United States Patent [19]

Burling et al.

[11] **3,906,128**

[45] **Sept. 16, 1975**

[54] **PACKAGING WITH INTERNAL PILE SURFACES**

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[73] Assignee: **Imperial Chemical Industries Limited**, London, England

[22] Filed: **July 22, 1974**

[21] Appl. No.: **491,479**

Related U.S. Application Data

[63] Continuation of Ser. No. 259,609, June 5, 1972, abandoned.

[30] **Foreign Application Priority Data**

June 9, 1971 United Kingdom..... 19670/71
Dec. 8, 1971 United Kingdom..... 56945/71

[52] **U.S. Cl.** **428/86**; 428/88; 428/92; 428/194; 428/200

[51] **Int. Cl.²** **D03D 27/00**; D04H 11/00

[58] **Field of Search** ..... 161/53, 62, 64, 65, 66, 161/67, 146; 206/62 R, 62 P, 46 R; 156/306

[56] **References Cited**

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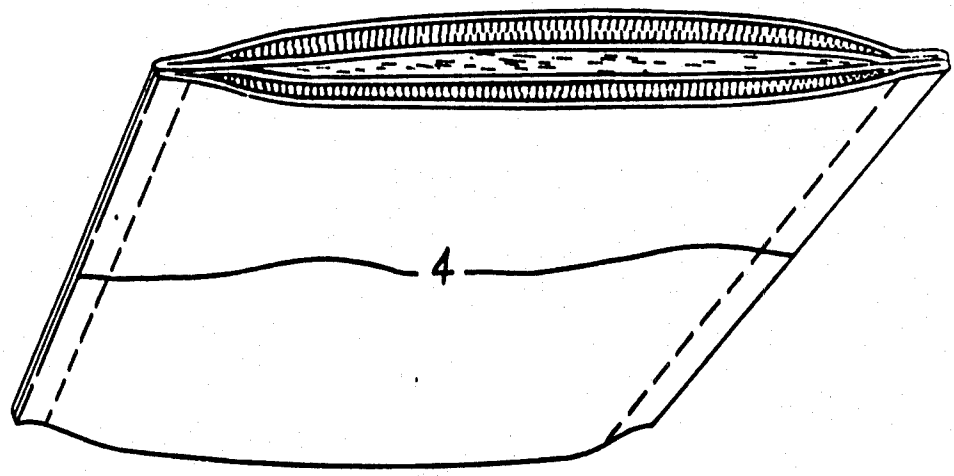
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Primary Examiner—Marion E. McCamish
Attorney, Agent, or Firm—Cushman, Darby & Cushman

[57] **ABSTRACT**

Laminar packaging having internal pile surfaces wherein the layers are heat bonded by means of the thermoplastic pile.

3 Claims, 12 Drawing Figures



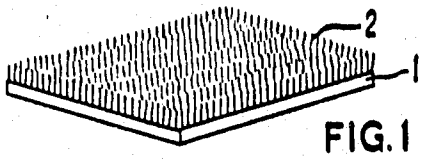


FIG. 1

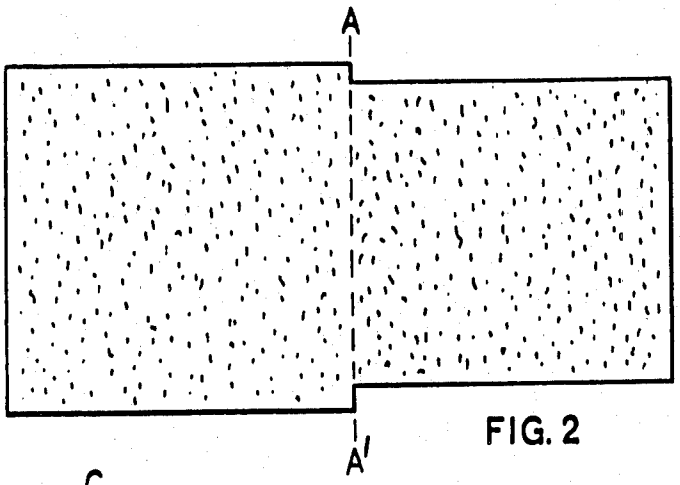


FIG. 2

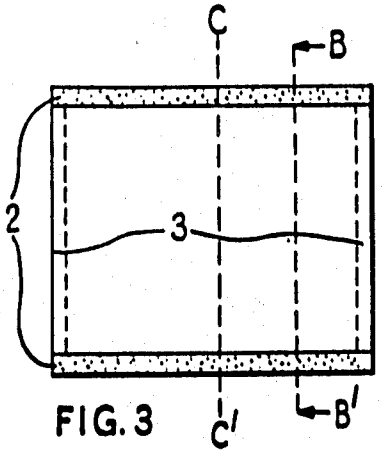


FIG. 3

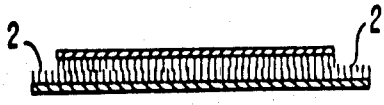


FIG. 4

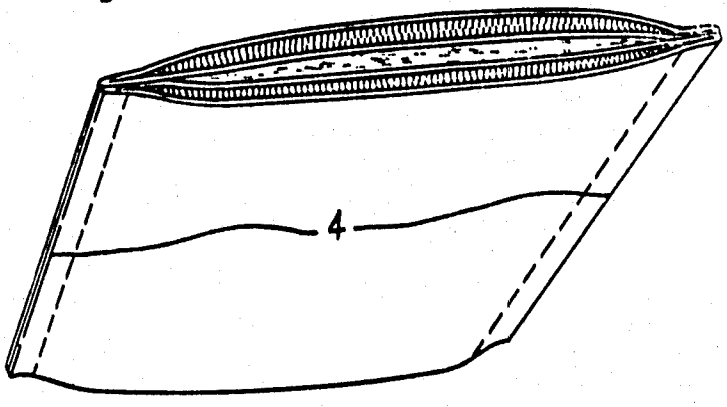


FIG. 5

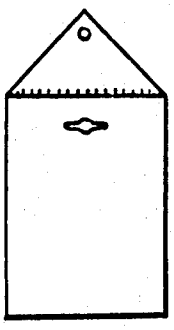


FIG. 6

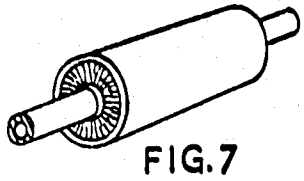


FIG. 7



FIG. 8

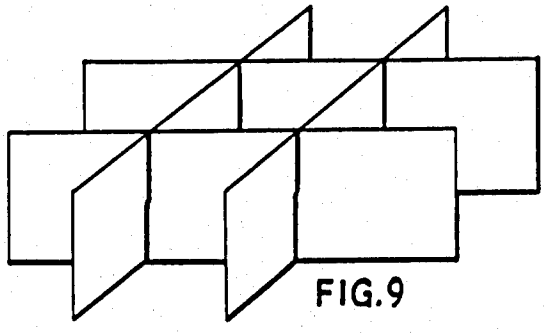


FIG. 9

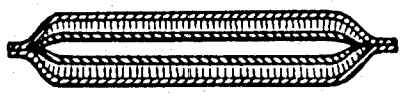


FIG. 13

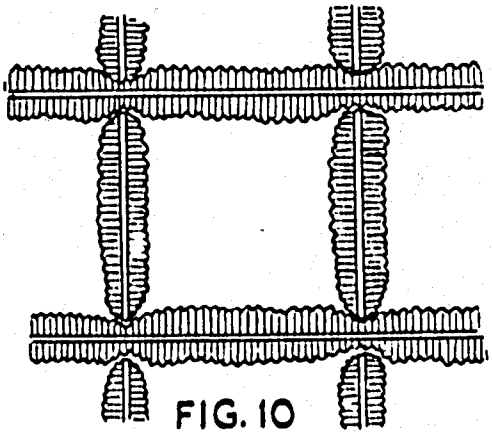


FIG. 10

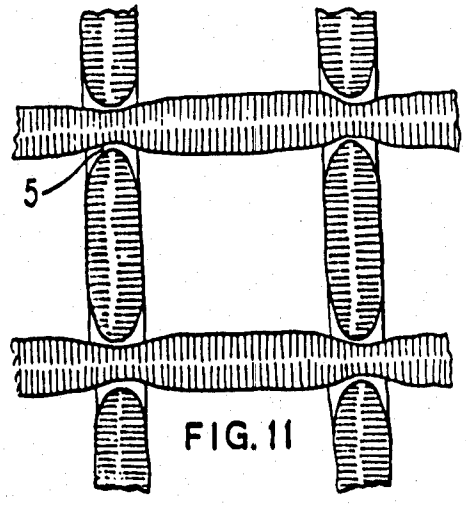


FIG. 11

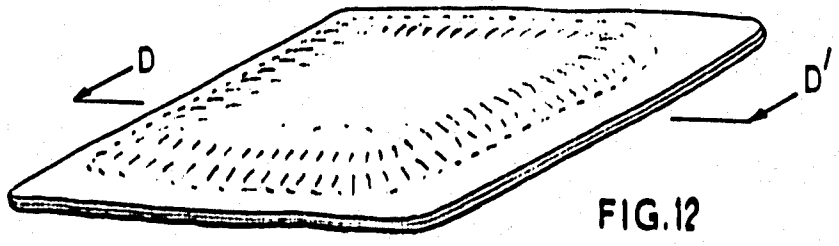


FIG. 12

PACKAGING WITH INTERNAL PILE SURFACES

This is a continuation of application Ser. No. 259,609, now abandoned.

This invention relates to packaging.

Our co-pending British Pat. applications Nos. 53265/69, 27068/70, 55241/70, 55242/70, 55243/70, 61324/70, 61325/70, 61326/70, 12336/71, and 28206/71 describe methods for production of pile-surfaced sheet materials.

The pile surfaced sheet material employed according to the present invention comprises a foundation sheet which may be semi-rigid or rigid, but preferably is flexible, said sheet being continuous, porous or perforated and having on at least one of its surfaces a pile comprising a plurality of fibres or fibrils of synthetic polymeric material, preferably of average length of the order of 1 to 20 mm.

We have found that many of the pile-surfaced products of the aforementioned processes, particularly the products having a close (i.e. dense) pile of fibre lengths averaging greater than about 5 mm and more particularly greater than about 10 mm, and similar pile surfaced materials produced by other processes, are useful as mechanical shock-absorbing or thermal insulating materials, and to this end they may be fabricated into packaging devices including, for example, bags, envelopes, cartons, separatos and the like having mechanical shock-absorbing or heat insulating properties.

Accordingly, the present invention provides packaging capable of affording mechanical and/or thermal insulation which comprises pile surfaced sheet material having a foundation sheet at least one of the surfaces of which carries a pile having a plurality of fibres or fibrils of synthetic polymeric material.

In one embodiment the packaging takes the form of a bag comprising the pile surfaced sheet materials described above.

Preferably the pile surfaced sheet material forms part of a "laminate" construction. This may be obtained for example by the application to the pile surface of a second sheet of appropriate material; this second sheet may itself have a pile surface, the pile being disposed towards or away from the pile of the first sheet.

This second sheet may be bonded to the pile-surfaced sheet for example by means of a suitable adhesive, or (where they are thermoplastic) by softening the pile fibrils by the action of heat or solvent and causing the softened fibrils to adhere to the second sheet; alternatively or in addition the second sheet itself may be rendered adhesive to the pile surfaced sheet, for example by melting if it is thermoplastic. It is not essential that the second sheet be bonded to the pile-surfaced sheet over a large area; thus it may be preferable for the second sheet to be bonded to the pile-surfaced product only at intervals, for example at discrete spots or along lines, e.g. along the edges of the sheets. Where the pile is of a thermoplastic material,and bonding is by local heat welding in which the polymeric material forming the pile is melted and pressed against the second sheet to which it bonds, such bonding will result in collapse of the pile locally, that it where softening of the pile with consequent adhesion occurs, but such collapse will be localised so that general collapse of the pile does not occur. The laminated structure so obtained comprises two substantially continuous sheets or laminae bonding an interlayer comprising a plurality of fibrils adhering to at least one of the said continuous sheets.

In one method of fabricating packaging having a laminate structure, two pieces of pile-surfaced sheet material may be placed together, or a single piece folded over, so that two piled regions are in contact, and some or all the edges sealed together to give a sheet product having a double thickness of pile sandwiched between two outer sheets. Such laminated products have better cushioning and insulating properties than the single pile-surfaced material, and do not expose a pile surface which could easily become soiled or damp. They may be fabricated into bags, envelopes, carton liners or the like by techniques well known in the art; for example pieces of the material may be cut and folded (with or without sealing along the edges), and they may be joined together by adhesives, adhesive tapes, staples, etc. In addition, if the outer sheets are of heat-sealable plastics material, pieces may be joined by heat sealing outer sheet to outer sheet. Alternatively, use may be made of the heat-sealing properties of the polymeric material forming the pile as hereinafter described.

Methods of making pile-surfaced sheet materials suitable for use as packaging in accordance with the present invention have been mentioned above, e.g. those described in our earlier co-pending applications. Particularly preferred are the methods which comprise the steps of interposing a softened or heat-softenable filament-forming material between a foundation sheet and a heated surface, holding the sheet against the softened polymeric material and the heated surface (optionally by pressure from a resilient surface) whereby bonding of the polymeric material to the sheet and adhesion of the polymeric material to the heated surface occurs, parting the sheet and the polymeric material from the heated surface to form fibrils, filaments or tufts, cooling the surface of the sheet distant from (i.e. the side away from) the heated surface and disjoining the fibrils, filaments or tufts so formed from the heated surface.

Preferred fibril-forming polymeric materials which may be employed in the production of a pile-surfaced product for use according to the present invention include addition polymers, for example, polymers and copolymers of ethylene, propylene, butadiene, vinyl chloride, vinyl acetate, vinylidene chloride, acrylonitrile and styrene and condensation polymers, for example polyamides and polyesters, e.g. of glycols and aromatic dicarboxylic acids. Blends of filament-forming polymeric materials may also be used.

As examples of specific thermoplastic polymeric materials that may be employed we may mention polyethylene, polypropylene, nylon, polyethylene terephthalate and polyvinyl chloride.

For reasons of cost, the particularly preferred polymeric material is low-density polyethylene, or blends of low-density polyethylene with bituminous material or with thermoplastics scraps.

Our co-pending British Pat. applications Nos. 12336/71 and 28206/71 describe the preparation of pile-surfaced products having a pile of thermosetting polymeric material; the pile-surfaced sheet materials of those applications may be employed as packaging materials as herein described.

The pile is preferably dense (that is, has a large number of fibres or fibrils per unit area), strong and resilient, although the actual density, strength and resilience of the pile will be selected in the light of the intended use of the packaging. Production of a wide

range of piles having suitable properties can be effected using the previously described processes with selection of appropriate materials.

The foundation sheet may be of any suitable material. It may be of a natural or synthetic material. As an example of a natural material we may mention regenerated cellulose (e.g. "Cellophane"). Synthetic materials from which the sheet may be made include for example those described above as being suitable for use as polymeric materials for the production of a pile.

Other materials from which the sheet may be made include metal, for example aluminium, mesh or foils, woven or non-woven textiles and laminates of two or more layers. Preferably, however, the foundation sheet is of paper, which may be newsprint, light, or heavy-duty wrapping paper, kraft paper, or flexible cardboard. There should preferably be good bonding between the polymeric material and the sheet, and highly sized glossy papers may not be suitable as sheet materials because of difficulty of bonding the highly glazed surface on the polymeric material. Papers which are glossy on one side only may be suitable provided that the polymeric material is applied to the non-glossy side. Laminated or coated papers may be used, and in particular a paper coated on one side or both sides with a suitable polymeric material may be used, which may eliminate the need for a separate supply of polymeric material in the pile forming process. The use of a paper having a polymeric coating on the side away from the pile may be advantageous also in that it may impart water resistance to the packaging, or it may have desirable aesthetic or other properties. In general, of course, the material employed in making up the packaging will be selected in the light of its intended use. Thus for packaging and carrying heavy items a flimsy material would not be used.

Particularly suitable for certain applications may be packaging comprising sheet materials consisting of a pile surface attached to a foam, conveniently a polyurethane foam, (which may be rigid but preferably is flexible) foundation layer, of the order of 1 to 10mm or more thick.

One embodiment of the invention is illustrated in FIGS. 2 to 6, 12 and 13 of the attached drawings which relate particularly to bag or envelope-like containers but illustrate the principle of the invention generally. FIG. 7 shows the use of pile-surfaced material as insulant for pipes, and in FIGS. 8–11 the pile-surfaced material is employed as bottle separating partitions. All such applications are contemplated and covered herein by the term "packaging".

FIG. 1 shows in perspective a portion of pile-surfaced material comprising a foundation sheet 1 and pile 2.

FIG. 2 shows in plan a flat blank cut to shape from a piece of material as shown in FIG. 1. AA' is a fold line about which the blank may be folded to the shape shown in FIG. 3 (a section along the line BB' is shown in FIG. 4), which may then be folded along line CC'. When the pile is of thermoplastic material it may conveniently be heat welded to effect adhesion of the sides of the material to a bag form as shown in FIG. 5. Thus, in FIGS. 3 and 4 regions 2 are exposed pile surfaces, and region 3 is a weld line where the pile has collapsed. Similarly regions 4 are weld lines in FIG. 5.

It will be appreciated that the product shown in FIG. 3 need not undergo further folding, but may provide a simple pile lined bag merely by sealing of a third side, in which case, of course, one or both of the extended pile surfaced regions 2 may not be necessary.

A bag shaped container obtained as illustrated in FIGS. 2–5 may find application as a heat-insulating container, for example for frozen food, ice cream etc. or for hot foods, as, for example "take-out" convenience foods. They may also find application as padded containers, e.g. envelopes, for the packaging and transportation of books and the like, and also, where the pile is of an appropriate thickness and resilience, of more fragile articles for example glass bottles, sample tubes, watches and electronic and engineering equipment. Envelopes may be provided with a flap and a closure means of an appropriate kind for example as illustrated in FIG. 6, thereby giving padded closable envelopes.

In another embodiment a bag or envelope has walls which comprise a laminate construction in which the walls have an inner and outer sheet component between which extends a pile; the inner sheet, or liner, is of thermoplastic material, and the components of the laminate are bonded together by heat welding whereby by melting of the thermoplastic sheet, and/or the pile if it also is thermoplastic, the sheets are joined together. The materials employed must of course, be compatible, i.e. they should be capable of being heat welded together.

One method of making a bag having such a thermoplastic lining component is as follows:

A four layer sandwich was formed comprising two rectangular pieces of 0.075 mm thick, low density polyethylene sheet interposed between two similarly sized rectangular pieces of a pile surfaced sheet material, the pile on which extends towards the polyethylene sheet. The pile surfaced sheet material was stout kraft paper having, as a coating on one of its surfaces, a multiplicity of fibrils of low density polyethylene, the fibrils having an average length in the range 3–6 mm. A continuous weld was formed around three edges of the sandwich by heating and pressure, so that the pile melted and bonded to the polyethylene liner, leaving a fourth edge open to allow introduction of an article between the polymeric sheets. Welding, may of course follow introduction of the article between the sheets and the weld pattern may be such that the article is retained thereby between the sheets.

Thus, for example, in an alternative method, a four layer sandwich is formed as above, an article inserted between the polymeric sheets and the four layers welded together in a localised area extending along the whole of the perimeter of the sandwich. In this way the article is encapsulated by an air- and water-tight envelope.

In a further method, each of the walls of the bag is produced separately by welding a polymeric sheet and a pile-surfaced sheet material together in localised areas. Two such walls arranged in superimposed relationship with the polymeric sheets adjacent one another are then welded together in localised areas preferably around a substantial proportion of the perimeter of the walls. Again a portion of the perimeter of the walls is not welded so allowing an article to be inserted into the envelope.

The packaging of the invention may take shapes other than bags or envelopes, for example cylindrical tubes, which may be useful as lagging for hot pipes, holders for glass bottles etc. FIG. 7 shows a pipe lagged

by a tube formed from 1 laminated sheet obtained as described above.

The material, in either the pile-surfaced form or preferably in double-layer "enclosed pile" form, may be fabricated into dividers for use as partitioning in crates or cartons intended to hold a number of bottles, glasses or other fragile articles. Bottle dividers are normally made by assembling a number of pieces of cardboard or other stiff material of the shape shown in FIG. 8, and engaging the slots together so as to build up a structure as shown in FIG. 9. Bottle dividers may be formed from pile-surfaced material stuck together foundation surface to foundation surface, giving a construction shown in plan view in FIG. 10. Alternatively, material with an inner pile layer and two outer continuous sheets may be employed; preferably the edges of the laminate will be heat-sealed. The construction is shown in plan view in FIG. 11 with the heat-sealed edges marked 5.

Further examples, describing also preparation of the pile surfaced material, are as follows:

A sheet of brown wrapping paper, 90 gm^{-2}, was fed into a Kodak 15 TC glazing machine with a hot roll at 150°C and a layer of polyethylene film (two piles each 50μm thick) was fed at the same rate between the paper and the hot roll. The contact time of the paper and film on the hot roll was approximately 30 seconds and during this time the paper and film were held in contact with the hot roll by pressure applied to an endless belt of resilient material. The paper sheet was parted from the hot roll and a blast of air directed at the side of the sheet nearest to the hot roll. The product was a sheet of paperhaving firmly bonded to it a soft pile of polyethylene fibrils approximately 5 mm long.

A sheet of the material was fabricated into a bag by the method described and illustrated in FIGS. 2–5.

A quilted product having the aforementioned laminated structure was obtained as follows:

A sheet of woven nylon textile material having a pile of low density polyethylene fibres of average length about 1.5 cm was folded so that the fibres were sandwiched between the nylon sheet, the edges were heat sealed to produce a sandwich comprising two outer sheets of nylon material with an inter-layer of polyethylene pile.

Welding of the polyethylene pile inter-layer along intersecting lines produced a product having a typical quilted appearance. This welding was effected by pressing the laminate between platens heated to a temperature of about 120°C. The platens had a pattern of matching ridges on both surfaces, whereby linewise welding together of the nylon sheets occurred by melting of the polyethylene.

The quilted product could be employed for furniture covering, garments, bed covers, in addition to their use as packaging or protective materials.

In a further embodiment an insulating bag was made having walls each consisting of a laminate comprising two outer sheets of HD polyethylene separated by an inter-layer of pile, the bag being formed by folding the laminate as described with reference to FIG. 3. In an alternative embodiment the laminate was formed into a tube, sealed with one longitudinal seal. Bag sections of appropriate length were then cut off from the length of tube so formed, and the tube flattened and sealed to close off the bottom.

What we claim is:

1. Laminar packaging comprising a first layer consisting of a backing material heat bonded to a pile of thermoplastic material by means of said thermoplastic laminated to a second layer also consisting of backing material heat bonded to a pile of thermoplastic material by means of said thermoplastic said layers being bonded with the pile surfaces adjacent each other.

2. Laminar packaging according to claim 1 in which said first and second layers are laminated over only certain selected areas.

3. Laminar packaging according to claim 1 in which the first and second layers are laminated by heat bonding of the thermoplastic material.

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