

FORM 1

608897

SPRUSON & FERGUSON

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

APPLICATION FOR A STANDARD PATENT

FBI Brands Ltd., of 16 Chemin Benoit, Mt. St. Hilaire, Quebec, J3G 4S6, CANADA, hereby apply for the grant of a standard patent for an invention entitled:

Method for Providing Shelf Stable Liquid Food Products
which is described in the accompanying complete specification.

Details of basic application(s):-

<u>Basic Applic. No:</u>	<u>Country:</u>	<u>Application Date:</u>
561,206	CA	11 March 1988

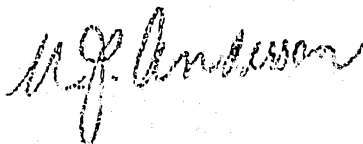
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DATED this TWENTY EIGHTH day of SEPTEMBER 1988

FBI Brands Ltd.

By:



Registered Patent Attorney

TO: THE COMMISSIONER OF PATENTS
OUR REF: 73638
S&F CODE: 54850

APPLICATION ACCEPTED AND AMENDMENTS

ALLOWED 18 . 1 . 91

5845/2

28/09/88

28/09/88

COMMONWEALTH OF AUSTRALIA
THE PATENTS ACT 1952
DECLARATION IN SUPPORT OF A
CONVENTION APPLICATION FOR A PATENT

AUSTRALIA
CONVENTION
STANDARD
& PETTY PATENT
DECLARATION

In support of the Convention Application made for a
patent for an invention entitled:

Title of Invention

METHOD OF PROVIDING SHELF STABLE LIQUID FOOD PRODUCTS

I/We ANTHONY TONDINO

Full name(s) and
address(es) of
Declarant(s)

of 276 Laure Gaudreau
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Canada J3V 5R4

do solemnly and sincerely declare as follows:-

Full name(s) of
Applicant(s)

1. ~~I am/We are~~ the applicant(s) for the patent

(or, in the case of an application by a body corporate)

1. I am/We are authorised by

FBI BRANDS LTD.

the applicant(s) for the patent to make this declaration on
its/their behalf.

2. The basic application(s) as defined by Section 141 of the
Act was/were made

Basic Country(ies)

in CANADA

Priority Date(s)

on MARCH 11, 1988

Basic Applicant(s)

by DONALD A. POOLE

Full name(s) and
address(es) of
inventor(s)

3. ~~I am/We are~~ the actual inventor(s) of the invention referred
to in the basic application(s)

(or where a person other than the inventor is the applicant)

3. DONALD A. POOLE

of 560 BLACKWOOD DRIVE
GREENFIELD PARK, QUEBEC
CANADA

(respectively)

is/are the actual inventor(s) of the invention and the facts upon
which the applicant(s) is/are entitled to make the application are
as follows:

Set out how Applicant(s)
derive title from actual
inventor(s) e.g. The
Applicant(s) is/are the
assignee(s) of the
invention from the
inventor(s)

THE APPLICANT IS THE ASSIGNEE OF THE INVENTION
FROM THE INVENTOR.

4. The basic application(s) referred to in paragraph 2 of this
Declaration was/were the first application(s) made in a Convention
country in respect of the invention(s) the subject of the application.

Declared at Mt. St. Hilaire this 4th day of May 1989
Mt. St. Hilaire, Canada

TITLE: Director of Finance FBI BRANDS LTD.
DIRECTOR OF FINANCE

BY

Signature of Declarant(s)

ANTHONY TONDINO

To: The Commissioner of Patents

1/81

(12) PATENT ABRIDGMENT (11) Document No. AU-B-22924/88
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 608897

(54) Title
METHOD FOR PROVIDING SHELF STABLE LIQUID FOOD PRODUCTS

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(57) Claim

1. A method of providing liquid food products that are shelf stable comprising the steps of:

- (a) cold filling a plastic or plastic coated container with an essentially non-carbonated liquid food product free from pathogenic and thermophilic organisms;
- (b) sealing said container;
- (c) heating the food product in said container to a pasturization hold temperature in the range of about 160°F. to the softening temperature of the plastic;
- (d) maintaining the food product at said pasturization hold temperature for sufficient time to provide adequate kill of essentially all microorganisms in the food product;
- (e) cooling.

24. The product of the method of any one of claims 1 to 23.

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FORM 10

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE:

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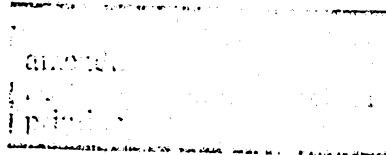
Complete Specification Lodged:

Accepted:

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Priority:

Related Art:



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Complete Specification for the invention entitled:

Method for Providing Shelf Stable Liquid Food Products

The following statement is a full description of this invention, including the best method of performing it known to me/us

ABSTRACT

This invention is concerned with the problem of providing liquid food products that are shelf stable. A plastic or plastic coated container is cold filled with a non-carbonated liquid food product free from pathogenic organisms. The container is sealed. The food product in the container is then heated to a pasturization hold temperature in the range 160° F. to 174F. and is maintained at that temperature for a sufficient time to provide adequate kill of essentially all microorganisms in the food product. The food product is then cooled.

This invention relates to a method of providing liquid food products that are shelf stable.

Liquid food products include all fruit juices, drinks, blends of juices in drinks with or without preservatives. Examples are citrus products, such as orange juice and citrus flavoured products with or without preservatives such as sodium benzoate or potassium sorbate, fruit products such as grape, apple or strawberry drinks or juices, vegetable juices and vegetable cocktails. Liquid food products also include dairy products such as milk. Liquid food products include sauces, puddings, custards, syrups and soups. Included also are low alcohol, non-carbonated products such as citrus wine coolers.

A variety of containers have been used including cans, glass, plastic and paperboard cartons.

Although containers of plastic and paperboard are generally less costly than glass containers or cans, there has been a problem of providing plastic or paperboard containers that have adequate shelf life without refrigeration.

Liquid food products are treated in various ways to render them free from microbial contaminants such as yeast mould and bacteria. If products after treatment still contain any of these organisms, spoilage will soon occur. Even if the microorganisms that are in juices or other drinks are controlled by methods such as pasturization, microwaves, or gamma rays, there is the danger of contamination from the atmosphere or from the empty container during filling.

One method of treatment that is commonly used may be called the "hot fill" method. The product is typically pasturized at about 195° F. and then filled into containers at 180° F. to 190° F., then the filled containers are sealed, inverted to sterilize the lid with the hot product and cooled to ambient

temperatures. Although the hot fill method is widely used it has disadvantages. Specially designed and costly containers are needed because of the temperature at which filling takes place. For example, a six layered carton is commonly used including successive layers of polyethylene, a barrier tie layer, an aluminum foil barrier, another tie layer, paperboard and polyethylene. The barrier tie layer is needed as otherwise there will be delamination between the polyethylene and the foil due to high filling temperatures. The temperature of filling is disadvantageous in the case of some products such as orange juice, which rapidly deteriorates due to oxidation at elevated temperatures to cause rapid degradation of flavour. There is a tendency for foaming and splashing to occur. Perhaps the most serious problem is that after cooling there is a vacuum which means that an extremely tight and effective closure must be used, otherwise air will channel into the interior bringing with it microorganisms which will cause the product to deteriorate. For example, if orange juice is filled by the hot fill method into a gable top paperboard container of the type conventional for milk, the adhesive used in milk cartons to secure the top, and which is releasable to form a pouring spout, would be entirely inadequate to cope with the vacuum following hot filling. The main areas where channelling of air and air borne microorganisms would be likely to occur would be at the centre of the gable top, or through the sides and down at the centre. If, however, a very strong seal is used to avoid channelling it is difficult or impossible for most consumers to open the gable top to form a pouring spout.

The problems of hot filling can be avoided by cold filling. The product is pasturized to 185° - 195° F. and cooled for filling to ambient

temperatures into a non-sterile package. The product must be refrigerated at all times and usually has a two week shelf life. Cold filling may also be used if adequate preservatives are present. The product has a preservative added to it such as sodium benzoate or potassium sorbate. Drinks are stable for three to six months at room temperature but juices should be kept refrigerated as a preservative only prevents microorganisms from growing, it does not kill them. If the initial content of microbes is too high, the preservative will not be able to stop rapid growth and spoilage will occur. A positive feature of preserved technology is the product can be packed into any container. A negative feature is that preservatives used at less than 500 ppm are ineffective and above this level leave a burning taste in the product.

The most recent technology is known as the "aseptic" method. It involves the filling of a presterilized product into a presterilized package under a sterile atmosphere. Product is pasturized up to 195° F. for 15 seconds and cooled to ambient temperature for filling. The package is treated with hydrogen peroxide or steam before filling. The filler is in a room held under positive air pressure. Examples of aseptically filled product can be seen with the "Brik" pack and some shelf stable puddings in plastic containers. This is highly complex technology requiring extensive amounts of capital and maintenance expense and is extremely unforgiving in the event of line problems. Line speeds are generally slow.

Although post pasturization or sterilization after filling and capping has been used in the brewing trade and for some carbonated drinks containing juices, this has involved glass

containers or cans. It is believed that no practical process has been developed for post pasturization where the containers are of plastic or paperboard coated with plastic.

5 Our invention utilizes post pasturization techniques to solve problems inherent in the use of plastic or paperboard containers coated with plastic.

10 In accordance with one aspect of this invention, a method of providing liquid food products that are shelf stable comprises the steps of:

- 15 (a) cold filling a plastic or plastic coated container with an essentially non-carbonated liquid food product free from pathogenic and thermophilic organisms;
- (b) sealing said container;
- 20 (c) heating the food product in said container to a pasturization hold temperature in the range of about 160° F. to the softening temperature of the plastic;
- (d) maintaining the food product at said pasturization hold temperature for sufficient time to provide adequate
- 25 kill of essentially all microorganisms in the food product;
- (e) cooling.

30 The liquid food products to which the method of this invention is applicable include non-carbonated fruit products such as the citrus products or citrus flavoured products, fruit products, vegetable juices and vegetable cocktails previously referred to. Carbonation must be avoided as otherwise the pressures that would be generated during the process

35 would be too high.

Another requirement of the food product is freedom from pathogenic and thermophilic bacteria. Most juices and drinks have pH's in the range 2.8 - 4.0 and not above pH 4.6. At a pH above 4.6 there is a potential problem of pathogenic bacteria. Below pH 4.6 the problems are yeast, moulds and bacteria.

If the pH is above 4.6, which would include such products as milk, then there should be a preliminary ultra high temperature treatment at 240° F. to 260° F. for 15-20 seconds to kill pathogenic organisms, followed by cooling to ambient temperature. A preliminary ultra high temperature treatment is advisable with some vegetable base products such as tomato, due to their initial high content of thermophilic moulds.

The juices and drinks to which this process is applicable are formulated in a tank at ambient temperatures in the range 40° - 75° F. and pretreated as discussed above if necessary. They are then pumped to a filling station where the juice or drink is fed into containers.

Although not essential, it may be useful to provide a sparging infusion valve in the line between the tank and filling station. The sparging infusion valve is used to add up to about 0.1 lbs/square inch of nitrogen or carbon dioxide, and preferably about 0.01 lbs/square inch. The purpose of sparging is to create a slight positive pressure to oppose the entrance of any bacteria into the container after filling. Carbon dioxide is preferred for this purpose. The product sparged with carbon dioxide would have such a small amount of carbon dioxide that it would not be classified as a carbonated product.

At the filling station which is of conventional type, a number of individual containers are filled cold. The temperature of the liquid food product should be less than about 80° F and desirably less than 70° F. to achieve a neutral or positive pressure after filling. This may be contrasted with hot fill temperatures of the order of 180° F. The maximum temperature that can be used depends on the conditions including the positive pressure from any sparging gas and on the strength of the seal, which in some cases might accept a slight vacuum. However, as previously indicated a vacuum is undesirable. After filling and closing the cartons there should be a neutral to slightly positive pressure.

The containers that are preferred are gable top cartons of paperboard having a barrier layer such as foil and a polyethylene layer in the interior of the carton and another polyethylene layer to bond the foil to the paperboard. The exterior of the carton may also be coated with polyethylene to give a total of five layers. A sixth layer, usual for hot filling methods, is not needed. It is not necessary that a strong seal be used, therefore an easy opening gable top container that can be opened to give a pouring spout that is suitable. Although some of the main benefits of this invention are obtained with easy opening gable top containers, other types of containers such as plastic pouches or plastic bottles may be used in accordance with this invention in its broadest aspect. Suitable plastics for the container also include vinyl resins, such as polyvinyl chloride, regenerated cellulose, polypropylene, polyethylene terephthalate, polycarbonates and other plastics that are used for food products. Where a barrier layer is to be used ethyl vinyl alcohol or like barrier film

may be substituted for foil.

The cold filled cartons are transferred to a processor comprising three zones, a preheat zone, a hold zone, and a cool zone.

5 The processor may be in the form of a continuously moving chain upon which rows of cartons are placed. The cartons are spaced to allow water to run down the sides of the cartons to heat or cool the contents.

10 1. Preheat zone

The cold filled cartons are preheated preferably by pouring water at a temperature of 180° F - 185° F. onto the cartons and allowing it to cascade down the sides. After a period of time that varies with the size of the carton, the liquid product within it reaches the desired "pasturization hold" temperature. The preferred temperature for "pasturization hold" is about 167° F, which will be reached in about 13 - 19 minutes in the case of 1 litre cartons. Two litre cartons would take 20 to 24 minutes to reach this temperature, while 4 to 7 minutes would be adequate for 250 ml. cartons.

2. Hold zone.

25 The product is maintained at the required pasturization temperature for a predetermined time to ensure adequate kill of all microorganisms. The appropriate time at various "pasturization hold" temperatures is available from standard texts. At the preferred temperature of 167° F. a hold time of ten minutes is recommended. The temperature should not be greater than about 174° F, at which the time will be about 4 minutes, as otherwise there may be problems with softening of the plastic where the container is polyethylen and delamination of foil from paperboard will occur. Slightly
35 higher temperature may be used with plastics having a higher softening point such as polypropylene.

At lower temperatures the hold time is quite long.
For example, at 160°F. it would be about 25 minutes.

3. Cool zone

5 After holding for the required amount
of time, the cartons go into a cooling zone and
exit at around 90°F. to 105°F. This temperature
is desirable as it will quickly evaporate off any
excess moisture adhering to the container.

10 The temperature of the cooling water
may be about 35°F. to 60°F. The cartons then leave
the processor and are packed in cases.

This invention is further illustrated
by the following examples:

Example I

15 This example relates to the production
of 1000 Imperial gal. of single strength (ready
to drink) orange juice. 135 gal. of orange juice
concentrate 65 Brix (% soluble solids) is added
to 865 gal. of water and blended for 10 minutes.
20 It is then pumped using positive pumps through a
line leading to a filler. The line includes a sparging
infusion valve to sparge carbon dioxide to give an
end product with about 0.1 lbs/square inch of gas.
At the filler the carton is filled at a temperature
25 of about 70°F. into one litre gable top cartons
which are heat sealed under pressure. The cartons
are brought up to a temperature of 167°F in 14 minutes
and held at that temperature for ten minutes. They
are then chilled with water at 40°F. for 12 minutes
30 to give an exit temperature of 90°F. The orange
juice has a desirable shelf life of three months
and a recommended maximum of six months. The taste
of the orange juice is markedly better than that
produced by hot filling.

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Example 2

5 This example relates to a Caesar's clam
juice cocktail. A thousand imp. gal. batch was
made of 100 imp. gal of tomato paste (32-34 brix)
60 lbs of salt; 60 lbs of monosodium glutamate; 700
lbs of glucose solids; 30 lbs of spices and 10 gal.
of clam broth. It is pumped to a pasturizer where
the product is brought to a temperature of 250° F.
in about 10 - 20 seconds, and held at this temperature
10 for 48 to 52 seconds, cooled to 70° F. and then filled
and processed as described in Example 1.

The claims defining the invention are as follows:

1. A method of providing liquid food products that are shelf stable comprising the steps of:
 - (a) cold filling a plastic or plastic coated container with an essentially non-carbonated liquid food product free from pathogenic and thermophilic organisms;
 - (b) sealing said container;
 - (c) heating the food product in said container to a pasturization hold temperature in the range of about 160°F. to the softening temperature of the plastic;
 - (d) maintaining the food product at said pasturization hold temperature for sufficient time to provide adequate kill of essentially all microorganisms in the food product;
 - (e) cooling.
2. A method as in claim 1 wherein the container is an easy opening gable top container.
3. A method as in claim 1 or claim 2 further characterized in that it provides a shelf stable liquid food product in any easy opening gable top container that can be opened by hand to give a pouring spout, said liquid product being free from the vacuum condition associated with hot filling.
4. A method as in any one of claims 1 to 3 in which the liquid food product is selected from citrus products, fruit products, vegetable juices and vegetable cocktails.
5. A method as in claim 4 in which the liquid food product is orange juice and the pasturization hold temperature is in the range of 160°F. to 174°F.
6. A method as in claim 4 in which the liquid food product is a clam tomato product.
7. A method as in any one of claims 1 to 6 in which the plastic or plastic coating is polyethylene and the pasturization hold temperature is in the range 160°F. to 174°F.
8. A method as in any one of claims 1 to 7, in which the container is a gable top container.
9. A method as in any one of claims 1 to 8, in which the container is a gable top container having an easy opening closure.
10. A method as in any one of claims 1 to 9, in which cold filling is at a temperature below 80°F.



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11. A method as in any one of claims 1 to 10, in which the pasturization hold temperature is about 167°F.

12. A method as in any one of claims 1 to 10, in which the pasturization hold temperature is about 167°F. and the time at that temperature is about 10 minutes.

13. A method as in any one of claims 1 to 12, in which after pasturization, cooling is to about 90°F. to 105°F.

14. A method as in any one of claims 1 to 13, including the preliminary step of sparging with a gas selected from nitrogen and carbon dioxide.

15. A method as in any one of claims 1 to 14, including the preliminary step of sparging with carbon dioxide.

16. A method as in any one of claims 1 to 15, including the preliminary step of ultra high temperature treatment to kill any pathogenic or thermophilic organisms followed by cooling.

17. A method as in any one of claims 1 to 16, in which the pH of the liquid food product is in the range 3.0 to 4.6.

18. A method as in any one of claims 1 to 17, in which the food product is non-alcoholic or has low alcohol.

19. A method as in any one of claims 1 to 18, in which the liquid food product is essentially free from artificial preservatives.

20. A method as in any one of claims 1 to 19, in which the liquid food product has a shelf life of at least three months.

21. A method as in claim 20 in which the liquid food product is citrus juice.

22. A method as in any one of claims 1 to 21, in which cold filling is conducted under ambient atmospheric conditions.

23. A method of providing liquid food products that are shelf stable substantially as hereinbefore described with reference to Example 1 or Example 2.

24. The product of the method of any one of claims 1 to 23.

DATED this NINTH day of JANUARY 1991
FBI Brands Ltd.

Patent Attorneys for the Applicant
SPRUSON & FERGUSON

