

SPECIFICATION**Improvements in and relating to the production of flexible package-forming material**

This invention relates to the production of flexible packaging material, pre-creased, printed provided with apertures, the material comprising a comparatively stiff base layer of foldable material, e.g. paper or cardboard, and thermoplastics coatings applied to the said base layer.

In the manufacture of modern consumer packages, in particular milk packages, high-capacity packing machines are used in which a web of plastics-coated packing material is converted to a tube, in that the longitudinal edges of the web are joined to one another and are sealed together, and the tube so formed is filled with contents and sealed off in narrow sealing zones situated at a distance from each other, and extending transversely of the formed tube. The tube sections, sealed in this manner and filled with contents, may be shaped e.g. in parallelepipedic form by fold-forming, which is done appropriately with the help of a crease-line pattern, facilitating the folding, which is impressed beforehand in the packing material web.

It is necessary that such consumer packages should be provided with an informative text concerning the contents, and it is also the wish of the producers that the packages should be provided with a form of advertising text and trade mark, so as to ensure that the producer's product can be distinguished from other products on the market.

Since the packages are identical in their shape and design when they are manufactured in the same type of packing machines, and the volume are standardised, the packing material for their manufacture will be the same for different producers and similarly the crease-line patterns impressed onto the packing material web, the apertures etc. are the same.

In order to keep the price of the packing material low, the material must be produced in a rational manner on high-capacity machines, which means that the impression of the crease-line patterns, the plastics coating etc. will take place at high speed, and that wide paper or cardboard webs will be used. Because different producers, e.g. of milk products, who use the packages in question demand different decorations and text arrangements on the packing material it is difficult, however, to carry out a rational production of packing material, since a substitution of the printing mechanism often has to be made when the printing of wide web comprising five or more package widths takes place simultaneously. Moreover an unreasonable large wastage arises in connection with running in and lining up of the printing.

Since the packing material, with the exception of the decoration and text printed onto the material, is the same for all producers and users

of the packing system in question, the present invention aims at the production of such packaging material in a more rational manner. With this end in view the invention consists in a method of producing a web of packaging material incorporating a comparatively stiff base layer, and externally coated with thermoplastic material, wherein a first web of said base layer material, of a width which includes a plurality of the width of a final web being produced is impressed with a pattern of crease-lines and apertures constituting the fold-lines and openings of packages subsequently to be formed from the finished web of packaging material, and is coated on each face with thermoplastic material, whereafter said first web with its said coating is divided longitudinally into a plurality of separate narrower webs, and these separate narrower webs are provided, in separate printing operations with decoration and wording, of information or advertising character, as desired, and subsequently coiled into magazine rolls of pre-arranged size.

If desired, the multiple-width web may incorporate a layer of metal foil. In this manner the main manufacture of the packing material can be concentrated in a small number of production locations with high-capacity machines, while the printing of the decorations of the individual users or producers may take place at a number of smaller processing units, to which the rolls are transported. At these processing locations the printing of the partial webs can take place with the help of relatively simple and possibly relatively slow-running printing presses, where the decoration of each producer or user is printed onto a packing material web of suitable width which already has the intended crease-line pattern and which is finally rolled up into magazine rolls of a size adapted to the packing machines.

Through such a process the wastage during running in, among other things, will be considerably reduced. An embodiment of the invention will now be described with reference to the accompanying schematic drawing, wherein

Fig. 1 shows a process diagram for the manufacture of the said partial webs provided with crease-line patterns and opening arrangements, and

Fig. 2 shows how the said partial webs, which have been rolled up into magazine rolls, are provided with printed text and decorations and are rolled up into magazine rolls adapted to the packing machine.

In the diagram shown in Fig. 1 a roll 1 of a "wide" first web of paper or cardboard is drawn off the roll 1 as at 2. Furthermore, there are provided a rotating device 3 for the impressing of crease-line patterns and an arrangement 4 for effecting the desired openings in the web. The extrusion arrangements 5 and 7 for the coating of plastics material on to the web 2 are shown as well as cooling and laminating cylinders 6 and 8. Furthermore, a rotating cutting arrangement 10 for the cut-off of narrower webs 11, is provided.

In Fig. 2 is shown a narrower web 11 rolled up into a large magazine roll 12, and four printing mechanisms 16, 17, 18 and 19 for the printing of different colours. A drying arrangement 20, and, finally, the finished packing material rolls 22, are illustrated.

In the manufacture of the packing material the process starts from a magazine roll 1 of a rolled-up web 2 of paper or cardboard. The width of the web 2 is considerably greater than the width of the eventual packing material webs, and as a rule a multiple of the width of a finished packing material web. The paper or cardboard web 2 is passed to a rotating creasing mechanism 3 comprising two co-operating rotatable tool cylinders, one of which cylinders has on its surface the intended crease-line pattern in raised relief, whilst corresponding crease-line patterns on the other tool cylinder consist of grooves or recesses. The web 2 passes between the said tool cylinders when the raised pattern in the one cylinder will be impressed into the material in corresponding grooves or recesses in the other cylinder, which means that a crease-line pattern facilitating the fold-forming is impressed into the web 2. Since the web 2 has a width which includes a multiple of the width of the finished packing material webs, each of which have a complete crease-line pattern, the crease tool 3 is the carrier of a number of impression devices, each comprising a complete crease-line pattern. After the passage past the creasing tool 3 the web 2 is conducted to a rotating punching or perforating tool 4 by means of which the punching operation or perforation is carried out in register with the crease-line pattern. The said perforation or punching is intended to constitute an aperture for the packages manufactured from the packing material, and it is important, therefore, that the said punching or creasing should be located correctly in relation to the impressed crease-line pattern. Each punching may consist, for example, of a small hole intended for a suction tube or a perforation which is intended to assist tearing during the opening of a finished package.

After the creasing and punching operations the web 2 is passed under the extruder 5, from which molten plastics material is extruded through a slotted die to form a thin film which is coated over the whole width of the web 2. With the help of cooling and pressing cylinders 6 the plastics layer applied is laminated so that it has good adhesion to the web 2. The web 2, which is now coated on one side with plastics material, is passed subsequently over a guide roller arrangement in such a manner that its uncoated side is conducted past a second extruder 7 by means of which a second plastics layer is applied to the web 2. The said second plastics layer is stabilised and bonded to the web 2 with the help of the cooling and pressing cylinders 8. The processed web, which in the manner described above has been provided with plastics coatings on both sides, is passed over guide rollers 9 to a cutting mechanism 10

wherein the plastics-coated web 13 is divided up into a number of partial webs 11 by rotating knives 10. The partial webs 11 are rolled up into separate magazine- and transport-rolls 12.

The web 2 may be laminated with further layers, e.g. a metal foil layer, so as to improve imperviousness to gas, and it is also possible to apply to the web a number of plastics layers placed on top of one another of different type or quality.

The magazine rolls 12 of plastics-coated, pre-creased material 13 provided with openings, are made relatively large as a rule and are intended to be transported to local processing units which in principle only carry out the printing of the web. This printing with decoration and text, which is adapted to the requirements and purposes of the user of the packing material, can be done in relatively simple and inexpensive and possibly slow-running printing presses, and such a printing press is shown in Fig. 2.

The magazine roll 12 received at the processing location of pre-creased and plastics-coated, but unprinted, packing material is printed in that the web which is drawn off the magazine roll 12 is passed over a guide roller 15 and through the printing machine 16, 17, in which two different colours of the desired decoration are printed on the web. Subsequently the web is passed over a guide roller 21, dried by means of a drying arrangement 20, whereupon continued printing with further colours is carried out with the help of printing rollers 18 and 19. The finished web can be dried further in a device 20 and rolled up subsequently into a magazine roll 22 of size adapted to the requirement of the packing machine.

By dis-associating the printing of the packing material from the manufacture thereof in the above mentioned manner, great benefits in production and administration can be achieved. In the first production location, where merely the crease-line impression, plastics coating etc. are carried out, the material can be processed in machines which operate at a very high web speed and therefore have a high capacity. Moreover, the packing material can be processed in very wide webs which further enhances the capacity. Since crease-line patterns, and location of openings etc. are more or less standardised, the said high-capacity manufacturing machines can operate without a break for a long time, since no change of decoration in the printing mechanism has to be carried out. An administrative advantage is that the central production location does not have to be burdened with the keeping ready and planning in of a large number of different decorations for various dairies etc. but can concentrate on the manufacture of unprinted packing materials which subsequently are transported in large magazine rolls to local processing units which serve a smaller number of users of the packing material, and where only the printing of the packing material produced earlier is carried out. Since the decoration printed on the webs in

general has to be adapted to the crease-line pattern, so that the decoration should be located in the same place on all packages, it has been found appropriate already at the first place of manufacture, that is to say on the wide first web, to print guiding marks in register with the crease-line pattern, which guiding marks are arranged so that they can be picked up by photoelectric devices, such as photocells, which guide the printing in the said processing units, and this means that the printed decorations and texts will be adapted to the crease-line pattern in the intended manner.

In certain cases, for example when the packing material which is manufactured is intended for small packages, the width of the individual packing material webs will be so small that even the partial webs which are manufactured at the first production location will comprise a number of non-separated webs arranged side by side, each having its crease-line pattern. In this case these partial webs, comprising several complete, parallel, crease-line patterns, can, of course be printed in a joint printing operation and can be cut up subsequently into individual webs, which are then rolled up into magazine rolls. A decisive factor on how wide the partial webs can be is, of course, the width of the printing cylinders on the available printing machines which should be used economically. In the manufacture of webs for milk packages, for example, it has been found that on a certain available printing machine webs for packages of 1 litre size can be printed advantageously on a partial web which has the width of a complete crease-line pattern, whereas on the other hand on the same printing machine webs for packages of 2-1/2 and 3 dl are so narrow that the partial web can contain two parallel complete crease-line patterns, which means that on printing of the partial web obtained from the first production location two complete decorations situated side by side can be printed, and that the partial web is then cut up in its longitudinal direction to form individual webs which are coiled into magazine rolls of suitable size, that is to say comprising a certain definite number of complete decoration patterns.

Claims

1. A method of producing a web of packaging material incorporating a comparatively stiff base layer, and externally coated with thermoplastics material, wherein a first web of said base layer material, of a width which includes a plurality of the width of a final web being produced is

impressed with a pattern of crease-lines and apertures constituting the fold-lines and openings of packages subsequently to be formed from the finished web of packaging material, and is coated on each face with thermoplastics material, whereafter said first web with its said coating is divided longitudinally into a plurality of separate narrower webs, and these separate narrower webs are provided, in separate printing operations with decoration and wording, of information or advertising character, as desired, and subsequently coiled into magazine rolls of pre-arranged size.

2. A method as claimed in claim 1, wherein the base layer is of fibrous material of the nature of paper or cardboard.

3. A method as claimed in Claim 1 or 2, wherein the external coating is of polyethylene.

4. A method as claimed in Claim 1, 2 or 3, wherein as well as being impressed with a pattern of crease-lines, the said first web receives printed guide lines adapted to be picked-up by photoelectric means, and located at pre-arranged positions in relation to the crease-line pattern.

5. A method as claimed in Claim 4, wherein the crease-lines are impressed in the first web in a repetitive pattern, and each of said repeated patterns is provided with its own guide line in pre-arranged relation thereto.

6. A method as claimed in any of Claims 1—5, wherein the narrower webs formed by longitudinal division of the first, wider, web, are rolled up, after said division, into relatively large magazine rolls for transport.

7. A method as claimed in any preceding claim, wherein the width of the narrower webs is determined by the width of the corresponding crease-line patterns impressed in the first web.

8. A method as claimed in any preceding claim, wherein narrower webs formed by dividing the first web longitudinally are of different widths.

9. A method as claimed in Claim 8, wherein a narrower web divided from the first web is of width equivalent to two or more of the final webs being produced, and after subsequent treatment is further divided longitudinally into two or more webs each of the desired final width.

10. A method of producing a web of packaging material, externally plastics-coated, and incorporating a comparatively stiff base-layer, substantially as described herein with reference to the accompanying drawings.

11. A web of packaging material whenever produced by a method substantially as claimed in any of Claims 1—10.



general has to be adapted to the crease-line pattern, so that the decoration should be located in the same place on all packages, it has been found appropriate already at the first place of manufacture, that is to say on the wide first web, to print guiding marks in register with the crease-line pattern, which guiding marks are arranged so that they can be picked up by photoelectric devices, such as photocells, which guide the printing in the said processing units, and this means that the printed decorations and texts will be adapted to the crease-line pattern in the intended manner.

In certain cases, for example when the packing material which is manufactured is intended for small packages, the width of the individual packing material webs will be so small that even the partial webs which are manufactured at the first production location will comprise a number of non-separated webs arranged side by side, each having its crease-line pattern. In this case these partial webs, comprising several complete, parallel, crease-line patterns, can, of course be printed in a joint printing operation and can be cut up subsequently into individual webs, which are then rolled up into magazine rolls. A decisive factor on how wide the partial webs can be is, of course, the width of the printing cylinders on the available printing machines which should be used economically. In the manufacture of webs for milk packages, for example, it has been found that on a certain available printing machine webs for packages of 1 litre size can be printed advantageously on a partial web which has the width of a complete crease-line pattern, whereas on the other hand on the same printing machine webs for packages of 2-1/2 and 3 dl are so narrow that the partial web can contain two parallel complete crease-line patterns, which means that on printing of the partial web obtained from the first production location two complete decorations situated side by side can be printed, and that the partial web is then cut up in its longitudinal direction to form individual webs which are coiled into magazine rolls of suitable size, that is to say comprising a certain definite number of complete decoration patterns.

Claims

1. A method of producing a web of packaging material incorporating a comparatively stiff base layer, and externally coated with thermoplastics material, wherein a first web of said base layer material, of a width which includes a plurality of the width of a final web being produced is

impressed with a pattern of crease-lines and apertures constituting the fold-lines and openings of packages subsequently to be formed from the finished web of packaging material, and is coated on each face with thermoplastics material, whereafter said first web with its said coating is divided longitudinally into a plurality of separate narrower webs, and these separate narrower webs are provided, in separate printing operations with decoration and wording, of information or advertising character, as desired, and subsequently coiled into magazine rolls of pre-arranged size.

2. A method as claimed in claim 1, wherein the base layer is of fibrous material of the nature of paper or cardboard.

3. A method as claimed in Claim 1 or 2, wherein the external coating is of polyethylene.

4. A method as claimed in Claim 1, 2 or 3, wherein as well as being impressed with a pattern of crease-lines, the said first web receives printed guide lines adapted to be picked-up by photo-electric means, and located at pre-arranged positions in relation to the crease-line pattern.

5. A method as claimed in Claim 4, wherein the crease-lines are impressed in the first web in a repetitive pattern, and each of said repeated patterns is provided with its own guide line in pre-arranged relation thereto.

6. A method as claimed in any of Claims 1—5, wherein the narrower webs formed by longitudinal division of the first, wider, web, are rolled up, after said division, into relatively large magazine rolls for transport.

7. A method as claimed in any preceding claim, wherein the width of the narrower webs is determined by the width of the corresponding crease-line patterns impressed in the first web.

8. A method as claimed in any preceding claim, wherein narrower webs formed by dividing the first web longitudinally are of different widths.

9. A method as claimed in Claim 8, wherein a narrower web divided from the first web is of width equivalent to two or more of the final webs being produced, and after subsequent treatment is further divided longitudinally into two or more webs each of the desired final width.

10. A method of producing a web of packaging material, externally plastics-coated, and incorporating a comparatively stiff base-layer, substantially as described herein with reference to the accompanying drawings.

11. A web of packaging material whenever produced by a method substantially as claimed in any of Claims 1—10.