

**A PACKING CONTAINER BLANK, A METHOD FOR THE MANUFACTURE OF THE SAME
AND A PACKING CONTAINER MADE FROM THE BLANK.**

The present invention relates to a blank for a packing container which comprises two straight, parallel edges. The invention also relates to a method for the manufacture of the blank and a packing container made from the blank.

5 Packing containers for the packing of liquid foodstuffs exist in a number of different types. One of the more usual is the so-called gable-top type which is in the main of parallelepipedic shape, but has a ridge-like top with a transverse sealing fin directed upwards. At present the same type of package also exists with the fin
10 folded down, the package having a substantially flat top. The packing container is manufactured from a flexible laminate which comprises a carrier layer of paper and external liquid-tight plastics layers including possibly a further layer e.g. of aluminium foil. The laminated material is fed in the form of individual blanks to the
15 packing machine where the packing containers are formed, filled and sealed. The blanks have previously been folded and sealed so that they are of a tubular shape of substantially square cross-section. Stacks of such tubular blanks in flattened condition are supplied to the packing machine which subsequently opens them to tubular shape and
20 closes their bases. During further passage through the packing machine the erected blanks are filled with contents, e.g. milk, the tops closed, the fins sealed.

The blanks from which the packing containers are manufactured are of material sheets which have been detached from a continuous web of
25 packing material with an outer contour which is adapted to the size and shape which the finished packing container is intended to have. For the type of packing container described, that is to say gable-top packages, each blank is of a four-sided main shape, with only two of the edges straight. The two other opposite edges have an uneven edge
30 line with projecting portions of material, which in the subsequent conversion of the blank to a finished packing container are intended to form the sealing fin directed upwards, and overlapping sealing

lugs at the bottom of the packing container. These non-uniform edges are a great and serious disadvantage, since owing to their irregularity they make impossible a rational cutting out of the blanks edge-to-edge with each other, and cause an appreciable amount of waste material which not only bring about increased material costs but also renders the manufacture extremely difficult, since the waste in the form of small separated bits of material constantly has to be removed and disposed of, so as not to disturb the production.

Various attempts have been made in the past to solve this problem by making the edges more uniform or reducing in some other manner the wastage on punching out the blanks. However, no acceptable solution has been suggested, and this is probably due to the fact that not only has the cutting out to be facilitated, but the blanks must also be provided with edges permitting the manufacture of packing containers without increased risk of leakage at the top or bottom. Thus it was necessary to avoid designing the blanks in such a way that the area of the available sealing surfaces, which are used for the sealing of the packing container, would be reduced.

It is an object of the present invention to provide a packing container blank of such a shape that the above mentioned disadvantages are avoided.

It is a further object of the present invention to provide a packing container blank on which opposite edges are formed according to a repeatable identical pattern so that the blanks can be punched out in continuous manufacture from a web without waste material being produced.

It is a further object of the present invention to provide a packing container blank of such a shape that the surfaces, which during the conversion of the blank to a packing container are to be used for sealing of the material, are given maximum size and optimum shape.

With these ends in view the invention consists in a method of cutting a web of packaging material into blanks for making packaging containers, each blank comprising a plurality of container

side-wall panels, with associated end-closure panels and sealing strips. all foldably connected together, wherein the width of the web is selected to be appropriate for dividing into a plurality of complete blanks located side-by-side transversely of the web, and the web is cut so that each blank has two opposite edges each in the form of a straight line, parallel or perpendicular to the edge of the web, and the other two edges of each blank are shaped to a pattern such that each can fully inter-nest with the adjacent edge of a neighbouring blank whereby there is no wastage of material along any of the cuts which separate the blanks from one another.

By giving the non-linear edges of the blank a pattern profile which is repeated over the width of the blank and nests with adjacent blank edges. the possibility is provided of cutting the blanks during continuous manufacture through punching the same from a web in such a manner that waste material can be wholly avoided. Since, thanks to the design of the blank in accordance with the invention, the profiled, transverse edges on two blanks adjoining each other can now be cut by means of a common cut. similarly to the two straight, parallel edges, the dispersion of waste material is wholly avoided, which makes possible an appreciable increase in the rate of manufacture.

A preferred embodiment of the invention will now be described in detail with reference to the accompanying drawings which show schematically a packing container and container blanks in accordance with the invention. Only the details required for the understanding of the invention have been included.

Fig. 1 shows in perspective a packing container of the so-called cable-top type which is manufactured in accordance with the invention.

Fig. 2 shows the upper end of the packing container in accordance with fig. 1 and illustrates by means of broken lines the internal folding of the upper end of the packing container blank.

Fig. 3 shows in perspective a part of the bottom end of the packing container in accordance with fig. 1 and illustrates the internal formation of the base.

Fig. 4 shows schematically a first embodiment of a packing container blank in accordance with the invention, the placing of the blank in a material web in relation to the surrounding packing container webs being indicated.

- 5 Fig. 5 shows a second embodiment of a packing container blank in accordance with the invention as placed on a packing material web where it is surrounded by further packing container blanks of the same type, whose adjoining edges are indicated by means of thin lines.
- 10 The packing container shown in fig. 1 is of the gable-top type and thus comprises a substantially parallelepipedic main body which at the top is designed with a ridgelike upper part. The main part of the packing container consists of four rectangular side wall panels 1, which are separated from each other by means of vertical
- 15 crease lines 2. At the upper end of the side wall panels on the one hand rectangular main top panels 3 sloping towards each other are present, and on the other hand triangular backfolding panels 4 folded-in between them are provided. The main top panels 3 as well as the backfolding panels 4 are delimited from the side wall
- 20 panels 2 by means of a transverse crease line 6. At the top of the main top panels 3 a transverse sealing fin 5 is provided wherein the upper ends of the different top panels are sealed together in a liquid-tight manner, made evident more clearly in fig. 2, which illustrates the internal construction of the top of the packing
- 25 container.

- Similarly to the top of the packing container the base too comprises a number of material panels separated by means of crease lines, which through folding and sealing together form a liquid-tight flat base. Thus two opposite substantially rectangular main bottom
- 30 panels 7 are present at the lower end of the packing container. Inside them are a number of triangular backfolding panels 8 which are sealed to the main bottom panels 7. The construction of the top as well as of the base will be described in greater detail in the following.

- In fig. 4 is shown a first embodiment of a packing container blank
- 35 in accordance with the invention for the manufacture of the packing container shown in figs. 1-3. As can be seen from the figure the packing container blank constitutes originally part of a broader material web from which a number of identical packing container blanks

are formed through cuts in the edge lines indicated. (The placing of adjoining packing container blanks is indicated partly by means of thinner contour lines). The packing container blank cut out is four-sided and comprises two straight, parallel lateral edges 9 and 10 and two transverse edges 11 and 12 extending between the lateral edges 9 and 10. The two transverse edges 11, 12 are not straight but profiled according to a pattern which is repeated over the width of the blank, as will be explained in greater detail in the following. Parallel with the two lateral edges 9, 10 extend the longitudinal crease lines 2 over the packing container blank and divide the same into four wall panels 13, each of which comprising two parallel lateral edges or crease lines and two transverse edges, which coincide with the transverse edges, 11, 12. The wall panels 13 are of two main types which in the drawing are indicated by A and B respectively. Outside one of the two outer wall panels 13 a longitudinal sealing strip 14, separated by one of the crease lines 2, is provided which is sealed to the opposite wall panel 13A along the lateral edge 9 when the packing container blank is to be converted to tubular form.

Each of the wall panels 13 is provided with further crease lines which divide the wall panels into different panels, which are folded or sealed so as to form different wall panels of the packing container when the packing container blank is to be converted to a finished packing container. With the help of the upper transverse crease line 6 mentioned earlier, which extends over all the wall panels 13 at a right angle to the crease lines, and a corresponding lower transverse crease line 15, the centrally situated side wall panels 1 are separated from the wall panels which form the upper part or top and the bottom respectively of the packing container. Each of the two wall panels 13A thus will comprise a side wall panel together with the substantially rectangular main bottom panel 7, separated at its lower end by means of the lower transverse crease line 15, and the backfolding panels 4 separated at the upper end of the side wall panel 1 by means of the upper transverse crease line 6. The triangular backfolding panels 4 comprise a central backfolding panel 4' and two likewise triangular backfolding panels 4" situated on either side.

Each of the two wall panels 13B likewise comprises a central side wall panel 1 which at its lower end is separated by means of the lower transverse crease line 15 from the triangular backfolding panels 8 which, similarly to the backfolding panels at the upper end of the packing container blank, comprise a central backfolding panel 8' and backfolding panels 8" situated on either side of the same. At the upper end of the side wall panel 1 the wall panels 13B comprise the rectangular main top panel 3, which is delimited from the side wall panel 1 by means of an upper transverse crease line 6. Above the main top panel 3 and the upper backfolding panel 4 there is a further sealing strip 16, extending transversely, which is used for sealing the top part of the package and forming the sealing fin 5. Usually the packing container blank is provided with further crease lines to permit e.g. the folding out and forming of a pouring spout on the finished packing container, but these crease lines are conventional and of no importance for the invention, so that, for the sake of clarity, they are not shown on the drawings.

As is clearly evident from fig. 4 the upper as well as the lower transverse edges 11, 12 are profiled according to a regular pattern repeated over the width of the blank. More particularly, each transverse edge 11, 12 extends alternately along two parallel boundary lines 17, situated at a slight distance from each other which are indicated as dot-dash lines on the drawing. The two boundary lines 17 meet or cross the longitudinal crease lines 2 so that the boundary lines are divided into several smaller parts. These parts are usually situated straight in front of one another, so that the boundary lines will be straight and unbroken, but it is also possible for the different parts of each boundary line to be somewhat displaced in relation to one another, if e.g. for reasons of sealing technique it is not desired to place the edge lines of the blank directly in front of one another which might have a negative effect on the tightness of the finished packing container (explained more fully in the following). The displacement is slight (1 - 3mm) and the boundary lines may, therefore, still be considered to be practically straight. Each of the two transverse edges 11, 12 thus extends along one boundary line 17', along a first wall panel

13B, to continue on the adjoining wall panel 13A partly along the second boundary line 17", partly along the sloping transition lines 18, which link together the two boundary lines 17. This pattern is repeated on opposite edges of the blank so that the two wall panels 13B are delimited at both ends by straight parts of the transverse edges 11, 12 extending along the boundary lines 17', whilst the two wall panels 13A are delimited along a central portion 19 at both ends by parts of the transverse edges 11, 12 extending along the two boundary lines 17" and on either side of the central portion 19 by sloping transition lines 18. The two ends of the panels 13A are delimited thus by parts of the two transverse edges 11, 12 which partly extend along the boundary line 17" (the central portion 19), partly along the sloping transition lines 18, which connect the said central portion 19 to points of intersection 20 between boundary lines 17' and the crease lines 2 extending between the wall panels 13.

If the packing container blank in accordance with fig. 4 is considered as a whole, it will be seen that the two different wall panel types A and B occur alternately, which means that the pattern on the one transverse edge 11 is situated straight before the pattern on the opposite transverse edge 12. According to a second embodiment of the packing container blank in accordance with the invention it is also possible, however, to displace the pattern on the one transverse edge in relation to the pattern on the opposite transverse edge whilst retaining the mutual identity of the patterns. This is illustrated in fig.5 where a packing container blank of a second embodiment is shown schematically together with parts of adjoining, identical packing container blanks in a wider material web. Similarly to the packing container blank shown in fig.4 the packing container blank according to fig.5 is cut so that the two parallel lateral edges 9, 10 delimit the blank in one direction, whilst profiled transverse edges 11, 12 delimit the blank at the opposite sides. The packing container blank according to fig. 5 has a similar crease line pattern as the packing container blank according to fig. 4, that is to say, it is divided by means of

mutually parallel crease lines 2 into four wall panels 13 laterally adjoining each other, which are identical in pairs and are designated 13C and 13D respectively. However, contrary to what is the case in the packing container blank according to fig. 4, the

5 main top panels 3 and the main bottom panels 7 (for better understanding the same reference numerals have been used as far as possible for both embodiments) are situated at opposite ends of the same wall panel type (C) whilst the backfolding panels at the top as well as at the bottom ends are situated at opposite ends of the other wall panel type 13D.

10 The upper and the lower transverse edges 11 and 12 respectively of the packing container blank are profiled according to a similar pattern which is regular and is repeated over the width of the blank. However, the pattern on the one transverse edge 11 is displaced in relation to the pattern on the opposite transverse edge 12, so that

15 each individual wall panel on its one end is delimited by a straight, transverse edge and on its opposite end is delimited by a profiled edge. The edge pattern on one end of each wall panel thus has its counterpart on the opposite end of the adjoining wall panel, which is the reverse of what was the case in the embodiment according to

20 fig. 4, where in fact the edge pattern on the end of each wall panel had its counterpart on the opposite end of the same wall panel. In other words the edge pattern of the embodiment according to fig. 5 may be said to be identical on both edges, but displaced by one wall panel width.

25 The transverse edges 11, 12 follow the same regular pattern as the corresponding transverse edges in the embodiment according to fig. 4. In other words the edges follow alternately the one boundary line 17' and the other boundary line 17" together with the sloping transition lines 18 situated in between. At the upper end of the

30 packing container blank the transverse edge 11 runs along the one boundary line 17' over the wall panels 13C to continue over the wall panels 13D partly along the other boundary line 17", partly along the sloping transition lines 18 which connect the central portion of the edge line running along the boundary line 17" to the points of

35 intersection 20 between the boundary line 17' and the crease lines 2 separating the wall panels 13. At the lower end of the packing

container blank the two wall panels 13 of type D have a straight edge 12 which extends along the boundary line 17' whilst the two wall panels 13C have an edge line which over a central portion 19 extends along the boundary line 17" to continue on either side of this central portion in the direction towards the point of intersection between the boundary line 17' and the crease lines 2.

Owing to the special design of the two transverse edges 11, 12 a cutting out of packing container blanks from a material web or a larger material sheet is made possible without any wastage of excess material between the different packing container blanks occurring, since thanks to the regular edge pattern they fit into each other and can be cut by means of a common cut which at the same time forms one edge of a first packing material blank and a greater or smaller part of an opposite edge of another adjoining packing material blank.

The two different embodiments of the packing material blank in accordance with the invention described are cut in different patterns. The first embodiment of the blank shown in fig.4 is cut with the two straight, parallel lateral edges 9, 10 parallel with the longitudinal direction of the material web, that is to say, the material web can be imagined to run vertically in the plane of the drawing. Since the two transverse edges 11, 12 of the packing container blank are formed according to regular, identical patterns which, moreover, are situated straight before each other, a profiled edge of one packing container blank will wholly coincide with the opposite profiled edge of the subsequent (or preceding) packing container blank, which makes it possible, by means of one transverse cut over the packing material web to form at the same time the lower transverse edge 12 of one packing container blank and the upper transverse edge 11 of the subsequent packing container blank. No wastage will occur in the course of this, since the edge profiles wholly coincide with one another. The lateral edges 9, 10 of the blanks are straight, and here too it will be possible, therefore, to cut a lateral edge of one sheet at the same time as the opposite lateral edge of the adjoining sheet without wastage, so that an arbitrary number of blanks may be placed side by side over the width of the material web.

In the second embodiment of the packing container blank in accordance with the invention (fig. 5) the material web from which the blank is made, likewise extends vertically in the plane of the drawing, that is to say the packing container blank is placed with the parallel lateral edges 9, 10 and the crease lines 2 at an angle of 90° to the longitudinal direction of the material web. Here, though the profiled transverse edges 11, 12 will not correspond directly to the edge profiles on the opposite edge of an adjoining blank, but the adjoining blank must be displaced over a distance which corresponds to the width of one wall panel 13. Owing to this displacement an arbitrary number of blanks can be placed side by side over the width of the material web and cut by means of common cuts which at the same time form the upper transverse edge 11 of one blank and the opposite transverse edge 12 of an adjoining blank. It is clear that in this embodiment a certain unavoidable wastage will occur at the outer edges of the material web, since these are straight and not profiled corresponding to the edges 11 and 12 of the packing container blank. The cutting can be carried out without wastage between successive blanks on the material web, if it follows the stepped line which the lateral edges 9, 10 of the packing material sheets placed side by side describe. The orientation of a packing container blank on the material web, and hence the choice of the first or the second embodiment of the packing container blank in accordance with the invention is determined, among other things, by the way in which it is wished to place the fibre direction in relation to the packing container blank. The laminated material from which the packing container blank is manufactured comprises, as mentioned before, a central carrier layer of paper. During the manufacture of the paper the individual fibres entering the paper are orientated more or less automatically in the direction of discharge of the paper from the paper machine, that is to say, the fibres will extend in the longitudinal direction of the web. In the embodiment according to figure 4, the fibres consequently will be orientated with their longitudinal axis in the longitudinal direction of the wall panels 13, i.e., vertically in the finished package, whilst in a packing container manufactured according

to the other embodiment of the blank (fig. 5) the fibres will be orientated horizontally in the packing container. Since this latter direction of orientation gives the side wall panels greater stiffness and, therefore, makes the packing container more stable to handle, it will generally be preferred. However, the vertical fibre orientation according to the first embodiment of the packing container blank allows easier forming of the upper, openable part of the package and can be desirable, therefore, in certain cases. The first embodiment, moreover, is somewhat simpler to manufacture at a faster rate, since the division of the wide material web is done by straight parallel cuts, which can be achieved at a very high working speed. Since the subsequent transverse division of the partial webs into individual packing container blanks takes place at an appreciably lower speed in connection with, or directly before, the conversion of the packing container material to individual packing containers, the profiled transverse cutting lines in this case do not signify any disadvantage.

When the packing container blank in accordance with the invention is converted to individual packing containers of the gable-top type the four wall panels 13, as mentioned previously, form four side walls, opposed in pairs, of the packing container as well as the top and the bottom of the packing container. During the forming of the top of the packing container the different top panels are folded according to a conventional pattern in that the two backfolding panels 4' are folded down, using corresponding parts of the upper transverse crease line 6 as a hinge, in the direction towards each other and towards the centre axis of the packing container. As a result the backfolding panels 4", located at the side, as well as the main top panels 3 connected with them are acted upon in direction towards each other. After the completed forming (fig. 2) the two parts of the sealing strip 16 adjoining the main top panel 3 will rest partly against each other and partly against the intermediate parts of the sealing strip 16 adjoining the backfolding panels, so that the sealing fin 5 pointing upwards can be formed.

The sealing together of the layers included in the fin takes place in conventional manner, that is to say, by heating of the material until the thermoplastics outer layers of the same reach melting temperature, and subsequent joining and pressing together. In this type of packing container top there are above all two areas which are critical from a point of view of leakage, namely at the two ends of the sealing fin 5, where two double-folded parts of the sealing strip 16 are to be pressed together. It is in these areas, marked by broken lines in fig. 1, that it is particularly difficult to prevent leakage along the folding lines in the sealing strip 16, since very fine channels tend to form "inside" the folds. The greater the length of the folding line available for sealing, the greater will be the possibility of preventing leakage along the folding line, and through the design of the packing container in accordance with the invention, moreover, optimum possibilities of preventing leakage are provided, since all the parts of the sealing strip 16 included in the sealing fin 5 are of full height in these critical areas, which was not the case in earlier designs where the two parts of the sealing strip 16 adjoining the backfolding panels only retained about one half of the height out to the crease lines 2.

The design of the packing container in accordance with the invention also contributes to safer sealing and improved tightness owing to a further feature, namely the fact that the portions of the sealing strip 16 extending along the two sloping transition lines 18 have a different slope on the same wall panel, which means that the said portions after forming of the packing container top, as can be seen in fig. 2, are subjected to slightly different stretching, as a result of which a direct and abrupt transition between double material thickness in the top part of the fin 5 to quadruple thickness in the bottom part of the fin is avoided, when the layers forming part of the sealing fin 5, are sealed to one another. A similar measure can also be adopted in other parts included in the sealing fin, e.g. by giving them a slightly different height (1-3 mm) which appreciably reduces the risk of leakage channels occurring along the lower portions of the sealing strip 16 forming part of the fin.

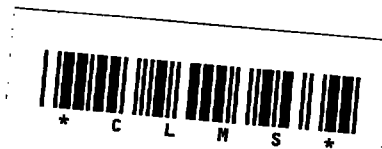
The bottom panel of the packing container is folded according to a substantially conventional pattern which involves acting upon the two opposing backfolding panels 8' in direction towards each other, so that they turn about the lower transverse crease line 15 serving as a hinge. In the course of this the two main bottom panels 7 are also acted upon via the lateral, triangular backfolding panels 8" in direction towards each other. After completed folding, the two corners of the backfolding panels 8' situated at the inner boundary lines attain a position close to one another, whilst the two edges of the main bottom panel 7 extending along the outer boundary line overlap each other in a central area of the base of the packing container. After sealing, this design provides a completely tight and plane base which is free of leakage channels or other features critical from a point of view of tightness.



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CLAIMS.

1. A method of cutting a web of packaging material into blanks for making packaging containers, each blank comprising a plurality of side-wall panels, with associated end-closure panels and sealing strips, all foldably connected together, wherein the width of the web is selected to be appropriate for dividing into a plurality of complete blanks located side-by-side transversely of the web, and the web is cut so that each blank has two opposite edges each in the form of a straight line, parallel or perpendicular to the edge of the web, and the other two edges of each blank are shaped to a pattern such that each can fully inter-nest with the adjacent edge of a neighbouring blank whereby there is no wastage of material along any of the cuts which separate the blanks from one another.
2. A method as claimed in Claim 1 wherein the web is divided by longitudinal cutting into separate columns of interconnected blanks.
3. A method as claimed in Claim 2 wherein separate individual blanks are provided by transverse cutting of a column along the common edges between neighbouring blanks.
4. A packaging container blank whenever cut by a method as claimed in Claim 1, 2 or 3 wherein the patterns to which two opposite edges of each blank are cut, are of a hill-and-dale profile.
5. A blank as claimed in Claim 4 wherein the hill-and-dale patterns at the opposite edges of each blank are displaced in relation to one another in a direction transversely of the blank.
6. A blank as claimed in Claim 4 or 5 wherein the overall patterns of said blank edges are the same as one another.
7. A blank as claimed in Claim 4, 5 or 6 wherein in the hill-and-dale patterned edges, the brow of each hill, and the trough of each dale are straight line cuts extending in a direction perpendicular to the opposite rectilinear edges of the blank, and adjacent straight line cuts are connected by inclined cuts.



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8. A blank as claimed in Claim 7 wherein said inclined cuts at opposite ends of an edge of a common wall panel of the blank are inclined at different angles in relation to the rectilinear edges of the blank.
- 5 9. A method of cutting a web of packaging material into blanks substantially as described herein with reference to the accompanying drawings.
10. A packaging container blank substantially as described herein in the reference to the accompanying drawings.
- 10 11. A packaging container whenever formed from a blank substantially as described herein with reference to the accompanying drawings.
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