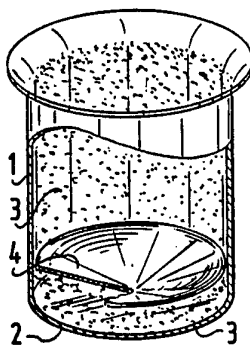




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<p>(21) International Application Number: PCT/EP93/02499 (22) International Filing Date: 14 September 1993 (14.09.93) (30) Priority data: 9200802 14 September 1992 (14.09.92) BE (71)(72) Applicants and Inventors: LEFEBVRE, Paul, Henri [BE/BE]; Avenue Bel Air 8, B-1970 Wezembeek (BE). LEFEBVRE, Henri, Jean, Louis [BE/BE]; Tervuurssteenweg 61A, B-3080 Duisberg (BE). (74) Agent: HOIJTINK, Reinoud; Arnold & Siedsma, Sweelinckplein 1, NL-2517 GK The Hague (NL).</p>		<p>(81) Designated States: AU, BB, BG, BR, BY, CA, CZ, FI, HU, JP, KP, KR, KZ, LK, MG, MN, MW, NO, NZ, PL, RO, RU, SD, SK, UA, US, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG):</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>

(54) Title: METHOD OF AND CONTAINERS FOR FERMETING OR REFERMENTING FOODSTUFFS AND DRINKS



(57) Abstract

The invention relates to a method of fermenting and/or refermenting beverages or foodstuffs by means of microorganisms, wherein the beverage or foodstuff together with the microorganisms used for the (re)fermentation are contained in a container which is provided with means for retaining the microorganisms and lees that may have formed in the container, upon emptying thereof. The container may be an at least partially metallic can or a bottle. The retaining means may be located on various spots in the container, such as the bottom, the interior wall or the lid of the container. The retaining means are made of various materials such as cellulose fragments, plastic, plastic foams, textile fibres, tissue fragments, adhering film, inorganic, organic, natural, synthetic or mineral materials such as diatoms, silicions earth, carbon, or combinations thereof. The invention further relates to a method wherein the containers are aseptically filled by means of the degassing and deareation of the beverage or foodstuff; pasteurizing or sterilizing the beverage or foodstuff; optional refrigeration of the beverage or foodstuff; introduction of the (re)fermenting microorganisms; introduction of steril solutions of carbo-hydrates and/or flavours; optional introduction of steril oxygen or air; mixing the constituents; and filling the containers under conditions providing the movement of a hot gas or mixtures of gasses free of oxygen to the exterior of the container to avoid infection by unwanted microorganisms.

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METHOD OF AND CONTAINERS FOR FERMENTING OR REFERMENTING
FOODSTUFFS AND DRINKS.

The invention relates to a method and containers for of fermenting or refermenting foods and drinks.

These products comprise at least for example beers, wines from grapes and other fruits, certain juices or
5 extracts from other vegetable sources, teas, infusions etc..

Usually the fermentation or refermentation of beverages and food products is performed in large vessels. After fermentation or refermentation the product is filled in much smaller containers for consumer use, such as
10 bottles, cans, party barrels etc. For certain kinds of beers, for example the so-called "white beers", the refermentation may take place in the bottle. Thereby the extra refermentation step in a large vessel is avoided. The disadvantage of fermentation or refermentation in the
15 consumer containers is however, that the lees are located inside the container. In the case of white beers this is not a problem, because they are characterized by a turbid appearance. In the case of clear beverages however, it is necessary to make certain that the lee is deposited before
20 pouring or drinking from the bottle or can. Although inconvenient, it is possible to await the deposition of the lees in a bottle, which is transparant, by means of visual inspection. In cans however it will never be visible whether the lees have deposited.

25 The present invention therefore provides a method enabling the fermentation or refermentation of beverages and foodstuffs in consumer containers, such as bottles or cans, avoiding the above problems.

The invention thus provides a method of fermenting
30 and/or refermenting beverages or foodstuffs by means of microorganisms, wherein the beverage or foodstuff together with the microorganisms used for the (re)fermentation are contained in a container which is provided with means for

retaining the microorganisms and lees that may have formed in the container upon emptying thereof.

The containers may be cans in various sizes, as well as small (at least partially metallic) vessels for consumer use, e.g. so-called party barrels for beer or wine, or bottles in various shapes and sizes. In fact every container that is suited for beverages and foodstuffs may be used in the invention. The present invention may also be used in larger vessels thus facilitating the emptying thereof because the (re)fermenting microorganisms and lees that may have formed stay behind in the vessel.

The microorganisms used for the (re)fermentation of the products, will in most cases be yeasts, but the invention is not restricted thereto.

Numerous products that were never before fermented or refermented in consumer container, are realizable by the process of the invention. The incomplete list hereinbelow gives an idea thereof. Suitable beverages are for example at least:

- a) every type of beer with every possible alcohol content;
- b) every type of wine with every possible alcohol content, including mixtures of water and wine;
- c) clear or turbid juices of vegetables or fruits not yet or only partially fermented; and
- d) other products that are susceptible to being subjected to an alcohol fermentation, such as for example teas or infusions.

It is also possible to use (semi)liquid foodstuffs.

In one embodiment of the invention a surface is provided inside each container onto which the lees, mainly consisting of cells of microorganisms, adhere well. Numerous substances which are in general irregular, rough or porous are suitable as retaining means, e.g. cellulose fragments, plastics or plastic foams, textile fibers or tissue fragments, filter paper, blisters in the lacquer, all kinds of inorganic, organic, natural, synthetic or mineral

materials, such as diatoms, silicious earth, carbon etc. However, even smooth surfaces may be used as long as the microorganisms and lees are sufficiently adhered thereto or retained thereby. It is convenient when the retaining means 5 could be attached to the interior wall of the container for example by means of an adhesive, such as varnish. It is also thinkable that the retaining means extend in the interior of the container, thus forming a retaining element that may be fixed inside the container in a suitable manner. A film 10 which is able to adhere to or enclose the microorganisms may also be suited.

Usually the containers are in a vertical position, bottom down, in the maturation rooms, prior to storage. Therefore it is preferred to provide at least the bottom of 15 the empty containers with the retaining means. This is however not an essential feature since other ways of storage may require other locations of the retaining means.

The invention is further illustrated by the attached drawing in which like reference numerals indicate 20 like parts and which shows in:

Figure 1A an empty can; and

Figures 1B to 1H different embodiments of the invention.

Reference numeral 1 refers to the empty container body, 2 25 refers to the bottom thereof, 3 refers to retaining means of for example cellulose fragments which is sticking to a glued surface in the container, 4 refers to tissue, film or paper retaining means which are only partially sticking to the bottom, 5 refers to the lid of the container, 6 is a 30 retaining element extending in the interior of the container and 7 refers to fixing means for the retaining element.

The invention further relates to a method of aseptically filling the containers, in which method the product will also be practically free of oxygen. When one 35 must realize conditions which assure the total absence of microorganisms that are not wanted and the almost complete absence of molecular oxygen, the following operations are required:

- A: Degassing and deaeration of the liquid.
- B: Pasteurization or sterilization of the liquid.
- C: Optional refrigeration of the liquid.
- D: Continuous and controlled introduction of the fermenting
5 microorganisms in the cold liquid
- E: Optional continuous introduction of a sterile solution of
carbohydrates and optionally flavours in the cold
liquid.
- F: Optional continuous injection of sterile oxygen or
10 sterile air which will dissolve in the liquid.
- G: Perfect mixing of the additives realized in D, E, F.
- H: Suitable sterilization of the containers, the retaining
means and the lids.
- I: Filling of the containers wherein every introduction of
15 unwanted microorganisms and molecular oxygen together
with excessive heating of the initially cold liquid which
contains the microorganisms is avoided.
- J: Closure of the containers by means of sterile lids as
prepared under "H".
- 20 K: Optional rinsing of the closed containers and in general
adjustment of the liquid temperature comprised therein
by means of for example water showers.

It is known that oxygen may stimulate the
reproduction of the microorganisms, however it may also
25 severely deteriorate the flavours some of which are
susceptible to traces of oxygen in the order of parts per
billion.

The (re)fermenting method in containers comprising
retaining means and the method of aseptically filling the
30 containers may naturally also be performed separately.

The present invention will be illustrated by the
following example, which is never intended to limit the
scope of the present invention.

EXAMPLE

In order to test the process of the present invention four filtered, pasteurized beers (5 to 8 % of alcohol) were refermented in cans, which had been provided
5 with retaining means.

In order to prepare the cans comprising the retaining means an excess of tiny, white, pure, cellulose fibres were distributed on the wet varnish in each empty can upto about 20 mm from the top. The varnish was dried in an
10 oven under conditions as recommended by the manufacturer of the varnish. The excess of cellulose fibres was removed with air and tap water. After that the cans and lids were sanitized in boiling water.

The cans were filled with flat beer and about 1%
15 of sterile sucrose and about 1,000,000 active yeast cells per ml. The air and the residual CO₂ were extracted under vacuum after the lids have been clinched (hooked up) on the cans. Than the vacuum was slowly established and later on slowly broken with pure CO₂ and the 24 cans were immediately
20 seamed to get perfectly airtight closures.

The refermentation was performed at 24 to 25°C during two weeks. After that the cans were transported to another location by car. After storage during two days in a cellar, the cans were fully emptied and the beers were
25 compared in normal glasses.

For each of the four beers, the three cans, comprising the retaining means gave a much better appearance of the beverage than the control cans without the retaining means (almost brilliant as compared to cloudy), thus
30 demonstrating the efficacy of the invention.

CLAIMS

1. Method of fermenting and/or refermenting
5 beverages or foodstuffs by means of microorganisms, wherein
the beverage or foodstuff together with the microorganisms
used for the (re)fermentation are contained in a container
which is provided with means for retaining the micro-
organisms and lees that may have formed in the container,
10 upon emptying thereof.

2. Method as claimed in claim 1, wherein the
container is an at least partially metallic can.

3. Method as claimed in claim 1, wherein the
container is a bottle.

15 4. Method as claimed in any one of the claims 1-3,
wherein the retaining means are located on the bottom of the
container.

5. Method as claimed in any one of the claims 1-4,
wherein the retaining means are located on the interior wall
20 of the container.

6. Method as claimed in any one of the claims 1-5,
wherein the retaining means are located on the lid of the
container.

7. Method as claimed in any one of the claims 1-6,
25 wherein the retaining means have the form of an element of
retaining material which element extends into the interior
of the container.

8. Method as claimed in claim 6, wherein the
retaining element is fixed between the lid and the wall of a
30 metallic can.

9. Method as claimed in any one of the claims 1-8,
wherein the retaining means are made of cellulose fragments,
plastic, plastic foams, textile fibres, tissue fragments,
adhering film, inorganic, organic, natural, synthetic or
35 mineral materials such as diatoms, silicious earth, carbon,
or combinations thereof.

10. Method as claimed in any one of the claims 1-9 wherein the containers are aseptically filled by means of the following steps:

- a) degassing and deaeration of the beverage or
5 foodstuff;
 - b) pasteurizing or sterilizing the beverage or foodstuff;
 - c) optional refrigeration of the beverage or foodstuff;
 - 10 d) introduction of the (re)fermenting microorganisms;
 - e) introduction of sterile solutions of carbohydrates and/or flavours;
 - f) optional introduction of sterile oxygen or air;
 - 15 g) mixing the constituents; and
 - h) filling the containers under conditions providing the movement of a hot gas or mixture of gasses free of oxygen to the exterior of the container to avoid infection by unwanted microorganisms.
- 20 11. Container suitable for (re)fermentation of beverages or foodstuffs comprising retaining means for retaining the microorganisms and lees, that may have formed in the container, upon emptying thereof.

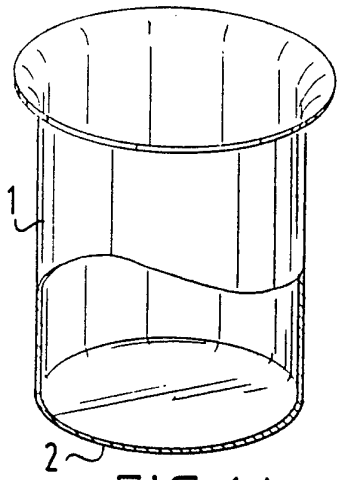


FIG. 1A

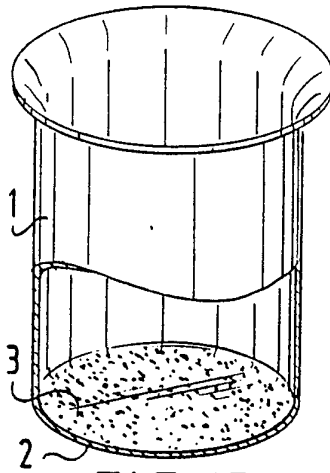


FIG. 1B

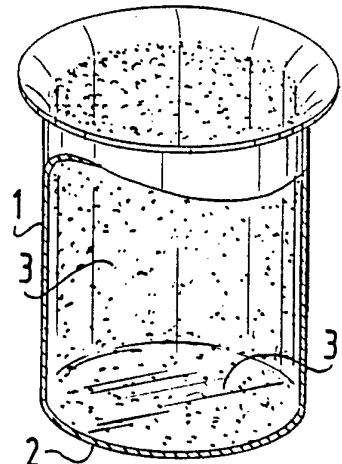


FIG. 1C

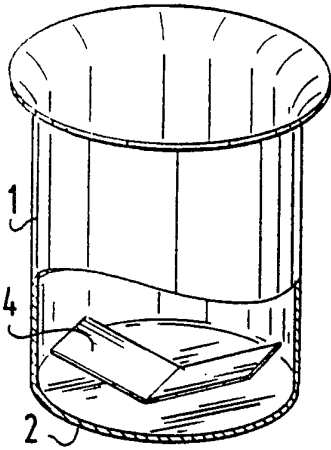


FIG. 1D

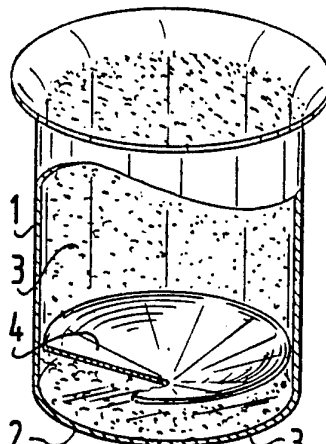


FIG. 1E

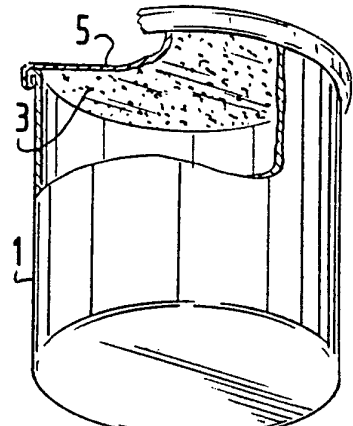


FIG. 1F

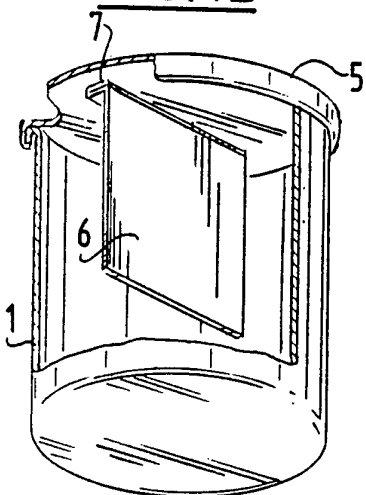


FIG. 1G

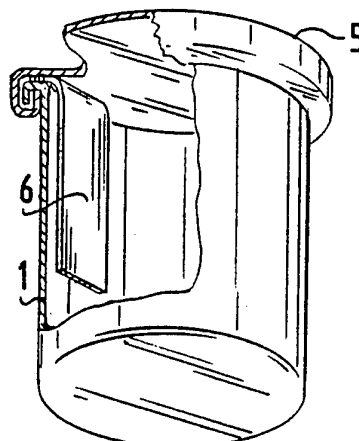


FIG. 1H

INTERNATIONAL SEARCH REPORT

Int: onal Application No

PCT/EP 93/02499

A. CLASSIFICATION OF SUBJECT MATTER IPC 5 C12G3/02 C12G1/00 C12C11/04 C12M1/40		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC 5 C12G C12C C12M A23L		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP,A,0 424 756 (MILLER BREWING COMPANY) 2 May 1991 see column 4, line 5 - line 15 see column 6, line 15 ---	1-3,5-6, 8,13-15
Y	US,A,4 675 192 (R. THYFAULT) 23 June 1987 see column 2, line 1 - line 4; claims ---	1-3,5-6, 8,13-15
Y	EP,A,0 327 380 (UNISEARCH LIMITED) 9 August 1989 see page 4, line 27 - page 5, line 11; claims; figures --- -/--	1-6, 8-11, 13-15
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 93/02499

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