We, GUINNESS BREWING WORLDWIDE LIMITED being the person(s) identified below as the Applicant, request the grant of a standard patent to the person identified below as the Nominated Person, for an invention described in the accompanying complete specification.

Full application details follow.

Applicant and Nominated Person: GUINNESS BREWING WORLDWIDE LIMITED
a British company

Address: Park Royal Brewery, London NW10 7RR United Kingdom

Invention Title: A sealed beverage package and a method of forming such a package

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BASIC CONVENTION APPLICATION(S) DETAILS

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<td>95 21 671.9</td>
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Drawing number recommended to accompany the abstract: Fig. 1

Dated this twenty one day of October 1996

GUINNESS BREWING WORLDWIDE LIMITED

By: FRED SCHILLING
Registered Patent Attorney
A sealed beverage package has a hollow insert 7 for developing froth on beverage 23 when closure cap 10 is removed from bottle 1. The insert 7 is carried through a socket and spigot coupling 9 on the underside of the cap 10. A barbed head 15 retains the spigot from withdrawal from the socket 17 and the socket and spigot coupling permits the insert 7 to swing on the cap 10.
Invention Title:

A sealed beverage package and a method of forming such a package

The following statement is a full description of this invention including the best method of performing it known to us:-
TECHNICAL FIELD & BACKGROUND ART

The present invention relates to a sealed beverage package and a method of forming such a package. More particularly it concerns a sealed package of the kind containing beverage having gas in solution and within which package is located a froth developing means, typically a hollow insert containing gas under pressure which, upon opening of the package and in response to a pressure differential developed thereby, causes fluid in the form of a gas or a liquid and gas, to be ejected from the insert to cause, or assist in, the formation of a head of froth on the beverage by the evolution of gas dissolved in the beverage. Froth developing means are now well known in the art and can take many forms of structure and operation and an example of which is discussed in our Patent Specification G.B.-A-2,183,592.

Beverage packages made in accordance with the preferred embodiment of our aforementioned British Patent Specification have met with considerable commercial success where, as with many other froth developing means, the insert is located at or towards the bottom of a container and retained as a press or interference fit with an upstanding side wall of the container. However, for some beverage packages it has been found desirable to locate and retain the froth developing means other than as aforementioned, for example to facilitate fitting of the insert within a particular form of container that is utilised and to locate the froth developing means at what is considered to be a preferred position for effecting froth development in the particular beverage that is
packaged. For example, our Patent Specification EP-A-0 518 522 discloses the location of a hollow insert within a narrow necked bottle and retained by an upward extension of the insert frictionally engaging with the narrowed top part of the bottle.

Our Patent Specification G.B.-A-1,266,351 discloses a sealed beverage package in which the froth developing means is carried within a container having an openable top by a removable closure or cap for that top. The carriage of the froth developing means by the removable closure of the container is particularly convenient for some beverage packaging lines, for example where the container is in the form of a narrow necked open topped bottle, and it is an object of the present invention to provide an improved sealed beverage package and a method of forming such a package where the froth developing means is carried by a closure for an openable top of the package.

**STATEMENTS OF INVENTION & ADVANTAGES**

According to the present invention there is provided a sealed beverage package comprising a container having an openable top and a closure part for said top; the container containing beverage which has gas in solution and forms a headspace that is at a pressure greater than atmospheric; froth developing means comprising an insert part carried within the container by said closure, said froth developing means reacting when the top of the container is opened and in response to a pressure differential developed thereby to cause gas to be liberated from solution in the beverage for froth development, and wherein the insert part is carried by the closure part through a coupling which comprises a spigot on one of said parts engaging in a socket on the other of said parts, said spigot having a head and said socket engaging over the head
to retain it from withdrawal from the socket and to capture the head in the event of its separation from the part on which it is located.

Further according to the present invention there is provided a method of forming a sealed beverage package as specified in the immediately preceding paragraph which comprises providing one of a socket and spigot on a closure part; providing the other of said socket and spigot on an insert part of froth developing means; press fitting the socket to the spigot to form a coupling in which the socket engages over a head of the spigot to retain the head from withdrawal from the socket and to capture the head in the socket in the event of the head becoming separated from the part on which it is located and so that the insert part is carried through the coupling by the closure part; moving the insert part into an open topped container through the open top thereof and which container contains beverage having gas in solution and sealing the closure part to the container to close the open top whilst providing pressure greater than atmospheric in a headspace formed by the beverage in the container.

By the present invention it is intended that the socket and spigot engagement between the closure part and the insert part provides a coupling which may be regarded as inseparable other than for when excessive separation forces are applied to the coupling (to the extent that such separation forces would result in identifiable damage being caused to components in the package, particularly the coupling, the insert part or the closure part).

Commercially it is important that the froth developing means does not separate from the closure part which carries it to become a free body within the beverage; whilst such separation may not hinder the reaction of the froth
developing means when the package is opened, the free body may be dispensed along with the beverage with undesirable consequences.

Usually the froth developing means will comprise a hollow insert part which contains at least gas at a pressure greater than atmospheric (and may contain both such gas and liquid/beverage) and have a restricted aperture so that when the top of the container is opened for the headspace to communicate with atmosphere, the pressure differential which develops causes fluid (gas or gas and liquid) in the insert to be ejected through the restricted aperture into the beverage for the development of a head of froth on the beverage by the evolution of gas from solution in the beverage. During the opening of the package, typically by removal of the closure part as in the case of a crown-type cap, it is possible for the package to be tilted and/or the hollow insert to be tilted to an extent where the restricted aperture is exposed from the beverage thereby reducing or negating the froth developing characteristics. To alleviate this possibility it is preferred that the insert part is carried by the coupling pendulously relative to the closure part. To achieve this the head of the spigot may be a loose fit within the socket whilst clearance is provided between a neck of the spigot on which the head is carried and the socket to permit the insert part to hang from, and swing relative to, the closure part so that if the container is tilted (within reason) from the vertical, a vertical orientation can be maintained for the insert to retain the restricted aperture submerged.

For convenience of assembly of the froth developing means with the closure part, typically in association with a packaging line where the open topped containers move
towards a filling and sealing station, it is preferred that
the head is simply press fitted to the socket to snap
engage therewith. With this in mind, at least one of the
head and socket may be provided with a tapered lead-in
surface for facilitating the location of the head in the
socket and the press fitting engagement. To ensure that
the head of the spigot is captured by the socket, such head
may have a barb which engages with a shoulder of the socket
to restrain withdrawal of the head from the socket.

It is not unknown for purchasers of beverage packages
which include froth developing means to seek compensation
for alleged damage caused by the froth developing means or
portions thereof becoming loose or breaking free within the
container. With the package of the present invention it
will be usual, but not essential, for the closure part to
be completely removed from the container on opening and to
carry with it the froth developing means thereby exposing
such means to the user. It is possible therefore for
damage to be inflicted purposely on the froth developing
means with the intention of seeking compensation with an
unjustified claim. With this in mind it is preferred that
the or a neck on which the head of the spigot is located is
frangible so that the head will break off and be retained
in the socket in response to a manual bending force applied
between the insert part and the closure part. Obviously
where a claim for compensation is made the components of
the beverage package must be available for inspection and
if the neck is broken purposely as aforementioned (as
compared with such breakage as may occur naturally
following normal packaging and handling), this will become
apparent by stress form analysis of the break surfaces
presented on the neck, particularly by the material of the
head that is retained in the socket. Alternatively, or
in addition, the neck on which the head is located may be provided with a weakened region at which the head can be broken off to be retained in the socket in response to a manual bending force applied between the insert part and the closure part so that following such a break the head captured by the socket can again be subjected to stress form analysis.

Either or both of the socket and spigot will usually be formed as a plastics moulding. Typically the insert part will be formed as a plastics moulding and the socket or spigot on that part is conveniently moulded integral therewith. The present invention was primarily, but not essentially, developed for a beverage package formed with an open topped bottle having a closure part which carries a sealant for effecting a seal between that part and the bottle. This sealant is usually thermo-formed, hot plate welded or glued on to the closure part and may itself be moulded to present the socket or spigot. However, sealant materials will usually be too resilient to define and serve for the socket or spigot, particularly the latter. It is preferred therefore that when the closure part comprises a sealant as aforementioned, the socket or spigot on the closure part is formed as a plastics moulding and that moulding is captured on the closure part by the sealant.

Preferably the spigot is on the insert part and the socket is on the closure part, this is particularly convenient for open topped bottles where the closure part is in the form of a crown cap but it will be realised that the reverse arrangement can be employed. Furthermore, whilst the closure part and froth developing means carried thereby will usually be completely removed from the container on opening of the container for dispensing the
beverage, such complete removal is not essential, for example where the closure part may be partially removed or an opening otherwise formed in the beverage package for dispensing purposes.

**DRAWINGS**

One embodiment of a sealed beverage package constructed in accordance with the present invention will now be described, by way of example only, with reference to the accompanying illustrative drawings in which:-

Figure 1 is a section through the package showing the coupling between the closure cap and a hollow insert of the froth developing means, and

Figure 2 is an exploded view, in section, showing the closure cap and components for the coupling and the hollow insert comprised in the package of Figure 1.

**DETAILED DESCRIPTION OF DRAWINGS**

The sealed beverage package is formed with a container 1 which consists of a conventionally shaped bottle, usually of glass, ceramic or plastics having a base 2 and an upwardly extending cylindrical side wall 3 that converges to a neck 4 which defines an open top 5 for a chamber 6 within the bottle.

Located within the chamber 6 is a hollow plastics insert 7 which contains gas under pressure and has a restricted aperture 8 through which gas and/or liquid/beverage in the insert 7 is to be ejected for the purpose of developing a head of froth on beverage 23 contained in the chamber 6.

The insert 7 is carried through a coupling 9 by a closure 10 for the open top 5. The closure is in the form of a crown cap 10 which is retained in conventional manner by crimping over an external annular lip 11 at the mouth of the bottle neck 4 so that the crown cap 10 can be removed
with the aid of a bottle opener or by twisting.

The hollow insert 7 is conveniently formed as a two part moulding 7A, 7B of which an upper part 7A has an external annular rib 12 and a lower part 7B has an internal annular groove 13 and includes, at its bottom end, the aperture 8. The insert 7 is assembled by snap fitting the rib 12 within the groove 13 and heat sealing the parts 7A and 7B together to form a chamber in the insert which is sealed other than for the aperture 8. The insert 7 is elongated along an axis 7C for convenience of fitting co-axially within the neck 4 of the bottle and to provide clearance with the neck.

The upper end of the insert part 7A has integrally moulded therewith an upwardly extending spigot 14 of the coupling 9. The spigot 14 is co-axial with the axis 7C and has a barbed head 15 carried on a neck 16. Also forming part of the coupling 9 is a plastics moulded socket 17 of tubular form and which has an internal shoulder 18 and an external flange 19. A tapered mouth 20 of the socket provides a lead-in surface to a necked region 18A formed in the bore of the socket adjacent to the shoulder 18. The socket 17 is secured to the underside of the cap 10 substantially centrally thereof. Conventionally crown caps 10, particularly when of metal, are provided on their underside face with a sealant 22 (Figure 1) which forms a seal between the cap and the lip 11 during the crimping operation. Conventionally therefore the socket 17 is secured to the underside of the cap 10 by the sealant 22 as the latter is thermo formed, welded or glued on the cap to capture the flange 19. It will be appreciated however that alternative techniques may be employed for securing the socket 17 on the underside of the cap 10, for example by adhesive or welding and it is also possible for the
socket 17 to be formed integral with the cap 10 or with the sealant 22.

In the packaging process the insert 7 assembled from the parts 7A and 7B heat seal together as aforementioned will usually be supplied separately from the cap 10 having the socket 17 already secured thereto by the sealant 22. Whilst an empty bottle 1 in an upstanding condition is moving along a bottle filling line (on which it is charged with an appropriate volume of beverage 23 containing gas in solution) the cap 10/socket 17 assembly and the insert 7 are conveniently moving parallel with the bottle and being connected together through the coupling 9. For this connection the head 15 of the spigot is press fitted co-axially into the socket 17 through the mouth 20 and necked region 18A thereof so that its barbs snap engage over the shoulder 18 and thereby the head is captured in the socket and prevented from being withdrawn. The barbed head 15 is conveniently tapered to provide a lead-in surface which cooperates with the lead-in surface 20 of the socket to facilitate the engagement of the coupling co-axially. The coupling 9 that is formed may be relatively rigid. Preferably however the head 15 is a loose fit within the socket 17 whilst a clearance is provided between the necked region 18A in the bore of the socket 17 and the neck 16 of the spigot 14 so that the insert 7 will hang from the cap 10 in pendulous manner (whereby the insert 7 is permitted to swing through the coupling 9 relative to the cap 10). It will be noted that the tapered lead-in surface 20 also provides clearance to permit for the aforementioned swinging movement.

Following coupling of the insert 7 to the cap 10 and charging of the bottle chamber 6 with the required beverage 23 (containing gas such as carbon dioxide and/or nitrogen
in solution) to form a headspace 24, the insert 7 is located co-axially within the neck 4. The beverage 23 will usually be alcoholic such as fermented stout, ale, lager or cider or non-alcoholic such as so-called soft drinks. The headspace 24 is pressurised conveniently by liquid nitrogen dosing or within a pressure chamber and the open top 5 of the bottle sealed by crimping the crown or screw cap to the lip 11 as aforementioned to form the beverage package with its headspace at pressure greater than atmospheric.

The hollow insert 7 will contain gas under pressure which is maintained by the pressurisation of the headspace 24. Upon opening of the container 1 by removal of the cap 10, the headspace 24 reduces to atmospheric pressure and, in known manner, a pressure differential results which causes pressurised gas and/or liquid in the insert 7 to be ejected therefrom through the restricted aperture 8 for the development of a head of froth on the beverage 23 (for example in the manner discussed in our Patent Specification G.B.-A-2,183,592).

During opening of the bottle it is most desirable that the aperture 8 is submerged in the beverage 23 for optimum froth development. It is possible that during removal of the cap 10 the bottle will be tilted from an upright condition. With a rigid coupling between the cap 10 and the insert 7, this tilting can result in the aperture 8 being exposed from the beverage or have its depths of submersion reduced to an extent that the froth development characteristics are less effective. However, by pendulously mounting the insert 7 through the coupling 9 as aforementioned, if the bottle 1 is tilted (within reason) from its upright condition, the insert 7 can swing on the cap 10 to maintain an upright condition and alleviate the
likelihood of the aperture 8 becoming exposed from, or too shallow in, the beverage 23.

In the present embodiment it is intended that the cap 10 together with the insert 7 carried thereby is removed fully from the bottle 1 for dispensing of the beverage after the initiation of the froth development. Following exposure of the insert 7 from the bottle it is possible that the insert 7 may be purposely broken off from the cap 10 with the intention of making an unjustified claim for compensation as a result of damage allegedly caused by the insert being a free body within the beverage 23 during its dispersion and consumption. With this in mind it is preferred that the neck 16 of the spigot 14 is frangible and/or has a weakened region whereby the barbed head 15 can break off from the insert 7 in response to a manual bending force applied between the insert 7 and the cap 10. Upon such breakage the head 15 is captured to be retained within the socket 17. In the event of a claim for damage as aforementioned it is reasonable to expect the components of the bottle package to be returned to the manufacturer for examination, particularly the cap 10 or the insert 7 and preferably both. By stress form analysis of the break surface on the head 15 captured in the socket 17 it will be possible to determine whether the breakage occurred as a result of natural usage and faulty manufacture or was inflicted purposely. Similar comments apply to the break surface presented on the neck 16.

It will be appreciated that the beverage package can have the coupling reversed by forming the socket 17 integral with the insert 7 and securing the spigot 14 to the underside of the cap 10.
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:—

1. A sealed beverage package comprising a container having an openable top and a closure part for said top; the container containing beverage which has gas in solution and forms a headspace that is at a pressure greater than atmospheric; froth developing means comprising an insert part carried within the container by said closure, said froth developing means reacting when the top of the container is opened and in response to a pressure differential developed thereby to cause gas to be liberated from solution in the beverage for froth development, and wherein the insert part is carried by the closure part through a coupling which comprises a spigot on one of said parts engaging in a socket on the other of said parts, said spigot having a head and said socket engaging over the head to retain it from withdrawal from the socket and to capture the head in the event of its separation from the part on which it is located.

2. A package as claimed in claim 1 in which the froth developing means is carried by the coupling pendulously relative to the closure part.

3. A package as claimed in claim 2 in which the head is a loose fit with the socket and clearance is provided between the socket and a neck of the spigot on which the head is located to permit the insert part to hang and swing relative to the closure part.

4. A package as claimed in any one of the preceding claims in which the head is press fitted to the socket and snap engages therewith.

5. A package as claimed in claim 4 in which at least one of the head and socket is provided with a tapered lead-in surface for facilitating said press fitting.

6. A package as claimed in any one of the preceding
claims in which the head is barbed to engage with a shoulder of the socket and thereby restrain withdrawal of the head from the socket.

7. A package as claimed in any one of the preceding claims in which the or a neck of the spigot on which the head is located is frangible for the head to break off and be retained in the socket in response to a manual bending force applied between the insert part and the closure part.

8. A package as claimed in any one of the preceding claims in which the or a neck of the spigot on which the head is located is provided with a weakened region at which the head can break off to be retained in the socket in response to a manual bending force applied between the insert part and the closure part.

9. A package as claimed in any one of the preceding claims in which at least one of the socket and spigot is formed as a plastics moulding.

10. A package as claimed in claim 9 in which the insert part comprises a plastics moulding and the socket or spigot on that part is moulded integral therewith.

11. A package as claimed in any one of the preceding claims in which the closure part has a sealant for effecting a seal between that part and the container and the socket or spigot on the closure part is retained on that part by the sealant.

12. A package as claimed in claim 11 in which the socket or spigot on the closure part is a plastics moulding and that moulding is captured on the closure part by the sealant.

13. A package as claimed in any one of the preceding claims in which the spigot is on the insert part and the socket is on the closure part.

14. A package as claimed in any one of the preceding
claims in which the container comprises an open topped bottle and the closure part is a cap sealed to the bottle.

15. A package as claimed in any one of the preceding claims in which the insert contains at least one of gas at pressure greater than atmospheric or gas at pressure greater than atmospheric and liquid and has a restricted aperture arranged so that in response to said pressure differential fluid under pressure is ejected through the restricted aperture into the beverage in the container for said froth development.

16. A method of forming a sealed beverage package as claimed in any one of the preceding claims which comprises providing one of a socket and spigot on a closure part; providing the other of said socket and spigot on an insert part of froth developing means; press fitting the socket to the spigot to form a coupling in which the socket engages over a head of the spigot to retain the head from withdrawal from the socket and to capture the head in the socket in the event of the head becoming separated from the part on which it is located and so that the insert part is carried through the coupling by the closure part; moving the insert part into an open topped container through the open top thereof and which container contains beverage having gas in solution and sealing the closure part to the container to close the open top whilst providing pressure greater than atmospheric in a headspace formed by the beverage in the container.

17. A method as claimed in claim 16 which comprises effecting the coupling so that the froth developing means is carried pendulously relative to the closure part.

18. A method as claimed in either claim 16 or claim 17 which comprises providing the socket on the closure part, providing the spigot on the insert part and press fitting
the head of the spigot into snap engagement with the socket.

19. A method as claimed in any one of claims 16 to 18 which comprises securing whichever of the socket and spigot is on the closure part to that part by a sealant on the closure part which is to form a seal between the closure part and the container.

20. A sealed beverage package substantially as herein described with reference to the accompanying illustrative drawings.

21. A method of forming a sealed beverage package as claimed in claim 16 and substantially as herein described.

DATED THIS 21 day of October 1996

GUINNESS BREWING WORLDWIDE LIMITED

Patent Attorneys for the Applicant:-

F B RICE & CO
ABSTRACT

A sealed beverage package has a hollow insert 7 for developing froth on beverage 23 when closure cap 10 is removed from bottle 1. The insert 7 is carried through a socket and spigot coupling 9 on the underside of the cap 10. A barbed head 15 retains the spigot from withdrawal from the socket 17 and the socket and spigot coupling permits the insert 7 to swing on the cap 10.
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