



Cut sheet and packet, in particular for cigarettes

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Description

The present invention relates to a pre-cut sheet and also boxes produced therefrom, as used in particular as packaging for cigarettes.

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Cigarettes are usually marketed either in soft-pack packs or in hard-pack packs, for example in flip-top boxes or hinge-lid boxes, but also in so-called rigid-soft packs without flip tops. In the case of hard-pack packs it is also known to round off corners and edges in order to protect the pockets of the consumer. Thus for example DE 29 40 797 A1 describes for this purpose a cigarette box among others of hinge-lid type in which all corners and edges are rounded off. However this German unexamined patent application does not disclose how this box can be produced.

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In EP 0 764 595 A1, a cigarette box of hinge-lid type is described, the four horizontal main edges of which are chamfered or rounded off. To produce these edges, corresponding pre-cut sheets are also shown. This European publication furthermore contains a reference to US 2 523 251 (lines 51 to 54 in column 4 of EP 0 764 595 A1) and thus also the combination of the rounded-off or chamfered horizontal edges of EP 0 764 595 A1 and the chamfered longitudinal edges of US 2 523 251. Again however there is no indication of how this special version is to be produced.

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5 In fact, the production of a box, in particular a cigarette flip-top box in which all corners and the longitudinal edges and horizontal main edges are rounded off or chamfered, from a single pre-cut sheet is problematic.

10 The problem of the present invention is therefore to provide a pre-cut sheet which is simple to produce for the production of a box, in particular a cigarette box in which all longitudinal edges and the horizontal main edges and also the corners are rounded off or chamfered to the greatest extent possible.

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The solution to this problem is a pre-cut sheet made from foldable material for forming a cuboidal box which is closed at least on 5 sides, two main surface fields lying diametrically opposite each other in the cuboidal box to be formed and a base field connecting them being arranged in rectilinear succession in the pre-cut sheet and the sides which, in the cuboidal box to be formed, lie against the two main surface fields lying diametrically opposite each other and against the base field connecting these, being formed by side-surface fields which project laterally from the two main surface fields, and edges of the two main surface fields lying diametrically opposite each other in the cuboidal box to be formed being formed by fold areas, characterized in that

30 - two fold areas meet each other at (preferably the bottom) corners of the two main surface fields lying

diametrically opposite each other in the cuboidal box to be formed and

- of two fold areas which meet each other (preferably essentially at right angles) the one is delimited by a circle arc segment of approx. 45° to 90° , preferably 65° to 80° , and the other by an S-curve, the S-curve conforming to the circle arc segment to the corner of the main surface fields and
- each of the fold areas is preferably formed by two or more neighbouring, essentially parallel fold lines.

Preferred is a pre-cut sheet as defined above with a first main surface field with a left- and right-hand first side-surface field,

- a base field joining up with the top edge of the first surface field and a second main surface field with a left- and right-hand second side-surface field joining up with the top edge of the base field,
- the pre-cut sheet having horizontal and vertical fold areas, namely a first and second horizontal fold area between the first main surface field and the base field as well as between the base field and the second main surface field and first to fourth vertical fold areas between the left-hand first side-surface field and the first main surface field, the first main surface field and the right-hand first side-surface field, the left-hand second side-surface field and the second main surface field as well as between the second main surface field and the right-hand second side-surface field,
- the first horizontal fold area meeting the first and second vertical fold areas at the top corners of the first main surface field and

- the second horizontal fold area meeting the third and fourth vertical fold areas at the bottom corners of the second main surface field.

5 The pre-cut sheet described above can be produced easily by appropriate modification of existing machines for the production of pre-cut sheets. By customary folding and gluing, a hard-pack pack results therefrom which consists only of a box part into which a cigarette group wrapped in
10 an inner liner can be inserted. Usually the box size is dimensioned such that the cigarette group sits tightly in the box and projects somewhat at the top, open end of the box in order to make it possible for the consumer to open the box and to remove the cigarettes.

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As a rule however, in addition to the box part the box will also have a lid part so that a customary hinge-lid box results.

20 In order to obtain this customary hinge-lid box, the pre-cut sheet described above has additional fields, namely, joining up with the second main surface field a third main surface field with a left- and right-hand third side-surface field, a top side field joining up with the top
25 edge of the third main surface field and a fourth main surface field with a left- and right-hand side-surface field joining up with the top edge of the top side field, and

- the pre-cut sheet having further horizontal and
30 vertical fold areas, namely a third and fourth horizontal fold area between the third main surface field and the top side field as well as between the top side field and the

- fourth main surface field and fifth to eighth vertical fold areas between the left-hand third side-surface field and the third main surface field, the third main surface field and the right-hand third side-surface field, the left-hand
5 fourth side-surface field and the fourth main surface field as well as between the fourth main surface field and the right-hand fourth side-surface field,
- the third horizontal fold area meeting the fifth and sixth vertical fold areas at the top corners of the third
10 main surface field and
 - the fourth horizontal fold area meeting the seventh and eighth vertical fold areas at the bottom corners of the fourth main surface field.
- 15 Advantageously, the pre-cut sheet, in addition to the fields described, also has supplementary left- and right-hand second side-surface field end tabs on the bottom edges of the left- and right-hand second side-surface fields, and also left-hand and right-hand third side-surface field end
20 tabs on the top edges of the left- and right-hand third side-surface fields. These side-surface field end tabs serve to strengthen the base and the lid of the finished box.
- 25 There is preferably located on the top edge of the fourth main surface field a strengthening field which, during the production of the box, is glued to the inside of the fourth main surface field and likewise serves to strengthen.
- 30 The customary materials for hinge-lid boxes can be used as foldable material, e.g. paper or cardboard, optionally

coated, and also plastic, plastic film or plastic laminate, preferably shortgrain paper or shortgrain cardboard.

5 The fold lines can be either grooves or preferably scoring lines and preferably extend over the whole length and breadth of the box.

10 To produce grooves the relevant points of the pre-cut sheet are indented by a grooving unit. On the opposite side there is a groove channel into which the material of the pre-cut sheet can be pressed. In the case of parallel-running grooves, a corrugated cross-section results according to the described process. This process is described for example in US 2 523 251 and the result shown in Fig. 2
15 thereof. When the thus-worked pre-cut sheet is folded up, the round (in the case of several grooves) or chamfered (in the case of two grooves) edges of the pack then automatically form along the grooves.

20 A disadvantage of this is however that, due to the inherent rigidity and the elastic restoring forces of the pack material, the gluing for producing the cigarette pack is not unproblematic. This is usually carried out on overlapping areas of the pre-cut sheet which form the side
25 walls of the box. As a result of the rounded-off or chamfered edges, these overlapping areas are clearly reduced compared with a normal e.g. hinge-lid box with the result that only a limited amount of glue can be applied. As a result therefore, the machine production is slowed
30 down, as it is necessary to wait longer until the relatively small amount of glue has dried well as the box

would otherwise reopen as a result of the elastic restoring forces of the material.

This is particularly pronounced when shortgrain cardboard
5 or paper is used for the production of the e.g. hinge-lid
box. In the case of paper or cardboard production, the
product-forming material is placed on a fast-moving belt.
This has the effect that the long fibres in the material
preferably orient themselves in longitudinal direction.

10 Depending on whether the pre-cut sheet is later cut along
or across the finished material web, the long fibres in the
pre-cut sheet are arranged across the longitudinal axis of
the pre-cut sheet (shortgrain) or along the longitudinal
axis of the pre-cut sheet (longgrain). The result of the
15 orientation of the fibres across the longitudinal direction
of the shortgrain pre-cut sheet is a good flexibility about
the transverse axis, but a poor flexibility about the
longitudinal axis. The elastic restoring forces for the
lateral gluing are therefore stronger than with longgrain
20 pre-cut sheets in which, due to the transposed position of
the long fibres in the material, the conditions are exactly
the opposite. On the other hand however, shortgrain pre-cut
sheets are preferably used for flip-top boxes, as they
clearly favour the stability of the lid (no crooked
25 closures, no easy tearing-off of the lid), the rigidity of
the pack as a result of a higher stability in the
transverse direction and the flat position of the pack,
i.e. as small a curvature of the pack as possible, compared
with the use of longgrain materials.

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By using scoring lines instead of grooves, the elastic
restoring forces are surprisingly clearly reduced with the

result that shortgrain materials can be used problem-free and swiftly to produce the boxes without problems arising with the gluing of the box because of the smaller available surface.

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To produce scoring lines, the thickness of the material forming the pack is reduced using a scoring knife. For this purpose, the pre-cut sheet is placed on a flat support and worked with a scoring knife with the result that, in addition to a compression, material can also be removed. Depending on the shape of the scoring knife, for example a v- or u-shaped cross-section is formed. As the support does not have channels at points opposite the scoring knife, as with the process for producing grooves, but rather a flat surface, a reduction in thickness results and not, as with the grooves, a deformation without a reduction in thickness.

The extent of the reduction in thickness depends on the material used and on the fold area affected. Scoring lines of vertical fold areas are formed by a 10-80%, preferably 30-70%, quite particularly preferably 40-60% and for example approx. 50% reduction in the thickness of the paper or cardboard, scoring lines of horizontal fold areas by a 10-50%, preferably 20-40% and for example approx. 30% reduction in the thickness of the paper or cardboard.

Scoring lines are also preferred for a second reason for the pre-cut sheets according to the invention. They have the advantage that, when they are located on the inside of the finished pack, the outside appears fully intact and

unworked and therefore offers the consumer a better optical appearance, which is not possible when grooves are used.

The extent and the type of rounding can be fixed by the
5 number of fold lines and their distance from one another. 6
to 8, in particular 7, fold lines per fold area which are
located at a distance of approx. 1 mm from one another are
preferred. Upon folding, a box with round edges results;
the radius of the rounding then approximately corresponds
10 to that of a cigarette customary in the trade. 2 fold lines
per fold area which are located at a distance of 6 to 8 mm,
in particular approximately 7 mm, from each other are also
preferred. Upon folding a box with chamfered (or bevelled)
edges then results.

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For a uniform optical appearance of the box it is further
preferred that all fold areas have the same number of fold
lines.

20 For the meeting of the vertical and horizontal fold areas
it is preferred that the end of the circle arc segment and
the end of the S-curve run at right angles from each other
and lie parallel to the edges of the main surface fields as
in this way a problem-free transition between the different
25 fold areas is possible.

The circle arc segment and the S-curve are preferably not
connected to each other, or connected only at the corner
point of the main surface fields. Although it is also
30 possible in principle for there to be an at least partial
connection between circle arc segment and S-curve, upon
folding-up to form the box, creasings and irregularities

then occur in the transition area between the two different fold areas.

It is furthermore preferred that at least one fold area is delimited either by a circle arc segment or an S-curve, just as it is preferred that in all fold areas which meet at their two ends essentially at a right angle to other fold areas, both ends of these fold areas are delimited either by the circle arc segment or the S-curve. Finally it is also preferred that all fold areas lying parallel to each other are in each case delimited either by a circle arc segment or an S-curve. In all three cases this leads to a better optical impression.

The pre-cut sheets are produced in known manner, i.e. the pre-cut sheets are taken off from widths of pre-cut sheet material which are stored on rolls and printed, preferably as shortgrain pre-cut sheets. This is usually followed by a step in which the pre-cut sheets are worked by a scoring knife or grooving unit in the described manner and at the same time punched and/or cut and optionally embossed. By customary folding and gluing at the side surfaces, the finished for example cigarette box is then obtained by machine, which usually contains a cigarette group wrapped in an inner liner. A customary collar part is normally also inserted into hinge-lid boxes according to the invention, which, in the opened box, protrudes slightly from the inside of the box front wall and has a recess which makes it possible to grasp the cigarettes located in the box.

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The invention will be explained in the following using an embodiment. There are shown in:

Figure 1 a pre-cut sheet according to the invention for
the production of a hinge-lid cigarette box and
Figure 2 a view of detail Y of Fig. 1.

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A first main surface field 20 is to be seen which
corresponds in the finished box to the front wall of the
box part of the box, with its adjacent side-surface fields
22 and 24. A first and second vertical fold area 90 and 91,
10 which are formed here by 7 scoring lines 100 and which have
a quadrant on their top end, are located between the left-
hand first side-surface field 22 and the first main surface
field 20 and also the first main surface field 20 and the
right-hand first side-surface field 24.

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The base field 30, followed by the second main surface
field 40, joins above with the first main surface field 20.
The first horizontal fold area 80 is located between the
first main surface field 20 and the base field 30, the
20 second horizontal fold area 82 between the base field 30
and the second main surface field 40. These two horizontal
fold areas 80 and 82 are also formed by 7 scoring lines 100
each of which displays an S-shaped line at both its ends.
The second main surface field 40 which corresponds in the
25 finished box to the back of the box part is flanked by the
left-hand second side-surface field 42 with the left-hand
side-surface field end tab 46 located thereon and the
right-hand second side-surface field 44 with the right-hand
second side-surface field end tab 48 located thereon. A
30 third and fourth vertical fold area 92 and 93 lie in
between.

The third main surface field 50, to which the lid rear wall corresponds in the finished box, joins up with the second main surface field 40. The main surface fields 40 and 50 are separated by the fold line 12 about which the lid in the finished box can be swivelled. The fifth vertical fold area 94 and the sixth vertical fold area 95 are located between the third main surface field 50 and the left-hand third side-surface field 52 with the left-hand third side-surface field end tab 56 located thereon on one side and the right-hand third side-surface field 54 with the right-hand third side-surface field end tab 58 located thereon on the other side. The vertical fold areas 92 and 93 and also 94 and 95 are separated from each other by indents which can extend up to the fold line 12 or even further.

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The lid field 60 follows on from the top side of the third main surface field 50 which is followed for its part by the fourth main surface field 70. The third horizontal fold area 84 is located between the third main surface field 50 and lid field 60 and the fourth horizontal fold area 86 between lid field 60 and the third main surface field 70, these again, like all the other fold areas, being formed by 7 scoring lines.

25 The left-hand fourth side-surface field 72, the right-hand fourth side-surface field 74 with the seventh and eighth vertical fold areas 96 and 97 located in between and also the strengthening field 72 group around the fourth main surface field 70. This strengthening field 72 had only four scoring lines 100 on account of its somewhat smaller dimensions.

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The vertical and horizontal fold areas meet at the corners of the main surface fields, thus e.g. the vertical fold areas 90 and 91 meet the horizontal fold area 80 at the top corners 21 and 23 of the main surface field. The vertical
 5 fold areas end in the version of Figure 1 in a quarter arc which passes smoothly on one side into the top edge of the respective neighbouring side-surface field and smoothly on the other side into the outer edge of the respective main surface field. The horizontal fold areas end in S-curves
 10 which pass smoothly into the outer edges on one side of the respective neighbouring main surface field and on the other side of the neighbouring base field or top side field.

In addition to the scoring lines 100 of the various fold
 15 areas, further fold lines are to be seen, thus the fold line 12 between the second 40 and the third 50 main surface field, the fold lines 77 in the strengthening field 72, and the fold lines 55 and 45 about which the side-surface field end tabs can be swivelled.

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To produce the cigarette box, firstly the side-surface fields 42 and 44 can be folded upwards by 90° and the side-surface field end tabs 46 and 48 located thereon then folded inwards, likewise by 90° . The bottom part of the
 25 pre-cut sheet 10 is then folded upwards by 90° with the base field 30 and the first main surface field 20, as a result of which the side-surface field end tabs 46 and 48 come into contact with the base field 30 and are glued. If the first main surface field 20 is folded further (by 90°),
 30 the side-surface fields 22, 42 and 24, 44 come to lie on top of one another and can be glued, with the result that the bottom part of the box, the box part, is finished. The

top part, the lid part, of the box is produced in similar manner, i.e. the side-surface field end tabs 56 and 58 are glued to the top side field 60. The strengthening field 72 is glued inwardly onto the fourth main surface field 70 and thereupon the side-surface fields 52, 72 and 54, 74 glued together. The scoring lines 100 are therefore located on the inside of the finished box and are not visible to the consumer from the outside.

- 10 The hinge-lid box obtained by the folding described has rounded-off longitudinal edges. The four horizontal main edges are also rounded off. As a result of the meeting of circle arc segment and S-curve at the ends of the fold areas, a smooth transition between the fold areas results and all 8 corners of the box are rounded off in this way.

The meeting of circle arc segment and S-curve is represented enlarged in the detail view of Figure 2. Each of the vertical fold areas 91 and 93 ends in a circle arc segment of approx. 60 to 70°, the horizontal fold areas 80 and 82 in an S-curve. Circle arc segments and S-curve lie adjacent to one another without being connected to one another and meet at the corner points 23 and 43.

Patent Claims

1. Pre-cut sheet (10) made from foldable material for forming a cuboidal box which is closed at least on 5 sides, two main surface fields (20, 40) lying diametrically opposite each other in the cubodial box to be formed and a base field (30) connecting them being arranged in rectilinear succession in the pre-cut sheet (10) and the sides which, in the cubodial box to be formed, lie against the two main surface fields (20, 40) lying diametrically opposite each other and against the base field (30) connecting these, are formed by side-surface fields (22, 24, 42, 44) which project laterally from the two main surface fields (20, 40), and edges of the two main surface fields (20, 40) lying diametrically opposite each other in the cuboidal box to be formed being formed by fold areas, characterized in that
- two fold areas meet each other at corners of the two main surface fields (20, 40) lying diametrically opposite each other in the cuboidal box to be formed and
 - of two fold areas which meet each other the one is delimited by a circle arc segment of approx. 45° to 90° and the other by an S-curve, the S-curve conforming to the circle arc segment to the corner of the main surface fields (20, 40).
2. Pre-cut sheet (10) according to claim 1, characterized in that the fold areas are each formed by two or more neighbouring, essentially parallel fold lines.

3. Pre-cut sheet (10) according to one of claims 1 or 2 with a first main surface field (20) with a left- and right-hand first side-surface field (22, 24),
- 5 - a base field (30) joining up with the top edge of the first surface field (20) and a second main surface field (40) with a left- and right-hand second side-surface field (42, 44) with the top edge of the base field (30),
- 10 - the pre-cut sheet (10) having horizontal and vertical fold areas, namely a first and second horizontal fold area (80, 82) between the first main surface field (20) and the base field (30) as well as between the base field (30) and the second main
- 15 surface field (40) and first to fourth vertical fold areas (90, 91, 92, 93) between the left-hand first side-surface field (22) and the first main surface field (20), the first main surface field (20) and the right-hand first side-surface field (24), the left-
- 20 hand second side-surface field (42) and the second main surface field (40) as well as between the second main surface field (40) and the right-hand second side-surface field (44),
- 25 - the first horizontal fold area (80) meeting the first and second vertical fold areas (90, 91) at the top corners (21, 23) of the first main surface field (20) and
- 30 - the second horizontal fold area (82) meeting the third and fourth vertical fold areas (92, 93) at the bottom corners (41, 43) of the second main surface field (40).

4. Pre-cut sheet (10) according to claim 3, characterized in that a left- and right-hand second side-surface field end tab (46, 48) joins up with the bottom edge of the left- and right-hand second side-surface field (42, 44).

5. Pre-cut sheet (10) according to claim 3 or 4, characterized in that a third main surface field (50) with a left- and right-hand third side-surface field (52, 54) joins up with the top edge of the second main surface fields (40), a top side field (60) with the top edge of the third main surface field (50) and a fourth main surface field (70) with a left- and right-hand side-surface field (72, 74) with the top edge of the top side field (60),

- the pre-cut sheet (10) having further horizontal and vertical fold areas, namely a third and fourth horizontal fold area (84, 86) between the third main surface field (50) and the top side field (60) as well as between the top side field (60) and the fourth main surface field (70) and fifth to eighth vertical fold areas (94, 95, 96, 97) between the left-hand third side-surface field (52) and the third main surface field (50), the third main surface field (50) and the right-hand third side-surface field (54), the left-hand fourth side-surface field (72) and the fourth main surface field (70) as well as between the fourth main surface field (70) and the right-hand fourth side-surface field (74),

- the third horizontal fold area (84) meeting the fifth and sixth vertical fold areas (94, 95) at the

top corners (51, 53) of the third main surface field (50) and

- the fourth horizontal fold area (86) meeting the seventh and eighth vertical fold areas (96, 97) at the bottom corners (71, 73) of the fourth main surface field (70).

6. Pre-cut sheet (10) according to claim 5, characterized in that a left- and right-hand third side-surface field end tab (56, 58) joins up with the top edge of the left- and right-hand third side-surface fields (52, 54) and a strengthening field (72) with the top edge of the fourth main surface field (70).

7. Pre-cut sheet (10) according to one of claims 1 to 6, characterized in that the foldable material is shortgrain cardboard or shortgrain paper.

8. Pre-cut sheet (10) according to claim 7, characterized in that the fold lines are scoring lines (100).

9. Pre-cut sheet (10) according to claim 8, characterized in that the scoring lines (100) of the vertical fold areas are formed by a 10 - 80%, in particular a 40 - 60%, reduction in the thickness of the paper or cardboard and the scoring lines (100) of the horizontal fold areas by a 10 - 50%, in particular a 20 - 40%, reduction in the thickness of the paper or cardboard.

10. Pre-cut sheet (10) according to one of claims 1 to 9, characterized in that the end of the circle arc

segment and the end of the S-curve run at right angles from each other and lie parallel to the edges of the main surface fields (20, 40, 50, 70).

- 5 11. Pre-cut sheet (10) according to one of claims 1 to 10, characterized in that the ends of at least one fold area are both delimited either by the circle arc segment or the S-curve.
- 10 12. Pre-cut sheet (10) according to one of claims 1 to 11, characterized in that in all fold areas which meet at their two ends at a right angle to other fold areas, both ends of these fold areas are delimited either by the circle arc segment or the S-curve.
- 15 13. Pre-cut sheet (10) according to one of claims 1 to 12, characterized in that all fold areas lying parallel to each other are in each case delimited either by the circle arc segment or the S-curve.
- 20 14. Box, which can be produced from a pre-cut sheet (10) according to one of claims 1 to 13.
- 25 15. Box, which can be produced from a pre-cut sheet according to claim 8 or 9, the scoring lines (100) being located on the inside of the box.