AUSTRALIA
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PATENT REQUEST : STANDARD PATENT

I/We, being the person(s) identified below as the Applicant(s), request the grant of a Standard Patent to the person(s) identified below as the Nominated Person(s), for an invention described in the accompanying complete specification.

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Invention Title: LIQUID BOTTLE CAP AND PROCESS FOR PRODUCING SUCH A CAP

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BASIC CONVENTION APPLICATION DETAILS
Application No: Country: Application Date:
95-41097 KR 13 November 1995
UM95-33305 KR 13 November 1995

Drawing number recommended to accompany the abstract: 1

DATED: 17 September 1996
SHIN DONG BANG CORPORATION

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1. A liquid bottle cap comprising:

   a cap body put on a liquid bottle, said cap body including:

   an inside cylinder fitted into the mouth of the bottle when putting the cap body on the bottle, said cylinder defining a liquid pouring opening therein;

   a cylindrical mouth covering skirt externally connected to the middle portion of said inside cylinder by an annular connector and fitted over the mouth of the bottle when putting the cap body on the bottle, the top surface of said skirt being curved and consisting of three parts of different heights, that is, two diametrically-opposite horizontal parts and a curved part extending between the two horizontal parts; and

   a packing member provided in the inside corner between said skirt and said annular connector and
adapted for sealing the lip of the bottle thereby preventing undesirable leakage of bottled liquid;

a top cover adapted for selectively covering the top of said cap body and thereby selectively closing said opening of the cap body, said cover including:

a cylindrical inside plug selectively fitted into said opening of the cap body thus closing the opening; and

an outside skirt integrally surrounding said inside plug, the edge of said outside skirt being curved into a configuration substantially meeting the curved top surface of the mouth covering skirt of the cap body; and

a flexible connecting rib integrally connecting said top cover to one horizontal part of said mouth covering skirt of the cap body.

7. A process for producing a liquid bottle cap, the cap including a tear-off piece and a finger-operable ring connected to said piece through a rib, said process comprising the step of:

injecting liquid plastic into a cavity between top and bottom molds through a gate extending to a cavity part corresponding to a part of said finger-operable ring, said part of the ring being diametrically opposite to said rib.
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COMPLETE SPECIFICATION
STANDARD PATENT

Applicant:
SHIN DONG BANG CORPORATION

Invention Title:
LIQUID BOTTLE CAP AND PROCESS FOR PRODUCING SUCH A CAP

The following statement is a full description of this invention, including the best method of performing it known to me/us:
LIQUID BOTTLE CAP AND PROCESS FOR PRODUCING SUCH A CAP

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates in general to a liquid bottle cap, for example, an edible oil bottle cap, and, more particularly, to a structural improvement in such a cap for preventing undesirable opening of the cap even when a bottle with the cap carelessly falls flat on its side wall or falls from something, for example, a table. The present invention also relates to a process for producing such a cap.

Description of the Prior Art

Japanese U.M. Laid-open Publication No. Sho. 55-108054 (published on July 29, 1980) disclosed a cap for liquid bottles. As shown in Figs. 1A and 1B, the above Japanese cap comprises a cap body 1 and a top cover 20. The above cover 20, which covers the top of the cap body 1, is connected to the body 1 by a flexible connecting rib 13. The cap body 1, cover 20 and rib 13 are formed into a single structure.

The above cap body 1, which is put on a bottle, consists of two concentric cylindrical members, that is, an inside cylinder 2 and a mouth covering skirt 3, which are formed into a single body. The lower portion of the inside cylinder 2
forms a fitting nipple, which is tightly fitted into the mouth of a bottle (not shown) when the cap is put on the bottle. The mouth covering skirt 3 is exteriorly and concentrically formed on the middle portion of the inside cylinder 2 with an annular space between them. The skirt 3 is tightly fitted over the mouth of the bottle when the cap is put on the bottle. A plurality of annular protrusions 4 are formed on the outer wall of the fitting nipple and are brought into watertight contact with the inner wall of the bottle's mouth when the nipple is fitted into the bottle's mouth. The above protrusions 4 thus not only watertightly seal the bottle's mouth with the cap body 1, they also prevent undesirable removal of the cap body 1 from the bottle's mouth. A snap ring 5 is integrated with the inner wall of the skirt 3 and is brought into snap engagement with the thickened lip of the bottle's mouth so that the ring 5 prevents undesirable separation of the cap body 1 from the bottle's mouth.

The top of the inside cylinder 2 is flared in order to form an enlarged-diameter mouth 7. The root of the flared mouth 7 is surrounded by a cylindrical click member 8. The above click member 8 is flared upward and is brought into click engagement with the thickened lip 18 of the cover 20. In order to prevent the liquid from suddenly pouring out of the bottle, a regulating means 12 is provided in the liquid pouring opening 9 of the above mouth 7. The above means 12
consists of a disc 10 and a leg 11.

The cover 20, which is connected to the body 1 by the flexible connecting rib 13, consists of a circular top wall 15 and two concentric side walls 16 and 17. The outer side wall or a skirt 16 extends from the edge of the above top wall 15 and has the thickened lip 18 on its free edge. The thickened lip 18 is brought into click engagement with the cylindrical click member 8 of the cap body 1. The inner side wall or a plug 17 is formed inside the outer side wall 16 and is selectively fitted into the mouth 7 of the cap body 1 thus closing the opening 9. A finger-operable protrusion 19 is provided on the outer surface of the skirt 16.

In the above bottle cap, the regulating means 12 provided in the opening 9 of the cap body 1 regulates the flow rate of the bottled liquid when the liquid is poured out of the bottle. The above cap thus appropriately regulates the flow rate and flow direction of the bottled liquid. However, the height of the plug 17 is low enough to cause the cover 20 to be undesirably opened when the bottle with the cap carelessly falls flat on its side wall or falls from something, for example, a table.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to
provide a liquid bottle cap of which the top cover tightly engages with the cap body thus preventing undesirable opening of the cap even when a bottle with the cap carelessly falls flat on its side wall or falls from something, for example, a table.

It is another object of the present invention to provide an injection molding process for producing a liquid bottle cap with a tear-off piece. In the process, liquid plastic is injected into the top and bottom molds through a gate extending to a cavity part corresponding to the finger-operable ring of the tear-off piece. The finger-operable ring thus has a high tensile strength so that the ring is neither undesirably separated from the tear-off piece nor breaks when the ring is pulled upward in order to remove the tear-off piece.

In order to accomplish the primary object, the present invention provides a liquid bottle cap having a cap body and a top cover, which are integrated into a single body by a flexible connecting rib.

In an embodiment, the cap body includes an inside cylinder, which is fitted into the mouth of the bottle when putting the cap body on the bottle. The cylinder defines a liquid pouring opening therein. A cylindrical mouth covering skirt is externally connected to the middle portion of the inside cylinder by an annular connector and is fitted over the
mouth of the bottle. The top surface of the skirt is curved and thereby consists of three parts of different heights, that is, two diametrically opposite horizontal parts and a curved part extending between the two horizontal parts. A packing member is provided in the inside corner between the skirt and the annular connector and seals the lip of the bottle thereby preventing undesirable leakage of bottled liquid. The top cover selectively covers the top of the cap body and thereby selectively closes the opening of the cap body. The cover includes a cylindrical inside plug, which is selectively fitted into the opening of the cap body thus closing the opening. An outside skirt integrally surrounds the inside plug. The edge of the outside skirt is curved into a configuration substantially meeting the curved top surface of the mouth covering skirt of the cap body. A flexible connecting rib integrally connects the top cover to the cap body.

In another embodiment, the height of the mouth covering skirt does not vary. In this embodiment, a tear-off piece is provided in the opening of the inside cylinder in order to seal the opening. The tear-off piece is defined by a tearing groove. A finger-operable ring is connected to the tear-off piece by a connecting rib and is pulled upward to remove the tear-off piece along the defined tearing groove.

The present invention also provides an injection molding
process for producing the liquid bottle cap. In the process, liquid plastic is injected into a cavity between top and bottom molds through a gate, which extends to a cavity part corresponding to a part of the finger-operable ring, the part of the ring being diametrically opposite to the rib. The tensile strength of the ring is thus increased.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and aspects of the invention will become apparent from the following description of embodiments with reference to the accompanying drawings, in which:

Fig. 1A is a front view of a typical liquid bottle cap with the opened cover;

Fig. 1B is a sectional view of the cap of Fig. 1A;

Fig. 2 is a sectional view of a liquid bottle cap with the opened cover in accordance with the primary embodiment of the present invention;

Fig. 3 is a front view of the cap of Fig. 2, which is put on a bottle;

Fig. 4 is a sectional view of a liquid bottle cap with the opened cover in accordance with another embodiment of the present invention; and

Fig. 5 is a sectional view of top and bottom molds which are used for injection molding of the cap of Fig. 4.
DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 2 is a sectional view of a liquid bottle cap with the opened cover in accordance with the primary embodiment of this invention. Fig. 3 is a front view of the cap of Fig. 2, which is put on a bottle.

As shown in Figs. 2 and 3, the above cap comprises a cap body 31 and a top cover 50. The cap body 31 is put on a bottle 100, while the cover 50 selectively covers the top of the cap body 31 in order to close the central opening 33 of the body 31. The cover 50 is connected to the body 31 by a flexible connecting rib 35. The cap body 31, cover 50 and rib 35 are formed into a single structure.

The bottled liquid is poured out of the bottle 100 through the liquid pouring opening 33 when the bottle 100 is tilted. The above opening 33 is defined by a hollow inside cylinder of the cap body 31. A cylindrical mouth covering skirt 39 is exteriorly and concentrically formed on the middle portion of the inside cylinder with an annular space between them. The skirt 39 is tightly fitted over the mouth of the bottle 100 when the cap is put on the bottle 100. The skirt 39 is connected to the inside cylinder by an annular connector 37.

In order to achieve the snap engagement of the cover 50 with the cap body 31, the cap body 31 has a click member 45.
The click member 45 vertically extends upward from the top 37 of the above connector 37 so that the member 45 is partially formed on the forward part of the cap body 31 in front of the opening 33. The above member 45 is also concentric with the inside cylinder of the body 31. The top end of the click member 45 is thickened in order to form a snap hook 43. The snap hook 43 elastically engages with the snap groove 55 of the cover 50 thus preventing undesirable opening of the cover 50 even when the bottle 100 carelessly falls flat on its side wall or falls from something, for example, a table. The above snap groove 55 is formed by horizontally grooving the inner surface of the flared skirt 57 of the cover 50. In the description of this invention, the part of the cap body 31 on the left-hand side of the drawings is referred to as the forward part of the body 31 and the opposite part on the right-hand side of the drawings is referred to as the rear part for ease of description.

The mouth covering skirt 39 of the cap body 31 has an annular protrusion 40 on its inside surface. The above protrusion 40 is brought into snap engagement with the annular groove (not shown) formed under the thickened lip of the bottle 100 when the cap is put on the bottle 100. Due to the above protrusion 40, the cap body 31 is tightly put on the bottle 100. A packing member 41 is provided on the inside corner between the skirt 39 and the annular connector 37. The
above packing member 41 seals the junction between the cap body 31 and the thickened lip of the bottle 100, thereby preventing undesirable leakage of the bottled liquid.

The top edge of the inside cylinder of the cap body 31 is bent outward so that the bottled liquid smoothly flows on the top edge when the liquid is poured out of the bottle 100. Such a top edge also comes into close contact with the annular surface 51a, which is formed outside the cylindrical inside plug 53 of the cover 50, when the cover 50 closes the opening 33 of the cap body 31. The bottled liquid is thus prevented from leaking through the junction between the cap body 31 and the cover 50 even when the bottle 100 falls flat on its side wall or falls over.

In the cap body 31, the top surface of the skirt 39 is curved in order to vary the height of the skirt 39. The top surface of the skirt 39 thus consists of three parts, that is, the lowest forward part 39a, highest rear part 39b and gently-curved intermediate part 39c.

The above cover 50 generally comprises the flared outside skirt 57, cylindrical inside plug 53 and top wall 51, which are formed into a single structure. When the cover 50 closes the opening 33 of the cap body 31, the skirt 57 elastically engages with the snap hook 43 of the cap body 31 by its snap groove 55. In the above state, the inside plug 53 is fitted into and closes the opening 33. The top wall 51 is internally
and smoothly depressed in order to form an arcuate cross-section. In the above cover 50, the plug and skirt 53 and 57 are spaced apart from each other so that the annular surface 51a is formed between them. The above annular surface 51a is brought into close contact with the top edge of the inside cylinder of the cap body 31 when the cover 50 closes the opening 33 of the body 31 as described above. The above cover 50 also has a finger-operable protrusion 60, which is formed on the edge of the skirt 57 and is pulled by a finger when clicking the cover 50 to create the opening 33.

As best seen in Fig. 3, the edge of the skirt 57 of the cover 50 is curved in the same manner as described for the top surface of the mouth covering skirt 39 of the cap body 31. That is, the edge of the above skirt 57 consists of three parts, that is, the highest forward part 57a, lowest rear part 57b and gently-curved intermediate part 57c. When the cover 50 closes the opening 33 of the cap body 31, the parts 57a, 57b and 57c of the skirt 57 substantially meet the parts 39a, 39b and 39c of the mouth covering skirt 39, respectively.

Due to the curved configuration of the skirts 39 and 57, the inside plug 53 of the cover 50 can be smoothly inserted into the opening 33 of the cap body 31 when the cover 50 closes the opening 33.

The operational effect of the above cap will be described hereinbelow.
In order to open the cover 50, the cover 50 in its shut position shown in dash and dot of Fig. 2 is opened by pulling the protrusion 60 of the cover 50 upward by a finger. In the above state, the snap groove 55 of the cover 50 is elastically released from the snap hook 43 of the click member 45 so that the cover 50 is opened.

When the bottle 100 in the above state is tilted, the bottled liquid is poured out of the bottle 100 through the opening 33.

After pouring a desired quantity of bottled liquid, the opening 33 of the cap body 31 is closed by the cover 50. When positioning the cover 50 over the body 31 and pressing the cover 50 onto the body 31, the inside plug 53 of the cover 50 is inserted into the opening 33 of the body 31. At the same time, the snap groove 55 of the cover 50 snaps into the snap hook 43 of the body 31, thus watertightly closing the opening 33.

In the above state the parts 57a, 57b and 57c of the skirt 57 of the cover 50 substantially meet the parts 39a, 39b and 39c of the skirt 39 of the cap body 31, respectively.

The above cap according to the primary embodiment of this invention reliably prevents undesirable leakage of the bottled liquid even when the bottle 100 with the cap carelessly falls flat on its side wall or falls from something, for example, a table. That is, the cover 50 is not undesirably opened since
it has both the inside plug 53, which is tightly fitted into the opening 33 of the cap body 31, and the snap groove 55, which tightly engages with the snap hook 43 of the cap body 31.

Fig. 4 is a sectional view of a liquid bottle cap according to the second embodiment of this invention. Fig. 5 is a sectional view of the top and bottom molds which are used for injection molding of the cap of Fig. 4. In the following description, the elements common to both the primary embodiment and the second embodiment will carry the same reference numerals.

One difference between the caps of the primary and second embodiments resides in that the height of the mouth covering skirt 39 of the cap body 31 does not vary so that the forward and rear parts 39a and 39b of the skirt 39 have the same height. A click member 45 with a snap hook 43 is integrated with the top of the above skirt 39. The flared outside skirt 67 of the cover 50 is internally grooved at a position near the edge of the skirt 67, thus forming an annular snap groove 67a. The above groove 67a snaps into the snap hook 43 of the click member 45 when the cover 50 covers the top of the cap body 31. In the same manner as described for the mouth covering skirt 39 of the cap body 31, the height of the flared skirt 67 of the cover 50 does not vary so that the forward and rear parts of the skirt 50 have the same height. The finger-
Operable protrusion 60, which is pulled upward by a finger when opening the cover 50, is integrated with the skirt 67 of the cover 50. In the above cover 50, the height of the inside plug 62 is lower than that of the flared skirt 67. The edge 62a of the plug 62 is smoothly bent inward so that the plug 62 can be easily inserted into the opening 33 of the cap body 31.

In the above cap body 31, a tear-off piece 58 is provided in the lower section of the opening 33. The above piece 58 is formed by a tearing groove 68. A finger-operable ring 61, which is pulled upward by a finger when tearing off the piece 58 along the groove 68, is connected to the connection rib 70 of the piece 58. The above ring 61 is inclinedly positioned inside the opening 33. The above ring 61 has a finger-passing hole 59.

The cap according to the second embodiment is formed by an injection molding process with the top and bottom molds 110 and 130 of Fig. 5.

The top and bottom molds 110 and 130 are spaced apart from each other thus remaining a cavity 114, which has the same shape as the above cap, between them.

A plurality of cores for molding the cap body 31, connecting rib 35 and cover 50 are set in the top mold 110. In the top mold 110, a first top core 111 forms the top side of the tear-off piece 58 with the rib 70 and finger-operable ring 61. A second top core 113, which forms the inside wall
of the inside cylinder of the cap body 31, surrounds the above first core 111. The opening 33 of the cap body 31 is defined by the above inside wall formed by the second core 113.

The first top core 111 is inclinedly holed in order to form a gate 170, through which liquid plastic is injected into the cavity 114. The gate 170 extends to a cavity part which corresponds to a part of the finger-operable ring 61, the part of the ring 61 being diametrically opposite to the rib 70. The above second core 113 in turn is surrounded by a third top core 115, which forms both the outside wall of the inside cylinder and the inside wall of the click member 45 of the cap body 31. The above third core 115 is surrounded by a fourth top core 117, which forms both the outside wall of the click member 45 and the flexible connecting rib 35.

A fifth top core, which forms the inside wall of the plug 62 of the cover 50, is designated by the reference numeral 119. The above fifth core 119 is surrounded by a sixth top core 118, which forms both the outside wall of the plug 62 and the inside wall of the flared skirt 67 of the cover 50. That is, the inside plug 62 of the cover 50 is molded by the cores 118 and 119, while the flared skirt 67 of the cover 50 is molded by the core 118 cooperating with the bottom mold 130.

A plurality of cores are set in the bottom mold 130. In the above bottom mold 130, a first bottom core 131, which forms the bottom side of the tear-off piece 58, is arranged
under the first top core 111. The first bottom core 131 is surrounded by a second bottom core 133, which forms both the packing member 41 and the inside wall of the mouth covering skirt 39 of the cap body 31. The bottom mold 130 is also spaced apart from the fifth and sixth top cores 119 and 118 thus forming a cavity part, which forms the top wall 51 and annular surface 51a of the cover 50.

The liquid bottle cap according to the second embodiment of this invention is injection-molded with the above molds 110 and 130 as follows.

In the injection molding process for molding the cap, the top and bottom molds 110 and 130 are primarily arrayed by operating an injection molding machine (not shown). Thereafter, a measured quantity of hot liquid plastic under pressure is poured or injected into the cavity 114 between the molds 110 and 130 through the gate 170 of the core 111. When a predetermined hardening time has passed since pouring of the liquid plastic, the cores of the molds 110 and 130 are removed from the machine prior to obtaining the cap that takes the shape of the cavity 114.

In the above injection molding process using the molds 110 and 130, the liquid plastic is injected into the cavity 114 through the gate 170, which extends to the cavity part corresponding to the finger-operable ring 61. The tensile strength of the ring 61 is thus higher than that of a ring
formed by the molds with a gate extending to either the center of the tear-off piece 58 or the rib 70.

When the ring 61 with the high tensile strength is pulled upward by a finger, the tear-off piece 58 is easily torn off along the groove 68 without failure. In this case, the ring 61 is neither undesirably removed from the rib 70 nor broken.

As described above, the present invention provides a structurally-improved liquid bottle cap. In the cap of this invention, the top cover not only has the inside plug, which is tightly fitted into the opening of the cap body, it also has the snap groove, which tightly engages with the snap hook of the cap body. Therefore, the above cap is not undesirably opened and reliably prevents undesirable leakage of the bottled liquid even when a bottle with the cap carelessly falls flat on its side wall or falls from something, for example, a table.

This invention also provides an injection molding process for producing a liquid bottle cap with a tear-off piece. In the process, the liquid plastic is injected into the top and bottom molds through a gate extending to the cavity part corresponding to the finger-operable ring of the tear-off piece. The finger-operable ring thus has a high tensile strength so that the ring is neither undesirably separated from the tear-off piece nor breaks when the ring is forcibly pulled upward in order to remove the tear-off piece.
Having described specific preferred embodiments of the invention with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention as defined in the appended claims.
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A liquid bottle cap comprising:
   a cap body put on a liquid bottle, said cap body including:
   an inside cylinder fitted into the mouth of the bottle when putting the cap body on the bottle, said cylinder defining a liquid pouring opening therein;
   a cylindrical mouth covering skirt externally connected to the middle portion of said inside cylinder by an annular connector and fitted over the mouth of the bottle when putting the cap body on the bottle, the top surface of said skirt being curved and consisting of three parts of different heights, that is, two diametrically-opposite horizontal parts and a curved part extending between the two horizontal parts; and
   a packing member provided in the inside corner between said skirt and said annular connector and adapted for sealing the lip of the bottle thereby preventing undesirable leakage of bottled liquid;
   a top cover adapted for selectively covering the top of said cap body and thereby selectively closing said opening of the cap body, said cover including:
a cylindrical inside plug selectively fitted into said opening of the cap body thus closing the opening; and

an outside skirt integrally surrounding said inside plug, the edge of said outside skirt being curved into a configuration substantially meeting the curved top surface of the mouth covering skirt of the cap body; and

a flexible connecting rib integrally connecting said top cover to one horizontal part of said mouth covering skirt of the cap body.

2. The liquid bottle cap according to claim 1, wherein a click member with a snap hook integrally extends from the other horizontal part of the top surface of said mouth covering skirt.

3. The liquid bottle cap according to claim 1, wherein a snap groove is provided on the inside wall of said outside skirt of the cover and selectively snaps into the snap hook of said click member.

4. A liquid bottle cap comprising:

a cap body put on a liquid bottle, said cap body including:
an inside cylinder fitted into the mouth of the bottle when putting the cap body on the bottle, said cylinder defining a liquid pouring opening therein;

a cylindrical mouth covering skirt externally connected to said inside cylinder by an annular connector and fitted over the mouth of the bottle when putting the cap body on the bottle;

a click member with a snap hook integrally extending from both forward and rear parts of the top surface of said mouth covering skirt;

a packing member provided in the inside corner between said skirt and said annular connector and adapted for sealing the lip of the bottle thereby preventing undesirable leakage of bottled liquid;

a tear-off piece provided in said opening of the inside cylinder for normally closing the opening;

a tearing groove defining said tear-off piece; and

a finger-operable ring connected to said tear-off piece by a connecting rib and adapted for tearing off the piece along said tearing groove, said ring having a finger passing hole; and

a top cover connected to said cap body by a flexible
connecting rib and adapted for selectively covering the top of said cap body and thereby selectively closing said opening of the cap body, said cover including:

a cylindrical inside plug selectively fitted into said opening of the cap body thus closing the opening; and

an outside skirt integrally surrounding said inside plug and selectively brought into snap engagement of said click member of the cap body.

5. The liquid bottle cap according to claim 4, wherein a snap groove is provided on the inside wall of said outside skirt of the cover and selectively snaps into the snap hook of said click member.

6. The liquid bottle cap according to claim 4, wherein the height of said inside plug of the cover is lower than that of said outside skirt of the cover.

7. A process for producing a liquid bottle cap, the cap including a tear-off piece and a finger-operable ring connected to said piece through a rib, said process comprising the step of:

injecting liquid plastic into a cavity between top and bottom molds through a gate extending to a cavity part
corresponding to a part of said finger-operable ring, said part of the ring being diametrically opposite to said rib.

DATED THIS 17TH DAY OF SEPTEMBER 1996

SHIN DONG BANG CORPORATION
By its Patent Attorneys:
GRIFFITH HACK

Fellows Institute of Patent Attorneys of Australia
ABSTRACT OF THE DISCLOSURE

A liquid bottle cap and injection molding process for producing the cap is disclosed. In the cap, the top cover has an inside plug, which is tightly fitted into the opening of the cap body. The cover also has the snap groove, which tightly engages with the snap hook of the cap body. The cap is thus not undesirably opened and reliably prevents undesirable leakage of the bottled liquid even when a bottle with the cap carelessly falls flat on its side wall or falls from something, for example, a table. In the injection molding process, liquid plastic is injected into top and bottom molds through a gate extending to the cavity part corresponding to the finger-operable ring of the tear-off piece. The finger-operable ring thus has a high tensile strength so that the ring is neither undesirably separated from the tear-off piece nor breaks when the ring is forcibly pulled upward in order to remove the tear-off piece.