials selected from the group consisting of carbon dioxide, nitrogen and mixtures thereof. Where biological inertness is not required, it is also possible to employ other gasses such as oxygen, air or mixtures thereof.

30 In the preferred embodiment of the process of the present invention, the polymeric substrate composition is prepared and maintained in a liquid or semi-liquid state in an appropriate holding tank until it is admixed with gas and dispatched through a suitable applicator onto the
35 product such as a cut of meat. Preferably the material is held at a tank temperature between about 265°F and about 375°F. Prior to dispatch, the liquid or semi-liquid polymeric substrate is admixed with a suitable gas to

entrain the gas therein. The gas and polymer mixture form a foamed material when dispatched through a suitable applicator and applied to the product. The resulting foamed material has the admixed gas encapsulated or
5 contained therein.

In the process of the present invention, particularly where the foamed material is to be applied to meat, it is preferred that the foamed material have a temperature below about 130°F at the point at which the
10 foamed material contacts the product. Preferably the point-of-contact temperature is between about 80°F and about 130°F. At temperatures within this range, the material can be applied directly to a cut of meat without the detrimental effects caused by localized heating.
15 Despite the temperature drop the dispatched foamed material retains sufficient fluidity or flexibility to permit application to the food product and adhesion thereto. The material sets up and adheres readily to the product quickly after contact.

20 It is to be understood that application of the foamed product of the present invention to meat occurs in meat-packing settings where the ambient temperature is maintained at or below about 40°F. These ambient temperatures greatly facilitate rapid heat transfer from
25 the foamed material to the surrounding air.

It has been found that the foamed material thus applied solidifies and adheres essentially upon contact with the meat cut to form a solid cushion which is releasably attached to the cut of meat. The bond between
30 the meat and the solidified foam is sufficiently strong to remain intact when jostled during subsequent wrapping and packaging. The solidified foam may be dislodged when desired by prying the foamed material off with minimal prying force with no appreciable damage to the meat.

35 After application of the foamed material, the product can be inserted into an outer wrapper package or bag. This wrapper package is made of a suitable commercially available plastic, such as those routinely

used in the meat-packing industry. The outer wrapper may be closed or sealed by any conventional means. In the finished product, the foamed material is interposed between sharp protrusions such as jagged bone ends and the wrapper.

5 In this manner, the protrusions are cushioned and any force created by a sharp or jagged end is either absorbed by or deflected throughout the overlying foamed material rather than being concentrated at the portion of the outer wrapper overlaying the protrusion.

10 Generally, when cuts of meat are packaged for storage and shipment, additional packaging steps can be performed as desired to meat products having the applied foamed material with no detrimental effects to the meat products and no impediments to the additional packing
15 processes. Such steps generally involve the evacuation of the atmosphere in the outer package or wrapper by conventional vacuum packaging processes. Such processes are performed to increase shelf-life of the product and ease of transport.

20 Where maximum shelf-life is sought, the foamed material of the present invention can be formulated using biologically inert gases, such as nitrogen and the like, to prevent oxygen which may have been otherwise present in the foamed material from leaking from the interstices present
25 in the foam to cause discoloration or spoilage. Optional additives can also be incorporated in the foam to inhibit bacterial growth or trigger conversion of any trace amounts of residual oxygen present in the package to biologically inert materials.

30 It has been found that the foamed material of the present invention will adhere to outer wrapper materials with a bond strength greater than the bond strength between the foamed material and a cut of meat when the package is subjected to certain conventional meat-packing procedures.

35 Examples of such meat-packing procedures include heat-shrink packaging, vacuum packaging, freezing or combinations of the three. In heat-shrink packaging, the meat is packaged in a suitable heat-shrinkable outer

wrapper and exposed to an external temperature of sufficient elevation for a sufficient duration to cause "shrinkage" of the wrap around the contours of the meat packaging. In vacuum packaging, the excess atmosphere
5 present in the wrapper is removed, causing the wrapper to tightly conform to the contours of the meat product and any foamed product positioned therebetween. Once subjected to these procedures, the packaged meat product can be stored at freezing or sub-freezing temperatures.

10 Without being bound to any theory, it is believed that procedures such as heat-shrinking and exposure to sub-freezing temperatures with contact between the outer wrapper and the foamed material contributes to the increased bond strength between wrapper and foamed
15 material. Examples of outer wrap materials suitable for this application are polymers selected from the group consisting of low-density polyethylene, ethylene vinyl acetate, polypropylene, nylon, polyvinyl chloride and mixtures thereof.

20 The variation in bond strengths between foamed material and meat product and foamed material and outer wrap permits the foamed material to adhere more readily to the outer wrap. Due to this phenomenon, removal of the outer wrapper will generally cause the release of the
25 foamed material from the product with the wrapper. This will eliminate the need for a separate removal step when the meat product is unwrapped.

While preferred forms and arrangements of parts have been discussed, it is to be understood that various
30 changes in detail be applied to other products to be packaged are to be considered within the scope and spirit of this disclosure.

To further illustrate the process and composition, the following Examples are given. It is to be
35 understood that these Examples are provided for illustrative purposes and are not to be construed as limiting the scope of the present invention.

Example I

A polymeric substrate composition was prepared in the following manner. A portion of the synthetic polyterpene commercially available from Goodyear Corporation under the trade name WINGTACK 95 amounting to 30.0g was added to a stainless steel hot melt mixing vessel. An amount of IRGANOX 1010 stabilizer equalling 0.1g was dispersed over the polyterpene. The material was heated to 350°F after which 70.0g of the polyethylene EPOLENE C-10 commercially available from Eastman Chemical Products was added. The polyethylene was permitted to liquify and was stirred for 20 minutes while the temperature was maintained at 350°F.

The resulting material was a white fluid which was decanted into a suitable storage vessel. Physical measurements indicated that the material has a density between about 7.4 and about 7.7 lbs/gal., a specific gravity between about 0.90 and 0.92 and a softening point between 203°F and 219°F.

Example II

Additional quantities of the formulation of Example I are prepared and inserted into a Nordson FOAMELT 150 device. The formulation is heated to a temperature of 350°F and mixed with nitrogen gas. The foamed material is dispensed onto a meat surface in a room with an ambience temperature of 39°F. Temperature readings of the foamed material are taken at the point of exit from the applicator and the point of contact with the meat. The temperature upon exit is 260°F and the point of contact temperature is 125°F.

Example III

Additional quantities of the formulation of Example I are prepared and selectively applied to protrusions on pieces of meat using a Nordson FOAMELT 150 device. The thickness of the applied foamed material is between about 3mm and 1/2 inch. The meat is contained in a conventional refrigerated packaging room where the temperature is not allowed to rise above 40°F.

The foamed material adheres readily to the meat product and is not tacky to the touch immediately upon contact with the meat. This is taken to indicate solidification.

5 The meat thus treated is, then, placed in an outer wrapper of conventional low-density polyethylene, vacuum packaged and held at sub-freezing temperatures for 72 hours. After this period, the meat product is thawed sufficiently to permit removal of the outer wrapping. The
10 majority of foamed material is found to adhere to the wrapping and can be removed with removal of the outer wrapper. Certain isolated areas that adhere to the meat are readily removed using manual prying force.

15 The meat is visually inspected after removal of the wrapper and any remaining areas of foamed material. No appreciable amounts of residual foamed material are found to adhere to the meat.

Example IV

20 The meat packaged using the procedures outlined in Example III is shipped using conventional commercial shipping procedures. Upon arrival at the destination, the packages are inspected for ruptures, leaks and the like. The number of ruptures and leaks attributable to protrusions is significantly reduced compared to non-
25 treated meat pieces.

 The packages are also inspected to determine whether the selectively applied foamed material shifted during shipment. No appreciable shifting is found.

Example V

30 A polymeric substrate containing 80% by weight EPOLENE C-10, 19.9% by WINGTACK 95 and 0.1% by weight IRGANOX 1010 is prepared according to the process outlined in Example I and applied and tested according to the procedures outlined in Examples III and IV with similar
35 results.

Example VI

 A polymeric substrate is prepared containing 15% by weight WINGTACK 95, 84.9% by weight of a mixture of

EPOLINE C-10 and EPOLINE C-17 and 0.1% by weight IRGANOX 1010 according to the procedures outlined in Example I. The ration of EPOLINE C-17 to EPOLINE C-10 was 1:16. The resulting material is a white fluid which solidified upon cooling.

Example VII

A polymeric substrate is prepared according to Example VI to which FORAL 85 was substituted for WINGTACK 95. The resulting material was permitted to cool and solidify.

Example VIII

The polymeric substrates of Examples VI and VII are applied and tested according to the procedures outlined in Examples III and IV. Both perform satisfactorily. However, more foamed material made from the composition described in Example VII is removed with the outer wrapping than for the foamed materials described in Example VI. This indicates greater adhesion between the outer wrapper and the foamed material in material containing hydrogenated glycerol esters such as FORAL 85.

What is Claimed is:

1 1. A process for packaging a product comprising
2 the steps of:
3 applying a material to a portion of the product
4 such that the material will foam upon contact with the
5 product and will releasably adhere to the product, the
6 material having a temperature between about 80°F and about
7 130°F when applied to the product, said material consisting
8 essentially of:
9 a) a polymer having a molecular weight
10 between about 1,800 molecular weight units and about 25,000
11 molecular weight units, said polymer selected from the
12 group consisting of polyethylene, copolymers of ethylene
13 vinyl acetate and mixtures thereof;
14 b) a hydrocarbon selected from the group
15 consisting of polyterpenes, hydrogenated glycerol esters,
16 and mixtures thereof;
17 c) a stabilizer capable of preventing
18 oxidation of said polymer and surrounding materials; and
19 d) a suitable gaseous material entrained
20 within said material; and, then
21 encasing the product in an outer wrapping to form
22 a package.

1 2. The process of claim 1 wherein the material
2 is in at least a semi-fluid state immediately prior to
3 application on the product.

1 3. The process of claim 1 wherein the product
2 has sharp protrusions and said polymeric material is
3 selectively applied to said protrusions prior to encasing
4 the product in the outer wrapping.

1 4. The process of claim 1 further comprising
2 the step of adhering said polymeric foamed material to the
3 outer wrapping with a bond strength greater than the
4 strength of adhesion between said foamed material and the

5 product such that said foamed material adheres to said
6 outer wrapping when said outer wrapping is removed from the
7 product.

1 5. The process of claim 1 further comprising the
2 steps of:

3 treating said package formed by said outer
4 wrapping to evacuate a substantial portion of the
5 atmosphere existing therein; and

6 closing and sealing said outer wrapping once
7 evacuation is complete.

1 6. The process of claim 5 further comprising the
2 step of substituting a biologically inert gas for said
3 atmosphere remaining in said package formed by said outer
4 wrapping after evacuation.

1 7. The process of claim 6 wherein the
2 biologically inert gas is selected from the group
3 consisting of carbon dioxide, nitrogen, and mixtures
4 thereof.

1 8. The foamed material of claim 1 wherein the
2 stabilizer is tetrakis [methylene (3, 5 di-tertbutyl-4-
3 hydroxy hydrocinnamate)] methane.

1 9. A process for packaging an edible product
2 having sharp protrusions comprising the steps of:
3 preparing a liquid polymeric composition
4 consisting essentially of:
5 a) a polymer selected from the group
6 consisting of polyethylene, copolymers of ethylene vinyl
7 acetate and mixtures thereof having a molecular weight
8 between about 1,800 and about 25,000, the polymer present
9 in an amount between about 40% and about 90% by weight of
10 said total polymeric composition;

11 b) an aliphatic hydrocarbon selected from
12 the group consisting of polyterpenes, hydrogenated glycerol
13 esters and mixtures thereof present in an amount between
14 about 3% and about 60% by weight of said total polymeric
15 composition;

16 c) a stabilizer capable of preventing
17 oxidation of said polymer and surrounding material present
18 in an amount between about 0.05% and about 0.5% by weight
19 of said polymeric composition;

20 admixing the polymeric composition with a
21 suitable gas in a ratio of composition-to-gas between about
22 1:1 and about 10:1;

23 selectively applying the admixed polymeric
24 composition over the sharp protrusions while simultaneously
25 allowing the polymeric composition to foam, said
26 composition applied at a temperature between about 80°F and
27 about 130°F at the point of contact with the product;

28 allowing said foamed material to adhere to the
29 product and solidify; and

30 encasing the product in an outer wrapper to form
31 a package.

1 10. The process of claim 9 wherein said polymer
2 is present in an amount between about 75% and about 90% by
3 weight of said polymeric composition, said hydrocarbon is
4 present in an amount between about 3% and about 25% by
5 weight of said polymeric composition, and said stabilizer
6 is present in an amount between about 0.1% and about 0.3%
7 by weight of said polymeric composition.

1 11. The process of claim 10 wherein said polymer
2 has a molecular weight between about 7,000 and about 11,000
3 Mw.

1 12. The process of claim 11 wherein said polymer
2 is a mixture of higher molecular weight constituents having
3 a molecular weight between about 17,000 and about 20,000 Mw
4 and lower molecular weight constituents having a molecular

5 weight between about 6,000 and about 9,000 Mw combined to
6 yield an average molecular weight between about 7,000 and
7 9,000 Mw.

1 13. The process of claim 9 wherein said gas is
2 biologically inert and is contained within said foamed
3 polymeric material upon solidification.

1 14. The process of claim 13 wherein
2 solidification occurs upon contact with the product.

1 15. The process of claim 9 further comprising
2 the step of:
3 adhering said foamed material to said outer
4 wrapper with a bond strength greater than the strength of
5 adhesion between said foamed material and the product such
6 that said foamed material adheres to said outer wrapper
7 upon removal of said outer wrapper from the product.

1 16. The process of claim 15 further comprising
2 the steps of:
3 treating said package formed by said outer
4 wrapper after encasement of the product to evacuate a
5 substantial portion of the atmosphere existing therein; and
6 sealing the package after evacuation of said
7 atmosphere is complete.

1 17. The process of claim 9 wherein said gas
2 contained in said foamed material is biologically inert.

1 18. The process of claim 9 wherein the product
2 to be packaged is meat.

1 19. A polymeric material consisting essentially
2 of:
3 between about 40% and about 90% by weight of a
4 polymer selected from the group consisting of polyethylene,
5 copolymers of ethylene vinyl acetate and mixtures thereof

6 having a molecular weight between about 1,800 and about
7 25,000;
8 between about 3% and about 60% by weight of a
9 hydrocarbon selected from the group consisting of
10 polyterpenes, hydrogenated glycerol esters, and mixtures
11 thereof; and
12 between about 0.05% and about 0.5% by weight of
13 an antioxidant stabilizer;
14 wherein said components can be liquified and
15 mixed with a suitable foaming agent to produce a foamed
16 material capable of solidifying at a temperature between
17 about 80°F and about 130°F.

1 20. The polymeric material of claim 19 wherein,
2 prior to admixture with the gaseous material, said polymer
3 is present in an amount between about 75% and about 90% by
4 weight, said hydrocarbon is present in an amount between
5 about 3% and about 25% by weight, and said stabilizer is
6 present in an amount between about 0.1% and about 0.3% by
7 weight.

1 21. The polymeric material of claim 20 wherein
2 said polymer has an average molecular weight between about
3 17,000 and 19,000 molecular weight units.

1 22. The polymeric material of claim 20 wherein
2 the polymer has an average molecular weight between about
3 7,000 and about 9,000 molecular weight units and is a
4 mixture of a high molecular weight polymer having an
5 average molecular weight between about 17,000 and about
6 20,000 molecular weight units and a lower molecular weight
7 polymer having an average molecular weight between about
8 6,000 and about 9,000 molecular weight units.

1 23. The polymeric material of claim 20 wherein
2 the material has a density between about 7.4 and 7.7
3 lbs/gal., a specific gravity between about 0.90 and 0.92,
4 and a softening point between about 203°F and 219°F.

1 24. A foamed material consisting essentially of:
2 a polymeric substrate and a gaseous material
3 encapsulated therein, the chemical substrate and gaseous
4 material present in a ratio of about 1:1 to about 10:1,
5 substrate to gaseous material respectively, wherein the
6 foamed material solidifies after contacting the product,
7 and the polymeric substrate consists essentially of:
8 a) between about 40% and about 90% by weight
9 of a polymer having a molecular weight between about 1,800
10 and about 25,000 molecular weight units and being selected
11 from the group consisting of polyethylene, ethylene vinyl
12 acetate and mixtures thereof;
13 b) between about 10% and about 90% by weight
14 of a resin selected from the group consisting of
15 polyterpene, hydrogenated glycerol esters, and mixtures
16 thereof; and
17 c) between about 0.05% and about 0.5% by
18 weight of an anti-oxidant stabilizer.

1 25. The foamed material of claim 24 wherein
2 initial solidification begins to occur between about 200°F
3 and 250°F.

1 26. The foamed material of claim 24 wherein the
2 polymer has a molecular weight between about 17,000 and
3 about 19,000 molecular weight units.

1 27. The foamed material of claim 24 wherein the
2 polymer has a molecular weight between about 7,000 and
3 about 9,000 Mw and the polymer is a mixture of a high
4 molecular weight constituent having a molecular weight
5 between about 17,000 and 20,000 Mw and a low molecular
6 weight constituent having a molecular weight between about
7 6,000 and 9,000 Mw.

1 28. The foamed material of claim 24 wherein the
2 polymer is present in an amount between about 15% and about
3 27% by weight.

1 29. The foamed material of claim 28 wherein the
2 resin is present in an amount between about 3% and about
3 75% by weight of the polymeric substrate.

1 30. The foamed material of claim 29 wherein the
2 stabilizer is present in an amount between about 0.0005%
3 and about 0.015% by weight.

INTERNATIONAL SEARCH REPORT

International Application No. **PCT/US91/06581**

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC IPC(5): C08J 9/12; B65B 25/00 31/02 U.S. CL. 53/472; 206/521; 426/124, 129, 307, 410, 412, 413 392; 521/82, 134, 140		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
U.S.	53/472; 206/521; 426/124, 129, 307, 410, 412, 413 392; 521/82, 134, 140	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category [*]	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	US, A, 3,251,911 (HANSEN) 17 MAY 1966	1-30
A	US, A, 4,446,254 (NAKAE ET AL) 01 MAY 1984	1-30
A	US, A, 3,367,998 (OSTERRIETH ET AL) 06 FEBRUARY 1968	1-30
A	US, A, 2,556,278 (IRVINE) 12 JUNE 1951	1-30
A	US, A, 4,146,521 (GODFREY) 27 MARCH 1979	1-30
A	US, A, 4,495,011 (SCHARFENBERG ET AL) 22 JANUARY 1985	1-30
A	US, A, 4,059,714 (SCHOLL ET AL) 22 NOVEMBER 1977	1-30
A	US, A, 3,983,258 (WEAVER) 28 SEPTEMBER 1976	1-30
[*] Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
16 DECEMBER 1991		09 JAN 1992
International Searching Authority		Signature of Authorized Officer
ISA/US		<i>Morton Foelak</i> Morton Foelak