A Patent: Innovation in the Bottle and Environmental Approach for Liquid Packaging Material

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Abstract: Food packaging is one of the essential steps of food industry because of kinds of reasons such as hygiene, practical usage, fast and easy consumption, long shelf life, good and long preserving of foods etc. This invention related with innovation of bottle that provides preservation, storage and transport of water and similar liquid into containers. Created patent brings a new invention of bottle which has not bottle cap but can be closed easily due to its invented special design thus a patent was obtained for related industries. In the patented design, length of inlet is long in the invention of container. There are one or two register films due to preference bottom of the inlet section. Bottle contains at least two vertical folding edges those have 180^{o} vertical angle and also have at least one or two due to preference horizontal folding edge in the inlet section. Biopolymers from renewable resources have been examined and studied with great interest in recently. Environmental plastics are made from renewable raw materials such as maize and potato starch or the patent article, patent was introduced with suggestion manufacturing designed bottle with biodegradable materials for sustainable environment.

Keywords: Patent, bottle, innovation, cap, biodegradable, sustainable environment.

1. INTRODUCTION

The practical development of fluid container brings easy and practical also economical benefits for the public. Caps of bottle can cause increasing of prices of bottles and much higher prices of related sectors especially manufacturing sectors. This patent invention was created a new invention of bottle which has no cap but can be closed easily due to its invented special design thus a patent was obtained for related industries. Today sustainable environment with food safety have great concern from point of reducing environment pollution and protection of environment with human health by providing food safety reason. The authors suggested manufacturing inventing bottle from biodegradable and green renewable materials those claimed in the article. There is a real that we have to live protected and sustainable environment to next generations. The packaging of materials including foods have been consuming common and in high quantities even some of food regulations force using packed safety foods because of food standards or any reasons.

There were reports about conventional polymers. Such as increased and common use of synthetic packaging films has led to serious ecological problems because of their total non-biodegradability [1].

Conventional polymers such as polyethylene and polypropylene are exist for many years. These are also known as PolyVinyl Chloride (PVC) bags, Polyethylene Terepthalate (PET) bottles and their wastes cause great environment problem because they are not bio-degradable [2]. There is a wide term for synthetic polymers The commodity plastics known as “big four” polyethylene (PE), poly(propylene) (PP), polystyrene (PS) and poly(vinyl chloride) (PVC) in a variety of forms such as films, flexible bags and rigid containers have revolutionized the packaging industry. Polylactic acid (PLA) polymer is widely used in such medical applications as surgical implants tissue cultures, [3,4,5]. Over 67 million tonnes of packaging waste is generated annually in the EU, comprising about one-third of all municipal solid waste (MSW). Plastics contribute 18 per cent of the 10.4 million tones of packaging wastes produced annually in the UK [6,7,8].

Sustainable environment contains various factors including biomaterials. A few of these factors comprise degradable and recycling in the nature and organic originated food packaging materials, which have food safety conditions for public health.

On the other hand, providing low incoming and practical packaging apart from using to old designs of

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bottling should bring practical and economic contribution to economy and consumer preference. In this article, it was examined both reviewing of bio materials for food packaging for sustainable environment and friendly environment food packaging material and also introducing a new patent bio-bottle closed without becoming cap. (Patent owner is F.B. Gürarslan, application number; 2016/14143).

Food packaging is one of the essential steps of food industry because of kinds of reasons such as hygiene, practical usage, fast and easy consumption, long shelf life, good and long preserving of foods etc. On the other hand innovations of packaging industry are requires from consumers and producers. In the day, each of new innovation studies brings development, new developments and benefits to food industry and consumer. It should be stay in the mind that every living beings requires sustainable environment for surviving the future generations. [9] Environmental Protection Agency (EPA) found that approximately only 31% of the Municipal solid waste (MSW generated in 2005 was from packaging-related materials, including glass, metal, plastic, paper, and paperboard. There is a great requirement for developing and applying biodegradable packaging products.

Environmental plastics are made from renewable raw materials such as maize and potato starch or certain blends. Biodegradable polymers includes cellulose, starch, protein, microbial polyesters and polylactic acid each of them can be used in sorts of applications [10] Biodegradable polymers are derived from replenishable agricultural feedstock, animal sources, marine food processing industry wastes, or microbial sources [11].

Biopolymers from renewable resources have been examined and studied with great interest in recent years. Renewable sources of polymeric materials offer an answer to providing sustainable development of economically and ecologically attractive technology [12]. In addition to renewable raw ingredients, biodegradable materials break down to produce environmentally friendly products such as carbon dioxide, water, and quality compost [13].

Poly(lactic acid) (PLA) is a compostable bioplastic produced by the polymerization of lactic acid monomers derived from the fermentation of starch. PLA is used as a replacement to conventional petrochemical based plastics, principally as food packaging containers and films [14]. A study was carried out about biodegradability of polylactide bottles in real and simulated composting conditions by Kale *et al*., 2007. [15] Biodegradability of PLA bottles were tested according to these methods (a) a cumulative measurement respirometric (CMR) system and (b) a gravimetric measurement respirometric (GMR) system Obtained results reported that biodegradation for PLA bottles and at the end of the 58th day the mineralization was 84.2±0.9% and 77.8±10.4%, respectively.

A similar patent study was explored by Patel, 20138 [16]. patent no: US20110089173 A1. https://www.google.com/patents/US20110089173?hl=tr

Plastic bottles are lightweight, can be molded easily at low cost, and are widely used in various industries as containers. A “bioplastic” is biodegradable, and is shaped by being formed, molded or extruded into a desired shape. Biodegradable products may be made from paper or bio plastic, biodegradable resins (bioplastic resins), namely, polyhydroxyalkonate (PHA), poly 3- hydroxybutrate co 3 hydroxyhexanote (PHBH), polyhydroxybutyrate-co-valerate (PHB/V), poly-3-hydroxybutyrate (PHB) etc.

The results of a study suggest that the incorporation of bacteriocins into PLA polymer could provide a possible delivery system for improving the efficacy of bacteriocins in food applications. In this study, only PLA/nisin films were evaluated [17].

2. MATERIALS AND METHODS

2.1. Material

Main topic of this article is introducing innovation of the bottle which can be closed without cap because of its special design by folding and locked by switching on the neck of bottle. Researchers have suggested that designed bottle can be produced by biodegradable and flexible materials that mentioned about in introduction section.

2.2. Methods

The pictures were given as below and explained in the article.

2.3. Picture

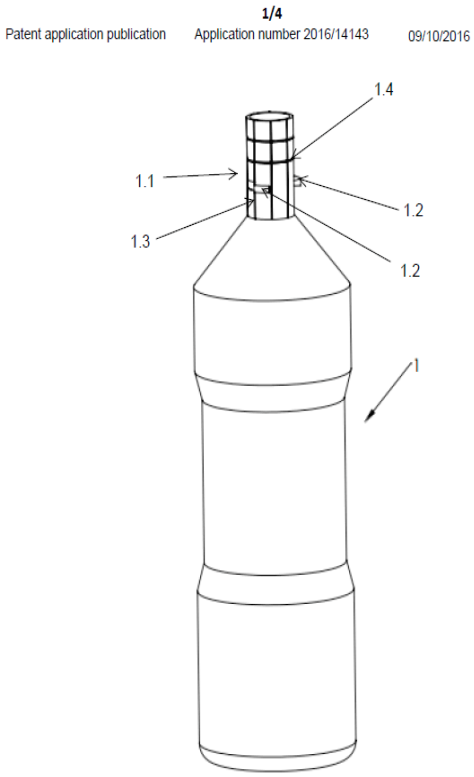

Figure 1: Perspective view of bottle in the invention.

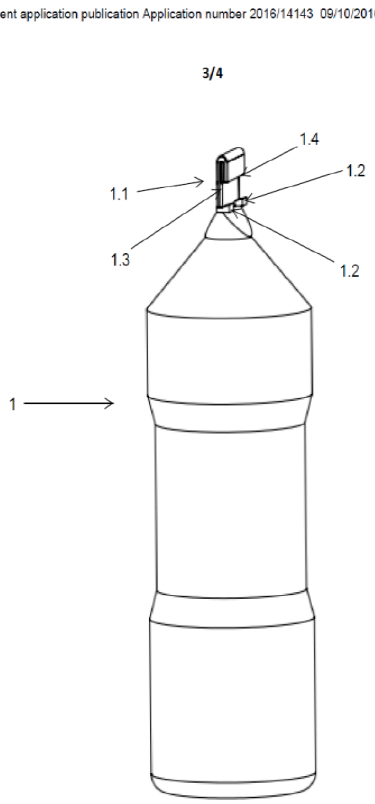

Figure 3: Perspective view folded plane on the first horizontal folding edge after folded of inlet section invented bottle on the edges of vertical folding section.

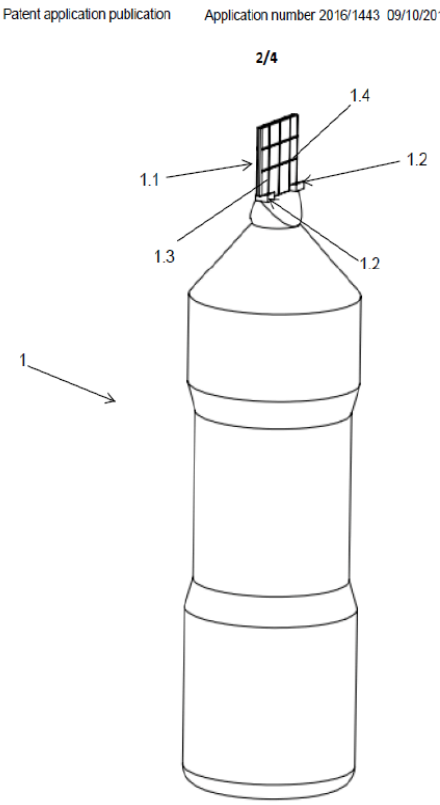

Figure 2: Perspective view of inlet section that folded level on the vertical axes in the bottle invention.

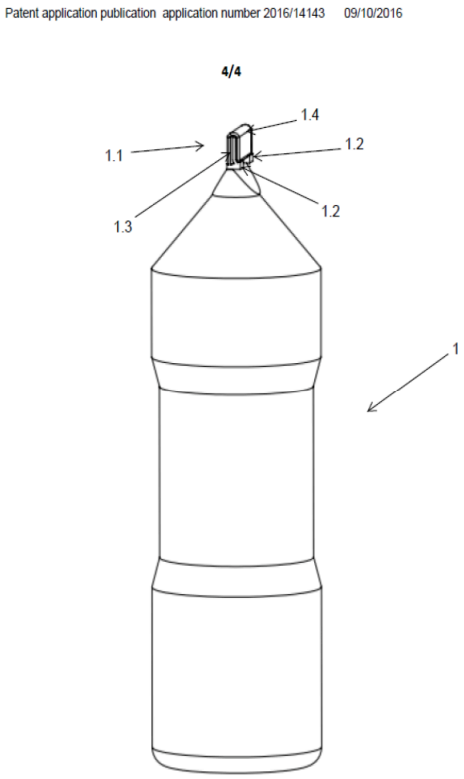

Figure 4: Perspective view of folded plane on the second horizontal folding edge and fixed by film register after figure **3** status of the invented bottle.

Patent Information:

http://www.turkpatent.gov.tr/TURKPATENT
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Related Patent Sources

EP2669214 A1(Advanced Tech Materials [US]) 04 December, 1999 (04.12.2013)
A US7866500 B1(PEGGS John David [US]) 11 January 2011 (11.01.2011)
A US8061548 B1 PEGGS John David [US]) 22 October 2002 (22.11.2011)

2.3.1. Parts and Sections

1. Bottle.

1.1 Inlet section.

1.2 Film register.

1.3 Vertical folding edge.

1.4 Horizontal folding edge.

3. DISCUSION AND RESULTS

3.1. Brief Description of Patent

The invention related with innovation of bottle (1) that provided preservation, storage and transport of water and similar liquid into vehicle.

Length of inlet (1.1) is long in the invention of container. There are one or two register films (1.2) due to preference bottom of the inlet section. There are at least two vertical folding (1.3) edges those have 180^{o} vertical angle. There are at least one or two due to preference horizontal folding edge (1.4) in the inlet section (Figure **1**).

The power was applied along the vertical folding edge (1.3) that becoming long of inlet section (1.1) in vertical position after added water or similar liquid into bottle in the invention (1.1) Entrance section of developed bottle in the invention was formed as flat shape as a result of applied power (Figure **2**). Forming flat shape folded on the horizontal folding edge (1.4) (Figure **3**).

Then, the neck of bottle by folding upon the second horizontal edge and by softening film registers (1.2) of horizontal folding edge (1.4), thus, provided to fix on the film registers, which is special lock of invented bottle (1), (Figure **4**). In this style, the upper edge of inlet section by staying inside was provided not to affect from outside as hygienic and becoming clean developed bottle in the inventions. When desired consuming liquid into bottle, by the handling horizontal folded edge from two film registers which are soften when liquid into bottle was discharged. The inlet of bottle was closed like explained as above after desired quantity of liquid was consumed. On this style, the bottle inlet can be opened or closed in the desired repeating periods and can be consumed whole liquid into bottle. Thickness of inlet bottle (1/1) is less than on vertical folding edge (1.3) and horizontal folding edge (1.4) thus, it is provided folding as easy treatment.

When compared advantages of innovation bottle that closed without cap and disadvantages the known bottles that contain caps, it was realized these situations. Authors suggested to invented bottle, which can be closed without cap, manufactured with biodegradable, organic raw materials, becomes environment friendly. The known bottles with caps can cause some of disadvantages; the bottle caps are

different parts of containers. During closing and opening of these known bottles with caps, children and old individuals can lose caps of bottles. On the other hand, caps can cause hygienic problems, when consuming liquid in kinds of periods. The bottles caps are collected and cause to additional environment pollution problem with exact no degradable bottle material problem. The bottle caps are manufactured in the injection machine from plastic materials. For this reason, there are requirements plastic injection machine and impress device. Supplying of both these devices can cause higher investment expenses in the plants for producers. Today, the bottles that contain water and similar liquids are produced in the blowing machines. The firms those filled water, supply plastic bottles and caps from different producing factories, It necessitate to supply both of required materials reaching the factory at the same time for whole productions of final products in the factories. This situation cannot be possible in most of time and affect the production negatively as a result, lack of productivity can decrease and cause higher cost of whole productions of the plants. It is necessary to work with merchandise stock be able to Prevent lack of productivity that causes cost of merchandise stock.

The developed patent bottle in the invention manufactured only in one machine, so it eliminates cost of additional cap device. It does not require to plan supplying both of bottle and cap to water or any liquid filling plant because each of single own closed bottle was produced in bottle factory. On the other hand, invented bottle removed to stock requirement for overcoming the problem that not reaching the cap and bottle at the same time to plant. The bottle caps create additional cost and increase cost of bottle. In the invented new bottle, different cap is not used from the bottle because of closed bottle by folding in the created style. It removed cost of cap impress device and cap of bottle. In the article, authors suggested to produce biodegradable and organic materials for both healthy food packing and food safety and sustainable environment conditions.

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