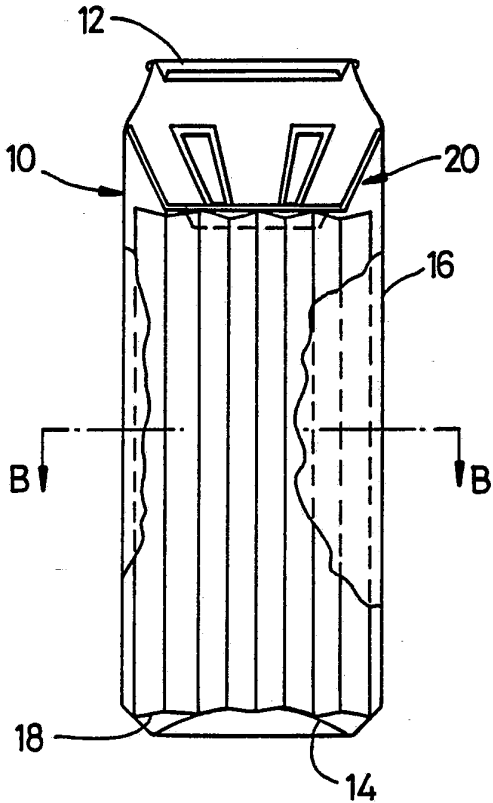




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<p>(54) Title: A CONTAINER OF CARBONATED BEVERAGE AND A METHOD OF ENHANCING RELEASE OF GAS FROM THE BEVERAGE ON OPENING THE CONTAINER</p>		
<p>(57) Abstract</p> <p>The invention is especially useful for the formation of a foamed head on low gas content "cask" beers. A pressurized container (10) of the carbonated beverage is provided with a nucleation promotion agent (18) which entraps gas bubbles in contact with the beverage and provides a gushing release of bubbles from the beverage on opening of the container (10).</p> <div style="text-align: right;">  </div>		

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A CONTAINER OF CARBONATED BEVERAGE AND A METHOD OF
ENHANCING RELEASE OF GAS FROM THE BEVERAGE ON OPENING THE
CONTAINER

5 This invention relates to a pressurised sealed container of carbonated beverage, which, on opening, releases gas bubbles from the liquid and to a method of enhancing release of gas bubbles.

10 The invention has particular application to containers of beer, which is used in this specification in its broad sense to include ales, stouts and lagers, for the enhancement of a foamed head on beer from the opened container.

15 The formation of a foamed head on beer is dependent, amongst other things, on the release of sufficient gas from the beer. This can be achieved by dissolving a high quantity of gas under high pressure in the beer to ensure
20 the release of sufficient gas when the beer is poured from the container. With many beers, however, especially cask beers, it is required to provide a low carbonation content to avoid spoiling the taste of the beer. A foamed head can only be produced with such beers by turbulent dispensing of
25 the beer.

It is difficult to produce low volume packs of beer with low gas content, which will produce a satisfactory

foamed head.

GB-A-1266351 discloses a complex and potentially expensive arrangement in which a secondary chamber in the container releases carbonated beverage through a narrow orifice into the main chamber of the container to produce excitation and a continuous release of gas for producing a foamed head.

10 GB-B-2183592 discloses the case of an insert which defines the secondary chamber. This arrangement is also potentially expensive and difficult to package.

15 GB-A-1588624 discloses excitation of a carbonated beverage after the container has been opened, e.g. by injection of gas or by pouring the beverages over shattered polystyrene granules, which forms a large uneven surface to cause excitation.

20 The present invention seeks to overcome these disadvantages of the prior art and to provide an improved, simple method of enhancing formation of a foamed head on low gas content beer.

25 The invention is, however, applicable to other carbonated beverages, where it is desired to produce release of a stream of gas bubbles on opening of a container, suitably a can, of the beverage. It is

possible, for example, that a stream of gas bubbles may be used to produce a predetermined sound, as by blowing a whistle.

5 It may also be desirable with highly carbonated beverages, e.g. lager beers, to provide enhancement of foamed head formation.

 The present invention provides a method of enhancing
10 release of gas from a carbonated beverage in a sealed container on opening of the container, in which a nucleation promotion agent is provided in the container, the agent being a material capable of carrying entrapped stabilised gas bubbles in contact with the beverage.

15

 The invention also resides in a pressurised sealed container of a carbonated beverage having provided in the container a nucleation promotion agent for promoting release of gas bubbles from the beverage when the container
20 is opened, the agent being a material carrying entrapped stabilised gas bubbles in contact with the beverage.

 In its application especially to beers, the invention may reside in a method of enhancing formation of a foamed
25 head on a carbonated beverage on opening of a pressurised container of the beverage, the method comprising providing in the container nucleation promotion agent in the form of a material capable of carrying entrapped stabilised gas

bubbles in contact with the beverage.

In this application to beers, the invention also resides in a pressurised sealed container of a carbonated beverage capable of producing a foamed head on the beverage when the container is opened, the container being provided with a nucleation promotion agent for promoting release of gas bubbles from the beverage when the container is opened to enhance the formation of a foamed head, the agent being a material carrying entrapped stabilised gas bubbles in contact with the beverage.

The material which carries the entrapped stabilised bubbles, may be provided as an insert in the container, or may be provided as a coating on the interior of the container.

The material is selected to have physical properties of hydrophobicity and porosity effective for entrapping bubbles and readily releasing the bubbles on release of pressure. The surface area and thickness are selected to ensure that a desired volume of gas is entrapped in a releasable manner, sufficient to promote the formation of a stream of bubbles or "gushing", from a carbonated beverage.

The material is also selected to ensure non-toxicity and to have little or no effect on the flavour of the

beverage.

The material may be affixed to the interior of the container with a food grade adhesive, or may be loosely
5 received in the container. However, it is preferably held in place by means of a suitable clip.

The material may be in the form of a plain or fluted tube, or a flat or pleated plate, or in the form of a coil.
10 Alternatively the material may be in the form of a semi-rigid "honeycomb" made in any suitable way. For example the honeycomb may be produced by folding a single sheet of material or produced by bonding several plain sheets of material together in appropriate fashion. Likewise the
15 material may be in the form of numerous plain hollow tubes ("straws") bonded together in suitable fashion, or as a corrugated structure prepared by bonding a fluted sheet of material to a plain one.

20 The material is conveniently inserted in the container and retained in position by a suitable device, e.g. a clip. Such a device is preferably made from a suitable food-grade plastic (for example moulded polyethylene or polypropylene). If the secondary device is both of
25 appropriate physical and structural properties and of appropriate dimensions it may act to restrain the movement of the material within the container, either by the friction generated between the material and the container

wall, or because of the specific spatial interactions between the secondary device and the material on the one hand, and the container on the other.

5 It has been found that some plastics materials have the desired properties, for example, spun polyolefin and polytetrafluoroethylene membranes. Spun-bonded high-density polyethylene fibres in a form such as TYVEK (Registered Trade Mark) has been found to be particularly
10 effective. The most effective type of the material TYVEK appears to be "type 10" or "hard" (that which is heavily bonded). Amongst many grades of "type 10" TYVEK which are suitable for exploitation in this invention, that which has a bulk density of 56 g.m^{-2} (so-called 1056 grade) performs
15 the best although other grades (for example those with bulk densities in the range 25 to 59 g.m^{-2}) work almost equally well. Thicker grades of "type 10" TYVEK (for example those with bulk densities of 73 g.m^{-2} , 79 g.m^{-2} or 85 g.m^{-2}) work less well. Ideally the material is corona treated to
20 oxidise the surface which increases both its surface tension (from 32 to 45 dynes.cm^{-1}) and its wettability.

Release of gas bubbles from the beverage is dependent on numerous factors, including volume of headspace and
25 overall gas content and these would be controlled to ensure production of the desired foamed head. Other factors, such as dispensing temperature and vigorous dispensing cannot be controlled at source.

There now follows a detailed description to be read with reference to the accompanying drawings of a container embodying the invention and its method of use. It will be realised that this container and its method of use have
5 been selected for description to illustrate the invention by way of example.

In the accompanying drawings:-

Figure 1a is a plan view of a clip for use in a
10 container embodying the invention;

Figure 1b is a sectional view of the clip on the line A-A of Figure 1a;

Figure 2a is a plan view showing a corrugated sheet material, suitable for entrapping bubbles;

15 Figure 2b is a side view of a container with part broken away namely a beer can, embodying the invention; and

Figure 2c is a section view on line B-B of Figure 2b showing the sheet material.

20 Figure 2b shows a beer can 10 embodying the invention, the shell of the can is of known construction and is made from metal having a pull-ring opening means (not shown) in an upper end wall 12. A bottom 14 is domed inwardly and the can has a generally cylindrical sheet metal side wall
25 16. The can 10 has an insert 18 of a sheet material 17 adapted to carry entrapped stabilised gas bubbles when the container is filled to a suitable level with a carbonated beverage under pressure. The insert is preferably made of

TYVEK as discussed herein. This is provided in a corrugated form (see especially Figures 2a and 2c); the corrugated material 17 can then be bent to provide the material as a generally cylindrical corrugated body adjacent an inner surface of the can side wall 16.

The insert 18 is retained in place in the can by a clip 20 (see Figures 1 and 2b) and by the domed bottom wall 14 of the can.

10

The clip 20 has a central generally annular ring portion 21 from which a number of arms 22 project outwardly and is conveniently injection-moulded from a suitable food-grade plastics material. The arms 22 are equally spaced and have openings 24. The clip 20 is generally frustoconical in appearance. Outer end portions 26 of the arms are curved with a curvature similar to that of a portion of the internal surface of the can side wall 16 which the end portions are, in use, intended to engage. As can be seen in Figure 2b, the clip 20 is received in an upper end portion of the can 10, the arms 22 being slightly too long, so that they slightly press, resiliently, against the side wall 16. The ring portion 21 is spaced by the arms 22 remotely from the upper end wall 12 of the can and the clip engages the insert 18 to retain it in place, between the clip and domed bottom wall 14, as shown in Figure 2b.

The can 10 is filled in the usual way, after the insert 19 and clip 20 have been put in place.

The flow of beverage from the container is barely
5 affected by the clip 20 in view of the open nature of the ring portion 21 and the openings 24 in the arms.

In one particular example, using the can shown in the drawings, in order to provide the desired effect of gas
10 release and generation of foam in a suitable beverage at a temperature of 6°C from a container, namely can 10, (e.g. 440 ml or 500 ml nominal volume) an insert 18 of area 625 cm² of an appropriate grade of TYVEK is required (e.g. 12.5 x 50 cm) having a configuration generally as shown in
15 Figures 2a-c of the drawings. Slightly lower surface areas (e.g. 400 cm² or 500 cm²) are marginally less effective, and the performance of a sheet with a surface area of 300 cm² is relatively poor. There is no significant improvement in performance above a surface area of 600 cm², and above 900
20 cm² there is a decrease in performance due to overlapping of the sheet. The pleated sheets of TYVEK may be treated during their manufacture so as to ensure that the entrapped gas is CO₂.

25 The performance of foam generation upon dispense of the beverage is temperature-sensitive and, in addition to a suitable surface area of TYVEK of appropriate grade, requires certain conditions of dissolved gas content in the

beverage and certain differential pressure between the headspace above the beverage in the can 10 and atmospheric pressure. In order to function in appropriate fashion at a temperature of 6°C a suitable dissolved gas content for 5 the beverage has been found to consist of 1.5 vol/vol CO₂ and 60 ppm N₂, and a suitable headspace pressure has been found to be 1.2 bar absolute.

Different dissolved gas contents may be present in 10 other beers and details may differ where other beers are to be dealt with, for example 2.8 vol/vol dissolved CO₂ but no dissolved N₂. The details in such systems may be adjusted to produce the desired result when opening a can.

CLAIMS

1. A method of enhancing release of gas from a carbonated beverage in a sealed container on opening of the container, characterised in that a nucleation promotion agent is provided in the container, the agent being a material capable of carrying entrapped stabilised gas bubbles in contact with the beverage.
5

2. A method of enhancing formation of a foamed head on a carbonated beverage on opening of a pressurised container of the beverage, characterised by providing in the container a nucleation promotion agent in the form of a material capable of carrying entrapped stabilised gas bubbles in contact with the beverage.
10

3. A pressurised sealed container of a carbonated beverage characterised by having provided in the container a nucleation promotion agent for promoting release of gas bubbles from the beverage when the container is opened, the agent being a material carrying entrapped stabilised gas bubbles in contact with the beverage.
15
20

4. A pressurised sealed container of a carbonated beverage capable of producing a foamed head on the beverage when the container is opened, characterised in that the container is provided with a nucleation promotion agent for promoting release of gas bubbles from the beverage when the container is opened to enhance the formation of a foamed
25

head, the agent being a material carrying entrapped stabilised gas bubbles in contact with the beverage.

5. A pressurised sealed container according to Claim 3 or
5 4, wherein said material is provided as a coating on the interior of the container.

6. A pressurised sealed container according to Claim 3 or
4, wherein said material is provided as an insert in the
10 container.

7. A pressurised sealed container according to Claim 6
comprising a clip received in the container and engaging
the insert whereby to assist in retaining the insert in a
15 desired position in the container.

8. A pressurised sealed container according to Claim 7
wherein the clip comprises a central annular portion from
which project outwardly a plurality of arms which engage a
20 wall, the clip being of generally frustoconical
configuration, the arms holding the annular portion spaced
from an end wall of the container.

9. A pressurised sealed container according to Claim 6,
25 wherein the insert is affixed to the container.

10. A pressurised sealed container according to any one of
Claims 3 to 9, wherein said material comprises a

polyolefin.

11. A pressurised sealed container according to Claim 10, wherein said material is spun polyethylene.

5

12. A pressurised sealed container according to any one of Claims 3 to 9, wherein said material is polytetrafluoroethylene.

10 13. A clip suitable for use in a pressurised sealed container according to any one of the preceding claims comprising a central annular portion and a plurality of arms projecting outwardly from the annular portion, the clip having a generally frustoconical configuration.

15

14. A clip according to Claim 13 comprising an opening in each arm.

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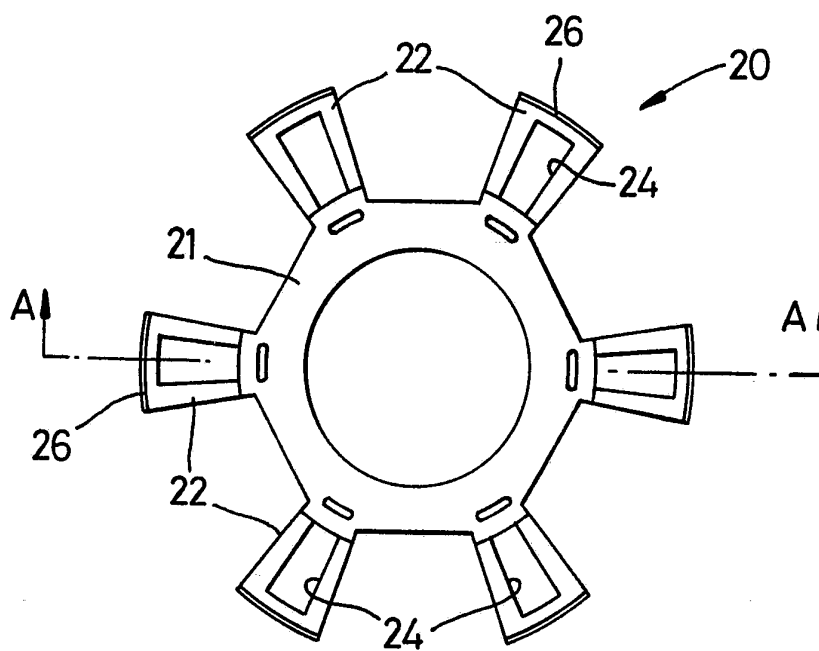


Fig. 1a

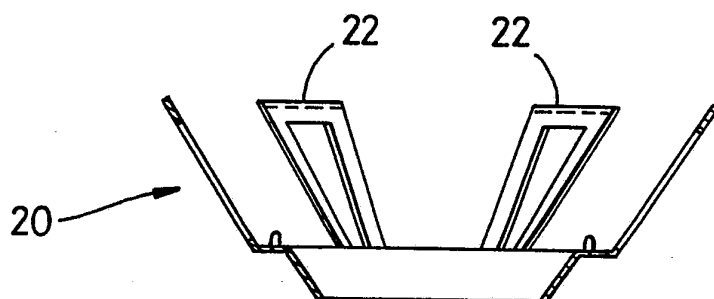


Fig. 1b

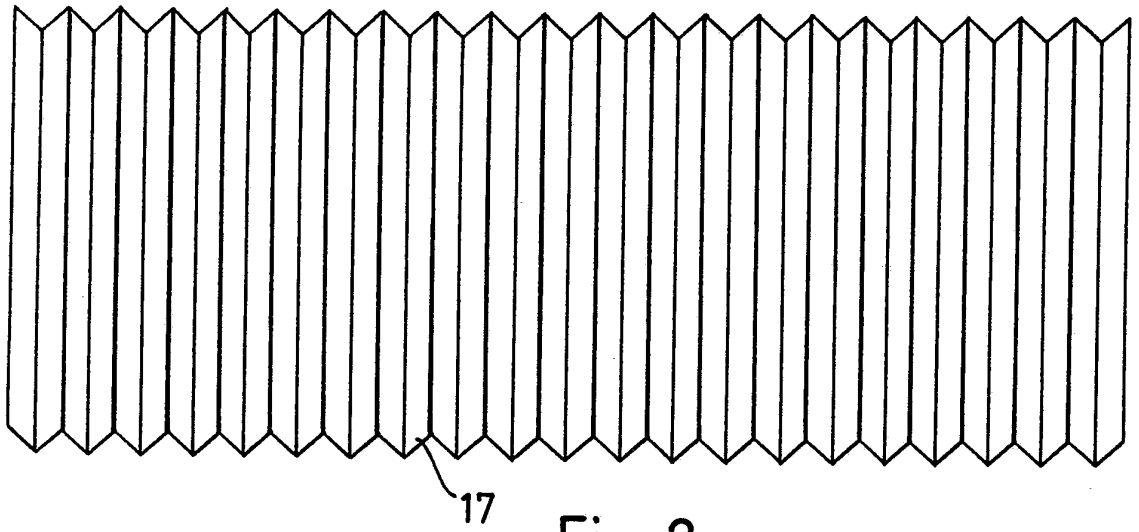


Fig. 2a

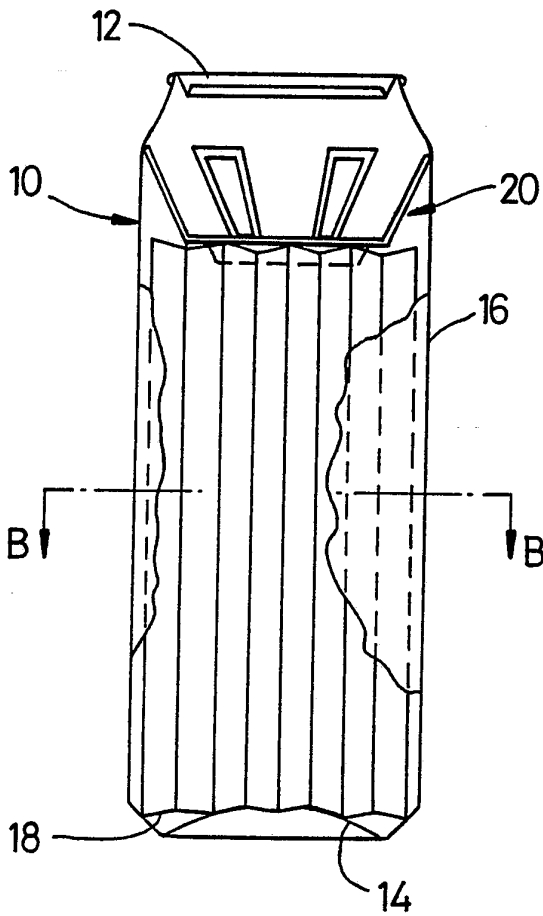


Fig. 2b

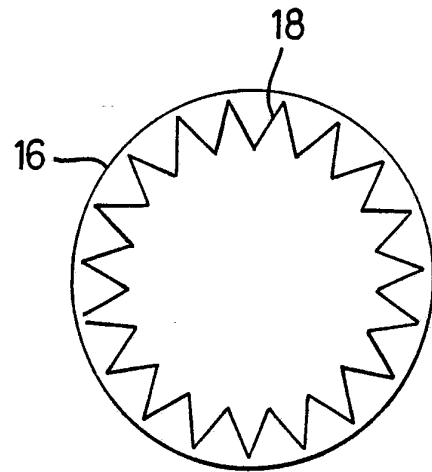



Fig. 2c

INTERNATIONAL SEARCH REPORT

PCT/GB 92/01535

International Application No

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5 B65D79/00		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 5	B65D	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	DE,A,2 002 976 (HILDEBRAND) 30 July 1970 cited in the application see claim 1; figures 1-4 -----	1-4
A	EP,A,0 227 213 (FORAGE) 1 July 1987 cited in the application ABSTRACT see figures 1-5 -----	1-4
<p>⁹ Special categories of cited documents :¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
12 NOVEMBER 1992	1. 12. 92	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	VANTOMME M.A. 	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. GB 9201535
SA 63635**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		CA-A- 939637	08-01-74
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