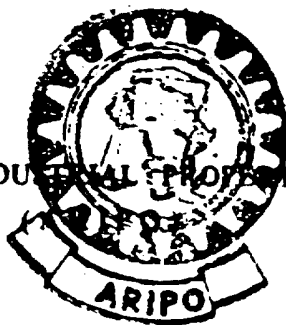




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(73) Applicant(s):

TETRA PAK INTERNATIONAL AB

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(72) Inventor(s):

Rolf Ignell

(74) Representative:

George Seirlis & Associates

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(54) Title: A Packing Container and a Blank for the Manufacture of the same.

(57) Abstract:

Fig.1

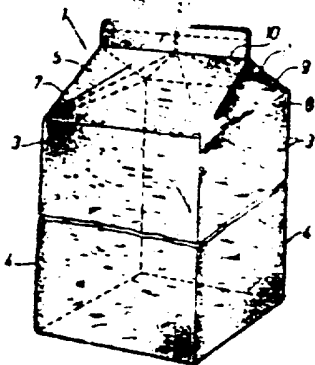


Fig.2

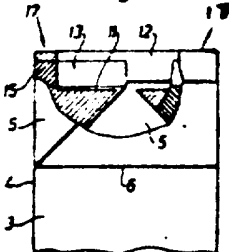
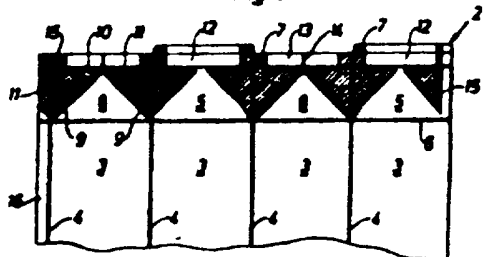


Fig.3



Packing containers of the non-returnable type are used, among other things, for the packaging of fermenting beverages. The carbon dioxide formed in the fermentation must be allowed to leave the package, since otherwise the latter will burst owing to the internal pressure.

A packing container and a blank for the manufacture of the same which make possible a ventilation of the container without the foam formed in the fermentation being entrained and ending up outside the package is provided with a pressure-equalizing opening arranged between a number of material layers forming the upper part of the packing container, which are sealed together for the purpose of closing the packing container but are partly non-sealed so as to form the said pressure-equalizing opening, and an antifoaming agent located in the packing container.

The antifoaming agent preferably has surface tension reducing properties and may be polyvinylalcohol with 88% degree of hydrolysis.

(56) References cited: CA 1153060, CA 1059478, CA 956282 CA 963865

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A PACKING CONTAINER AND A PLAN FOR THE MANUFACTURE OF THE SAME

The present invention relates to a packing container and a blank for the manufacture of the same. Packing containers of the non-returnable type are used at present for the packaging of a great number of different types of liquid foodstuffs, e.g. milk, beer, edible oil and others. Each type of contents presents the package manufacturer with special problems. However, these problems are solved one after the other and the number of products which can be packed increases continuously. Certain types of contents, though, have properties which are particularly difficult to control. Such a material is Sorghum beer, a traditional alcoholic drink which is produced and drunk in particular in Southern Africa. This beverage, which has no similarity with e.g. European beer, is packed and distributed whilst it continues strongly to ferment which means that the packing containers which are used must have some form of pressure equalizing opening, since otherwise the carbon dioxide liberated during the fermenting process (approx. 17 litres carbon dioxide are formed during the fermentation of 1 litre beer) causes the package to start leaking and even to burst.

A solution of this problem immediately coming to mind is to draw the upper, not liquid-filled, part of the packing container with a hole penetrating the package wall. Through this hole the carbon dioxide formed can escape. However, it is found in practice that the beer foams so strongly during the fermentation that the upper part of the packing container is filled with foam which, because of the pressure in the packing container, is entrained by the escaping carbon dioxide through the hole and emanates in the form of foam or liquid along the outside of the package. This of course is undesirable, especially if the beer foam contains a large amount of powder and yeast particles which attach themselves to, and form a sticky coating on, the outside of the packing container. During the transport of a number of packing containers in a collective holder the beer foam emanating acts as a glue which binds together the walls of the individual packing containers so that



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they can only be separated from one another with difficulties.

In attempts to diminish the foam problem in the aforementioned type of packing container it has been tried to place on the one hand pressure-equalizing ^{openings} as high as possible in the packing container, and on the other hand to raise the height of the packing container for a given volume of contents above what it is customary for less problematical, non-foaming contents. This of course entails an appreciably greater consumption of material which is a considerable disadvantage. In practice the method has not been effective either, since under certain conditions, e.g. at the transport over uneven, poorly surfaced roads in hot climates the foam and gas formation becomes very violent and overfills even a very large so-called headspace in the upper part of the package.

In spite of a number of trials no packing container of the non-returnable type has been presented up to now which is suitable for the packaging of Sorghum beer. Such a packing container on the one hand has to meet the conventional demands which are made on most types of packing containers for liquid contents, and on the other hand make possible the packaging of Sorghum beer in such a manner that the continuing fermentation and discharge of carbon dioxide is not prevented. Only in this manner is it possible to ensure that the contents as well as the packing container are in first class condition when they reach the consumer.

It is an object of the present invention to provide a packing container for gas-generating contents which is not subject to the disadvantages of previously known similar packing containers.

It is a further object of the present invention to provide a packing container which is intended in particular to make possible the packaging of fermenting and foaming contents and which makes possible a continuous pressure-equalizing between the interior of the packing container and the environment without foam from the contents leaking out or foreign, external objects being able to enter into the packing container.

It is a further object of the present invention to provide a packing container which is optimally adapted to the packaging of Sorghum beer and which can be manufactured and distributed at low

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cost.

Test and other checks have been carried in accordance with the invention in that a packing container has been given the characteristic that it is provided with a pressure-equalizing opening arranged between a number of material layers forming the upper part of the packing container which are sealed together for the purpose of closing the packing container but are partly non-sealed so as to form the pressure-equalizing opening.

Preferred embodiments of the packing container in accordance with the invention have been given, moreover, the characteristics which are evident from subsidiary claims 2 to 10 inclusive.

It is a further object of the present invention to provide a blank for the manufacture of the said packing container and the invention therefore also relates to a blank for the manufacture of packing containers, this blank being given the characteristic that it has a coating of antifoaming agent which substantially covers the surfaces of the backfolding panels facing towards the interior of the packing container.



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Preferred embodiments of the blank in accordance with the invention have been given. Moreover, the characteristics which are evident from subsidiary claims 15 to 18 inclusive.

By providing the packing container and the blank for the same 5 in accordance with the invention with a pressure-equalizing vent arrangement as well as a layer of antifoaming agent appropriately located in relation thereto, a packing container is obtained in which the internal excess pressure can be equalized by discharge of gas without any contents emanating in the form of liquid or 10 foam from the packing container. In the preferred embodiment of the packing container this is prevented, moreover, by the gradually narrowing channel which connects the contents space of the packing container with the pressure-equalizing opening. This arrangement also ensures that any leakage of the contents is reduced 15 even if the packing container tilts over.

It is obvious that the packing container and the blank in accordance with the invention can be designed within the scope of the concept of the invention and the following claims in a number of different ways. The pressure-equalizing openings as 20 well as the antifoaming agent may be used in packing containers of varying geometrical design, but a particularly appropriate packing container has proved to be the type known in itself which is called "gable-top package" or "ridge package".

A preferred embodiment of the packing container and the blank 25 in accordance with the invention will now be described in more detail with special reference to the attached diagrammatic drawings which shows the invention as embodied in a gable-top package.

Fig.1 shows in perspective a packing container in accordance with the invention.

30 Fig.2 shows from the side the upper part of the packing container in accordance with fig.1, certain parts having been cut away to facilitate understanding of the invention.

Fig.3 shows the upper part of a packing container blank in accordance with the invention.

35 The preferred embodiment of a packing container 1 in accordance with the invention shown in fig.1 is manufactured from

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a substantially rectangular blank 2 of laminated packing material. The packing material is flexible but relatively stiff and comprises a central barrier layer of fibrous material, usually paper which is covered on either side with thin, liquid-tight layers of thermoplastic material, preferably polythene. Beside acting as a stopping layer which prevents any leaking out of the liquid contents from the packing container, the thermoplastics also serves as a sealing material when the packing material blank 2 is converted to a packing container 1, by folding and sealing.

- 10 The embodiment of the packing container shown, preferred in this context, is of the "pile-top type" and thus comprises a substantially parallelepipedic main body which is provided with a ridgelike top. The greater part of the main body of the packing container is filled with liquid contents, whilst the ridgelike top 15 forms a free space or so-called headspace above the surface of the contents. This main type of packing container has been well-known for a long time and there is no need, therefore, to describe here more closely either the detailed construction of the packing container or the manner of manufacturing and shaping of the same.
- 20 The main body of the packing container is constituted, however, of four substantially rectangular side wall panels 3 which are separated from each other by means of vertical crease lines 4. The base of the packing container, similar to the top, is obtained by folding and sealing of a number of material panels designed in 25 a suitable manner.

The top part located at the upper end of the side wall panels too comprises a number of wall panels separated by means of crease lines. More particularly, each of the two opposing side wall panels 3 of the main body changes over at its top into rectangular 30 main panels 5 which by means of a horizontal crease line 6 are separated from the main body of the packing container. The rectangular panels 5 have a width corresponding to the width of the side wall panels 3 and are limited in lateral direction by crease lines 7 which constitute a continuation of the vertical 35 crease lines 4 between the side wall panels 3. Each of the two remaining opposing side walls 3 of the main body changes over at



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its top into panels corresponding in size and shape to panels 5, each of which however being divided into three triangular panels. One of these triangular panels, called infolding panel, is indicated by reference numeral 8 and is substantially isosceles. The triangular infolding panel 8 is terminated at its lower end by the crease line 6 mentioned earlier which extends over the whole width of the container blank and which constitutes the base edge of the triangle as well as the upper limitation edge of the side walls 3. The infolding panel 8 thus has a width corresponding to the width of the side wall 3 and a height corresponding to the height of the main panel 5. The isosceles sides of the triangular infolding panel 8 are formed by crease lines 9 each of which extends from its point of intersection between the crease lines 4 and 6 and to a point located centrally between the crease lines 4 on a crease line 10 extending on a level with the upper edge of the main panel 5. Between the triangular infolding panels 8 and the rectangular main panels 5 are located triangular backfolding panels 11, each of which is limited by the crease line 7, the crease line 9 and a part of the crease line 10.

Above the described area of the top of the packing container consisting of main panels 5, infolding panels 8 and backfolding panels 11, a number of sealing panels are present above the crease line 10 which in closed condition of the package form a sealing fin. The sealing panels terminate the packing container at the top and comprise two sealing panels 12 located above the rectangular main panels 5 which have a width corresponding to the rectangular main panels. Between these two sealing panels 12 extend sealing panels 13 located above the top of the backfolding panels 11. The sealing panels 13 which are a little lower than the sealing panels 12 are each divided by a vertical crease line 14 which extends from the meeting point of the crease lines 9 on the crease line 10 and vertically upwards to the top edge of the panels 13.

Fig. 3 makes evident how certain parts of the surface of the packing material blank 2 are coated with an antifoaming agent. The coating has been marked in the figures by oblique hatching

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and the coated areas have been given reference numeral 15. The coating 15 covers substantially the surfaces which thereafter will face towards the interior of the packing container and the greater part of the edge zones of the main panel 5 adjoining the coated 5 backfolding panels 11 and sealing panels 12. As is evident in particular from fig.3, in the preferred embodiment where the coating consists of an antifoaming as well as of a seal-inhibiting agent, the coating 15 extends over two or more edge areas of the sealing panels 12,13, that is to say substantially along the parts 10 of the crease lines 7 which delimit the sealing panels 12,13 from one another. The width of the coating in this area amounts to approx. 10 mm on either side of the respective crease line 7 which has been found to give good results, but the width may vary so that 10 - 40% of the surface of the sealing panels 12,13 are 15 covered by seal-inhibiting (and antifoaming) agent. The coating 15 thus consists preferably of an agent which is antifoaming as well as seal-inhibiting, but it is also possible to use two different agents, namely an antifoaming agent which covers the backfolding panels 11 and parts of the main panels 5 and a seal-inhibiting 20 agent which covers parts of the sealing panels 12 and 13. It is possible to apply both types of coating by means of a simple printing process in connection with the manufacture of the packing material. It is also possible to apply the agent by spraying or in some other known manner so that a coating of a thickness 25 appropriate for the purpose, preferably approx. $0.5 - 3 \text{ g/m}^2$, is obtained.

When the packing container blank 2 in accordance with fig.3 is to be converted to a packing container in accordance with the invention the packing container blank is folded first along the 30 crease lines 4 whereupon the two outer side wall panels 3 are joined to one another with the help of a sealing panel 16 extending along the crease line 4 of one of the side wall panels. The sealing takes place in a known manner by heating the appropriate parts of the thermoplastic layer of the packing material to such 35 a temperature that the thermoplastic material softens whereupon the layers are pressed together and allowed to cool. As a result



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a liquid-tight vertical seal is formed which imparts to the packing material blank the shape of a tube of substantially square cross-section. Then the base of the packing container is formed in that the bottom wall panels (not shown) designed in conventional manner are folded towards each other and heat-sealed so as to form a liquid-tight, substantially plane base. After this has been done the packing container can be filled with contents to a suitable level which substantially coincides with the main body of the packing container and the crease line 6 separating the top part. After filling with the required amount of contents has been completed the packing container is closed by folding down and sealing to one another the wall panels forming the top of the packing container.

The forming of the top of the packing container more particularly is realized by folding down the triangular panels 8 in the direction of the centre of the packing container at the same time as the rectangular main panels 5 are folded down towards each other and a swivelling movement is imparted to the triangular backfolding panels 11 connecting the panels 5 with the panels 8. In fully closed position (fig.1) the two main panels 5 like the triangular infolding panels 8 located under them, are inclined towards one another in pairs whereas the backfolding panels 11 are located at some distance under the main panels 5. In this manner between the main panels 5 and the backfolding panels 11 a channel which gradually narrows in upwards - outwards direction is formed, whose width at the end (facing towards the interior of the package at crease line 9) amounts to approx. 5 mm, then to taper off gradually in the direction towards the upper corner of the backfolding panel 11 which is formed by the crease lines 7 and 10 (where the width of the channel is approx. 1 mm). The surfaces forming the channel, that is to say the sides of the backfolding panels 11 facing towards the interior of the packing container and the corresponding triangular parts of the main panels 5 are preferably both (wholly or partly) coated with the antifoaming agent which together with the geometrical form of the channel results in a very good antifoaming effect. Moreover,

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since the channel extends at an angle to the vertical plane, a labyrinth function is created which effectively prevents the contents from getting up to the sealing fin formed by the sealing panels 12,13 when the packing container is subjected to impact or shaking.

After the top part of the packing container has been formed through folding in of the different panels forming the top part the shape of the top part is made permanent by sealing parts of the surfaces of the sealing panels 12,13 lying against one another by conventional heat sealing. Since the packing container in accordance with the invention is to be provided in its upper part with one or more pressure-equalizing openings the sealing panels 12,13 as described earlier have been coated with a seal-inhibiting and possibly also antifoaming agent. In the preferred embodiment of the packing container in accordance with the invention, four individual pressure-equalizing openings 17 are formed accordingly which extend along each of the vertical crease lines 7. On sealing together of the sealing panels 12,13 to form the sealing fin of the packing container the coating 15 prevents the sealing together of the sealing panels 12,13 in the said areas extending along the crease lines 7 which means that the two sealing panels 12 are sealed together only in a central area whilst approx. 10 mm openings are formed adjacent to the crease lines 7. The folded in sealing panels 13 situated in between are sealed to the sealing panels 12 only in their central part situated on either side of the crease lines 14, which means that here too non-sealed areas are present along the crease lines 7. Owing to the coating pattern on the preferred embodiment of the packing container in accordance with the invention shown, four individual pressure-equalizing openings are thus produced between the different layers in the otherwise sealed up sealing fin.

Fig.2 demonstrates how the sealed areas and the surfaces coated with seal-inhibiting and/or antifoaming agent relate to each other. In the central portion of the sealing fin the different sealing panels 12,13 are sealed to one another which is appropriate, since the contents have direct access via the top



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part of the packing container to this area and therefore can easily escape through possible leaks. The pressure-equalizing openings on the other hand are situated at both ends of the sealing fin and connection with the interior of the packing container is possible only via the channels extending between the backfolding panels 11 and adjoining parts of the main panels 5. Since the walls of the channels are coated with the antifoaming agent, an effective chemical foam-killing is obtained in the first place, whilst in addition any foam forcing its way up receives a mechanical treatment owing to the narrowing shape of the channel. Each of the four pressure-equalizing openings 17, as mentioned previously, has a width of approx. 10 mm, but the area of the openings can vary as a function of the actual pressure in the packing container and the quantity of carbon dioxide which happens to escape at the particular moment. When no pressure or no significant pressure prevails in the packing container the pressure-equalizing openings are kept substantially shut owing to the flexibility of the packing material, whereas the openings can be widened when the pressure in the package increases owing to shaking or increased temperature until the excess pressure has been reduced. It has been found in practice that the pressure-equalizing openings are rarely opened at the same time, but that as good as all cases they open successively one after the other. This is an inherent advantage in the arrangement having a number of pressure-equalizing openings, since each of these can be given a relatively small area which prevents unintentional leakage of the contents when the packing container tilts over. Likewise any risk of foreign objects penetrating into the packing container through the pressure-equalizing openings is largely eliminated.

The coating pattern for the antifoaming and seal-inhibiting agent may also be given a different geometrical shape or extent. Where no seal-inhibiting agent is used (or where it is applied in a separate operation) it is particularly advantageous to apply the antifoaming agent in a bandlike area along and directly below the crease line 10, since the application then does not have to be

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done in register with the panels and crease lines of the blank. The width of the donutlike area can be varied as a function of the required foam-killing effect.

The antifoaming agent may be of different types (polyvinyl alcohol, alginate etc.), but since in accordance with a preferred embodiment of the invention it is desirable to be able to make use of agents of a single kind to obtain the antifoaming as well as the seal-inhibiting effect, the available supply of suitable agents is somewhat limited. It has been found in practice that the use of a polyvinyl alcohol with a degree of hydrolysis of 80 - 95% is advantageous. Especially suitable is a polyvinyl alcohol with a degree of hydrolysis of 88%. This type of polyvinyl alcohol also has seal-inhibiting properties and the seal-inhibiting agent therefore may also be constituted of polyvinyl alcohol. As a result the coating for the purpose of foam-killing as well as of seal-inhibiting can be done in one operation which appreciably facilitates and renders less expensive the manufacture of packing containers in accordance with the invention. A layer of polyvinyl alcohol on the parts of the sealing panels 12,13 between which the pressure-equalizing openings are to be formed thus prevents effectively the fusing together and sealing of the thermoplastic layers in the packing laminate within this area, at the same time as on contact with the polyvinyl alcohol coating any foam formed by the contents is reduced to liquid which runs back into the packing container.

As an alternative to the seal-inhibiting layer on parts of the sealing panels 12,13 the sealing in these areas can be prevented also in other ways of course, e.g. in that these areas are prevented from being heated during the sealing of the top part. It can be advantageous however to retain the seal-inhibiting areas all the same, since this makes it even more certain that the pressure-equalizing openings will be formed and will operate in the intended manner.

As mentioned previously the packing container and the blank in accordance with the invention may be of a particularly varied geometrical design and it is only necessary for the attainment

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of the object which forms the basis of the invention that the upper part of the packing container should be provided with one or more pressure-equalizing openings and that an antifoaming agent is placed in the packing container inside the same. In practical
5 experiments it has been found that the packing container in accordance with the invention serves its purpose very well and is especially suitable for the packaging of goods developing gas and tending to foam such as Sorghum beer.

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CLAIMS

1. A packing container,
characterized in that it is provided with
a pressure-equalizing opening (17) arranged between a number
5 of material layers (12,13) forming the upper part of the packing
container (1) which are sealed together for the purpose of closing
the packing container but are partly non-sealed so as to form the
said pressure-equalizing opening (17), and an antifoaming agent located
in the packing container.
- 10 2. A packing container in accordance with claim 1,
characterized in that the pressure-equalizing
opening (17) at its part facing towards the interior of the
packing container (1) connects to a space wherein at least one
boundary surface is coated with the antifoaming agent.
- 15 3. A packing container in accordance with one or more of the
preceding claims comprising a ridgelike top part with two main
panels (5) inclined towards each other, two triangular panels(8)
located under these, also inclined towards each other, and back-
folding panels (11) joining together the main panels and the infold-
20 ing panels, characterized in that an
arrangement for preventing the emanating of liquid foam is provided
between the contents space proper of the packing container (1) and
the pressure-equalizing opening (17), this arrangement comprising
a gradually narrowing channel which is formed between a main panel
25 and adjoining backfolding panels (11), the walls of the channel
being coated at least partly with antifoaming agent.
4. A packing container in accordance with claim 3,
characterized in that the pressure-
equalizing opening is located at the upper end of the main panels (5)
30 where sealing panels (12,13) known in themselves are sealed to one
another in their central part whilst non-sealed areas at the ends
of the sealing panels form the said pressure-equalizing opening (17).

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5. A packing container in accordance with claim 4,
characterized in that because of the flexi-
bility of the packing material the pressure-equalizing openings (17)
normally are kept nearly closed, whereas the pressure-equalizing
5 openings are widened when the pressure in the packing container
increases until the excess pressure has been reduced.
6. A packing container in accordance with one or more of the
preceding claims,
characterized in that the antifoaming agent
10 is polyvinyl alcohol with a degree of hydrolysis of 80 - 95%.
7. A packing container in accordance with claim 6,
characterized in that the polyvinyl alcohol
has a degree of hydrolysis of 88%.
8. A packing container in accordance with one or more of claims
15 1 to 5 inclusive,
characterized in that the antifoaming agent
is an alginate.
9. A packing container in accordance with claim 1 or 4,
characterized in that the said non-sealed
20 area is coated with a seal-inhibiting agent.
10. A packing container in accordance with claim 9,
characterized in that the seal-inhibiting
agent consists of polyvinyl alcohol.
11. A blank for the manufacture of packing containers in accord-
25 ance with one or more of the preceding claims,

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