



BAG-IN-CARTON WITH A COIL SPRING

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The present invention generally relates to a Bag-In-Carton (BIC), and more particularly to BIC used to contain and dispense a liquid.

BACKGROUND OF THE INVENTION

Bag-In-Carton containers are used to store and dispense liquids to be consumed. BICs may be used both for containing low viscosity liquids, such as juice; or for high viscosity liquids, such as certain printing inks. BICs generally comprise a carton, a nozzle or spout structure and a liquid impermeable bag housed within the carton for containing a liquid to be dispensed for consumption. An interior end of the nozzle having an opening for receiving liquid is coupled to the bag housed within the carton. A portion of the nozzle penetrates through a wall of the carton to provide a means for dispensing the liquid. The bag itself is usually made from a highly flexible material which is impermeable to the liquid being stored, such as a foil or plastic laminate.

A drawback associated with conventional BICs is the potential for unnecessary blockage of the nozzle due to the collapse of the bag as the liquid is dispensed. In many applications, particularly when dispensing a high viscosity liquid such as ink, the BIC is designed so that it does not permit the introduction of air into the bag to replace the liquid being dispensed. In such applications, the flexible bag collapses in response to atmospheric pressure as the liquid is dispensed. Unless preventive measures are taken, as the bag collapses a portion of the bag may come in contact with and block the opening in



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the interior end of the nozzle. A substantial portion of the content of the bag may be wasted if the nozzle becomes blocked in this manner before the bag is fully drained.

One solution which has been used to overcome this problem is to adhere or attach part of the inner bag to the carton. However, this solution increases production expenses and is cumbersome due to the need to apply an adhesive to the bag and/or the carton. Therefore, there is a need for a bag-in-carton which enables full use of the liquid stored in the bag, minimizes liquid waste and lowers the production cost by eliminating the need to adhere or attach the bag to the carton.

SUMMARY OF THE INVENTION

The aforementioned drawbacks associated with known bag-in-cartons designs are overcome by the present invention. The present invention provides an inner bag disposed within a carton for containing a liquid. A nozzle is disposed on the carton and penetrates through the inner bag. The nozzle provides a path to direct the flow of the liquid therefrom. A cap may be disposed on the nozzle to protect it during storage, prior to use. A compressible coil spring mounted on the nozzle extends into the inner bag and prevents the bag from collapsing on the nozzle as the liquid is consumed.

For purposes of illustration only, the present invention is described below for the use of ink as the liquid in a printer application. The present invention, however, is not limited to the use of ink and may be used with many different liquids without regard to viscosity. Ink from an inner bag is dispensed by means of suction from an attached printer mechanism, which is well known in the art and beyond the scope of this disclosure. As ink is dispensed from the bag through the nozzle, the bag collapses

inwards towards the nozzle. The compressible coil spring prevents the inner bag from collapsing onto the nozzle opening, ensuring that the full volume of ink can be dispensed. As more ink is dispensed, the bag collapses further and pushes the compressible coil spring in toward the nozzle. As the spring is forced inward, the bag further collapses to the point where the amount of remaining ink in the inner bag is minimized.

An advantage of the present invention is the production cost compared to conventional BICs that adhere or otherwise attach the bag to the carton. Thus, the present invention has the feature of being less expensive to produce.

BRIEF DESCRIPTION OF THE DRAWINGS

The aforementioned and related advantages and features of the present invention will become apparent upon review of the following detailed description of the invention, taken in conjunction with the following drawings, where like numerals represent like elements, in which:

FIG. 1 is a sectional view of the bag-in-carton of the present invention, with the inner bag filled with liquid;

FIG. 2 is a side view of the bag-in-carton of the present invention, after the liquid is dispensed;

FIG. 3 is a sectional view of the nozzle of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The Bag-In-Carton according to the present invention is designed to maximize liquid use and minimize liquid waste while lowering the production cost. The BIC of the present invention will now be described with reference to FIGS. 1 – 3.

FIG. 1 shows an embodiment of a Bag-In-Carton 100 which is filled with a liquid to be dispensed. An inner bag 104 is disposed within a carton 106. Inner bag 104 may be made of any suitable material. Appropriate materials are known to those skilled in the art. Preferably, inner bag 104 is made from a material which is inert in relation to the contents of the bag, is impermeable to the contents, and which has sufficient strength to withstand any forces which it may be subjected to in handling and in use without risk of rupturing or otherwise losing its integrity. Various types of laminated plastic or foil structures are well suited for use as the bag material.

The carton 106 is preferably a substantially enclosed carton which may take any convenient shape such as a rectangular box. A low cost material such as cardboard may be used. A liquid 112 to be dispensed from the BIC and consumed is contained within the inner bag 104. The liquid 112 can be of high viscosity, such as a ink; however, the present invention is not limited to ink and may be used with many different liquids without regard to viscosity. The present invention has particular application to BIC containers which do not allow air into the bag as liquid is dispensed and which, therefore, collapse as the contents of the bag are consumed.

The inner bag 104 is shown in its filled state in FIG. 1. The inner bag 104 is made of a flexible material so that it will collapse as liquid is dispensed. According to the present invention, the inner bag 104 need not be adhered or otherwise attached to any of the inner surfaces of the carton 106.

A nozzle 108 for dispensing liquid from the bag is mounted on the carton and penetrates into the interior of the inner bag 104. Nozzle 108 is also depicted in FIG. 3.

The nozzle 108 is preferably mounted on a lower end of one surface of the carton 106.

The nozzle 108 may be generally cylindrical with an exterior end 120 extending outwardly from carton 106 and an interior end 130 extending into the interior of carton 106 and into the interior of inner bag 104. A hollow passage way 140 provides a communication path which allows the liquid within inner bag 104 to be dispensed out of an opening 150 formed in the exterior end 120 of nozzle 108. Inner bag 104 is sealingly coupled to interior end 130 of nozzle 108. Nozzle 108 may be made of any suitable material which is compatible with the liquid contents of the BIC. Plastic is a preferred material because of its low expense and ease of molding.

A compressible coil spring 102 is mounted on the interior 130 end of nozzle 108 and extends into the interior of inner bag 104. Coil spring 102 may also be made of any suitable material which is compatible with the contents of the liquid stored in the BIC. Preferably, coil spring 102 has a spring constant which allows the spring to collapse as liquid is dispensed and inner bag 104 collapses.

The nozzle 108 has a threaded portion 113 on the outer periphery of its exterior end 120. A flange 122 is formed on the outer periphery of nozzle 108 and adapted to allow inner bag 104 to be sealingly mounted thereon. Nozzle 108 has an annular groove 124 formed between two flanges 155, 156 which secure the nozzle to carton 106. The exterior end of nozzle 108 may be formed so that it mates with a connector of an external device such as a printer (not shown) which consumes the liquid dispensed from the BIC. A suction force may be applied by the external device to draw liquid out of the BIC.

A cap 110 may be screwed onto the threaded portion 113 of the exterior end 120 of the nozzle 108 to protect the nozzle from damage and to protect a seal 170 from being punctured or broken before the BIC is placed in use.

FIG. 2 is a side view of the BIC of the present invention, after substantially all the liquid 112 has been dispensed and the inner bag 104 has collapsed. As liquid 112 is removed from the inner bag 104, atmospheric pressure causes the bag to collapse towards the nozzle 108. Without compressible coil spring 102, a portion of the collapsing inner bag 104 might come in contact with and block opening 180 before all of the liquid in bag 104 has been consumed resulting in unnecessary and undesirable waste.

The present invention overcomes this drawback through the use of the compressible coil spring 102. As the liquid 112 is dispensed, and inner bag 104 collapses, compressible coil spring 102 prevents the interior surfaces of the bag from blocking opening 180 in nozzle 108.

After a certain point, as more liquid 112 is dispensed, the inner bag 104 collapses further and pushes the compressible coil spring 102 inward towards the nozzle 108. Preferably, compressible coil spring 102 has a spring constant which permits it to compress as the inner bag 104 collapses. FIG. 2 shows compressible coil spring 102 in a fully compressed state after the liquid 112 has been fully dispensed.

The present invention enables full use of the liquid 112 thereby minimizing liquid waste without requiring the inner bag 104 to be adhered or otherwise attached to the carton. This reduces labor costs since the time and effort associated with adhering or attaching the inner bag 104 to the carton 106 are eliminated.

The foregoing detailed description of the invention has been provided for the purposes of illustration and description. Although exemplary embodiments of the present invention have been described in detail herein with reference to the accompanying drawings, it is to be understood that the invention is not limited to the precise embodiments disclosed, and that various changes and modifications to the present invention are possible in light of the above teaching. Accordingly, the scope of the present invention is to be defined by the claims appended hereto.

What is claimed is :

1. A bag-in-carton for dispensing a liquid, comprising:
 - an enclosed carton;
 - a collapsible inner bag disposed within said carton, for containing a liquid to be dispensed;
 - a nozzle disposed on said carton, said nozzle having an interior end which penetrates into the interior of said carton and said inner bag, said interior end being sealingly coupled to said inner bag, an exterior end which projects from an exterior wall of said carton, and a liquid communication path between said interior and exterior ends such that liquid within said inner bag may be dispensed through said nozzle;
 - a coil spring mounted in the vicinity of said nozzle such that said coil spring prevents said inner bag from blocking said nozzle as liquid is dispensed and said inner bag collapses, wherein said coil spring is compressible (in an axial direction of the coil spring) by the bag as liquid is dispensed and said inner bag collapses.
2. The bag-in-carton of claim 1, wherein said coil spring is mounted on said interior end of said nozzle.
3. The bag-in-carton of claim 1, wherein said inner bag is formed from a laminate material.
4. The bag-in-carton of claim 3, wherein said laminate material is plastic.
5. The bag-in-carton of claim 3, wherein said laminate material is foil.
6. The bag-in-carton of claim 3, wherein said nozzle has a cap disposed on said exterior end of said nozzle.
7. The bag-in-carton of claim 1 wherein the coil spring is frustoconical in shape with the base of said shape being furthestmost from said nozzle.
8. A bag-in-carton comprising:
 - a substantially enclosed carton;
 - a collapsible inner bag disposed in said carton, for containing a liquid to be dispensed;
 - a nozzle disposed on said carton and penetrating into the interior of said inner bag, to provide a path for said liquid to be dispensed; wherein said nozzle has an exterior end extending outwardly from said carton and an interior end extending into said interior of said carton and collapsible inner bag, and said nozzle is disposed on an end portion of one surface of said carton;
 - a compressible coil spring mounted on said nozzle; wherein said coil spring prevents said inner bag from blocking said nozzle as liquid is dispensed and said inner bag collapses; wherein said compressible coil spring is of sufficient elasticity to compress in an axial direction of said compressible coil spring as said inner bag collapses;
 - a cap disposed on said exterior end of said nozzle.