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(54) LAMINATE FOR PACKAGING FLOUR

(71) We, FIRBRET ENGINEERING LIMITED, a British Company of Moss Road, Witham, Essex CM8 3UG, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of packaging flour mainly for domestic use and to a material for use therein.

The packaging of flour presents certain problems. The material is a finely divided powder which must be kept from leaking out, thus necessitating a packaging material which does not have significant pores. The material must be kept dry to prevent spoilage, and, most important, it must be allowed to "breathe". Flour and other like milled grain products cannot be sealed in a totally impervious material, or in a materal of very restricted permeability, since this would lead to accelerated deterioration. In general a shelf life of about six months is desirable.

An added problem is that flour is one of the food products which is traditional and on which the buying public have very conservative views.

Traditionally, flour has always been packed in either finely woven cotton bags treated with a sizing material to prevent sepage (the traditional flour bag) or, in more recent years, stout paper bags. The cotton bags have now been superceded more or less completely, since they do not lend themselves to modern automatic filling techniques, and are very expensive. Stout paper, on the other hand, as used more or less exclusively thoughout the flour packaging industry today, requires complicated machinery which takes up a lot of space in the packing station and requires a high capital outlay (of the order of £300,000). Attempts to sell flour in modern plastics film packs have been totally unsuccessful, since the consumer rejects such packs.

We have now found that if a heat-sealable, but permeable film is laminated to thin paper (i.e. paper of a significantly smaller gauge than that used for conventional flour bags) this material can be used to produce packages which closely resemble traditional flour bags, but which can be produced on small modern machines of the "form, fill and seal" type. However, not any paper laminate can be used and we have found that a particular combination of paper and plastics film is necessary for success.

According to the present invention there is provided a method of packing flour and the like, in which a two-ply web of paper and plastics film is used to form bags on an automatic packaging machine of the "form, fill and seal" type, the web comprising a layer of paper of 30 to 50 gsm (g/m²) adhesive-bonded to a perforated film of an alkylene polymer or copolymer, the film being of 25 to 50 microns thickness and having a perforation size of 0.5 to 2 mm diameter and a perforation distribution of 5,000 to 20,000 perforations/m², whereby packs are produced having a paper exterior resembling a traditional stout paper flour bag.

According to a further feature of this invention we provide a pack of flour or the like comprising a two-ply bag formed from a two-ply web as defined above *in situ* and heat-sealed, the paper layer being on the outside of the bag.

According to this invention we also provide a two-ply web comprising a layer of paper of 30 to 50 gsm adhesive bonded to a perforated film of an alkylene polymer or copolymer, the film being of 25 to 50 microns thickness and having a perforation size of 0.5 to 2 mm diameter and a perforation distribution of 5,000 to 20,000 pores/m².

The plastics film used in this invention is an alkylene polymer or copolymer film, and is preferably based on ethylene polymers, in particular a polyethylene/EVA copolymer. An example of a film of a plastics material of this type is the type known as EX

70 produced by British Cellophane Limited. As stated, the thickness of the film should be from 25 to 50 microns and a thickness of about 38 microns is preferred. The film must be perforated. The preferred size of perforation is about 1mm diameter at a distribution of about 10,000 perforation/m², preferably in a square array. It is also preferred that one surface of the film is treated with a corona discharge in order to facilitate adhesive bonding.

The paper to which the above film is laminated may be any suitable packaging paper of the required strength, but is is essential that its thickness is such that its weight does not exceed 50 gsm. Higher weight papers cause problems with heat sealing, leading to weak packages. The paper may be printed before or after lamination, using any convenient printing technique.

The adhesive used for the lamination may be any adhesives suitable for bonding a polyalkylene film to paper. Some preferred adhesives are:

1. a single component polyurethane adhesive, supplied solventless or in an organic solvent;
2. a two component polyurethane adhesive;
3. an epoxy adhesive, for example an epoxyamine. epoxyamide or epoxyuretane; or
4. a single component thermoplastic and/or curing adhesive in water-borne form, for example a vinyl or acrylic copolymer polyisoprene, synthetic rubber, synthetic butadiene, or polyacrylonitrile, or ABS.

Adhesives 1 or 2 or preferred.

The "form, fill and seal" machinery which can be used with the laminated film according to the present invention may comprise any suitable machine which is commercially available for use with heat-sealable plastics films. A typical example is the L2CS Form Fill Seal Machine sold under the Trade Name Maidstone Triangle, distributed by Maidstone Packaging Equipment Limited of Whitstable, Kent. Such machines are commonly used for the packaging of confectionary or particulate materials such as whole rice or dried peas. Such machines are compact and are very much cheaper than the elaborate machinery required for the production of stout paper bags. Machines of this type are available with the necessary means for ensuring that a finely divided product such as flour does not inhibit the heat-sealing operation. It will be appreciated that before the two adjacent layers of plastics film can be heat-sealed their adjoining surfaces must be substantially free of flour.

According to the present invention, it is thus possible to produce a package of flour or the like which looks very similar to the traditional pack, but which can be produced far more cheaply on simpler, cheaper and smaller machinery.

WHAT WE CLAIM IS:—

1. A method of packing flour and the like, in which a two-ply web of paper and plastics film is used to form bags on an automatic packaging machine of the "form, fill and seal" type, the web comprising a layer of paper of 30 to 50 gsm (g/m²) adhesive-bonded to a perforated film of an alkylene polymer or copolymer, the film being of 25 to 50 microns thickness and having a perforation size of 0.5 to 2 mm diameter and a perforation distribution of 5,000 to 20,000 perforations/m², whereby packs are produced having a paper exterior resembling a traditional stout paper flour bag.
2. A method according to Claim 1, in which the film is a polyethylene film.
3. A method according to Claim 2, in which the film is a polyethylene/EVA copolymer film.
4. A method according to any of Claims 1 to 3, in which the film thickness is about 38 microns.
5. A method according to any of the preceding claims, in which the film has perforations of approximately 1 mm diameter.
6. A method according to any of the preceding claims in which the perforations are at a distribution of about 10,000 perforations/m².
7. A method according to any of the preceding claims in which one surface of the film has been treated with a corona discharge before lamination.
8. A method according to any of the preceding claims in which the paper weight is about 36 gsm.
9. A method according to any of the preceding claims in which the two-ply web is adhesive-bonded with one of the following adhesives, namely
   1. a single component polyurethane adhesive;
   2. a two component urethane adhesive;
   3. an epoxy adhesive; or
   4. a single component thermoplastic and/or curing adhesive in water-borne form.
10. A method of packing flour or the like according to Claim 1, substantially as herein described.
11. A pack of flour or the like comprising a two-ply bag formed from a two-ply web as defined in Claim 1, formed *in situ* and heat-sealed, the paper layer being on the outside of the bag.
12. A pack according to Claim 11 in which the two-ply web comprises paper of about 36 gsm adhesive bonded to a polyethylene film of about 38 microns thickness having perforations of about 1 mm in

diameter at a distribution of about 10,000 perforations/m².

13. A two-ply web comprising a layer of paper of 30 to 50 gsm adhesive bonded to a perforated film of an alkylene polymer or copolymer, the film being of 25 to 50 microns thickness and having a perforation size of 0.5 to 2 mm diameter and a perforation distribution of 5,000 to 20,000 perforations/m².

14. A web according to Claim 13, in which the plastics film is a polyethylene film.

15. A web according to Claim 14, in which the film is a polyethylene/EVA copolymer film.

16. A web according to any of Claims 13 to 15 in which the film has a thickness of about 38 microns.

17. A web according to any of the claims 13 to 16 in which the film has perforations of approximately 1 mm diameter.

18. A web according to any of Claims 13 to 17 in which the perforations are at a distribution of about 10,000 perforations/m².

19. A web according to any of Claims 13 to 18 in which the film has been treated with a corona discharge before lamination.

20. A web according to any of Claims 13 to 19 in which the paper weight is about 36 gsm.

21. A web according to any of Claims 13 to 20, adhesive-bonded with one of the adhesives listed in Claim 9.

22. A two-ply web according to any of Claims 13 to 21, substantially as herein described.

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