PROCEDURE FOR FILLING ALCOHOLIC BEVERAGES, IN PARTICULAR WINE, INTO STAND-UP TYPE POUCHES MADE FROM POLY Laminate MATERIAL.

A procedure for filling alcoholic beverages, in particular wine, into stand-up type containers made from polylaminate material comprises the following operational steps: a) preparing a stand-up type container; b) mechanically opening the upper part of the container (21) to form a filling space; c) injecting an inert gas in the filling space with the aim of reducing the presence of oxygen in the space; d) introducing a predetermined quantity of an alcoholic beverage, in particular wine. The polylaminate material used comprises a cellulose layer having a basic weight of not less than 150 g/m²; the mechanical opening comprises the mechanical opening from the inside of the mouth of the container (21) and the deep injection into the container of a high pressure jet of air; step f) is performed inside a sealing station (38) in which a first sealing unit (35) performs a hermetic sealing operation ful lling sealing a shaped strip inside the upper portion of the container (21).
PROCEDURE FOR FILLING ALCOHOLIC BEVERAGES, IN PARTICULAR WINE, INTO STAND-UP TYPE POUCHES MADE FROM POLYLAMINATE MATERIAL

TECHNICAL FIELD

This invention relates to an industrial procedure for filling alcoholic beverages, in particular wine, into stand-up type pouches made from polylaminate material.

This invention also relates to a filling machine designed to perform the procedure.

The machine according to the invention comprises certain operating stations which are able to perform various advanced functions during the filling steps, at the end of which there is a final product of high quality, which is especially necessary in the presence of high quality wines.

This invention can be applied in the field of machines for filling beverages such as wines or the like in containers and in particular in paper-based polylaminate containers.

BACKGROUND ART

It is known that machines currently exist on the market allowing automation of the operations for packaging a wide range of food products in a wide range of containers made from a wide range of materials.

One of the containers most commonly used for beverages which, in addition to glass, gives the best results from the point of view of conservation is the cellulose-based polylaminate container; this is a packaging system for foodstuffs which is widely used throughout the world for the conservation of a wide
variety of beverages and liquid foodstuffs such as milk and fruit juices.

The polylaminate packaging is a container which, depending on the commercial life-span of the product, can consist of paper, plastic and aluminium or paper and plastic. The first type allows a long conservation of the foods, of between six and twenty four months, at ambient temperature, whilst the container made of paper and plastic is used for the short-term conservation of fresh foods at low temperatures.

The cellulose-based polylaminate containers are currently made using machines for the production of beverage containers, also for single use, where the machines comprise means for making containers made from polylaminate material, starting from a sheet of polylaminate material made of paper, generally comprising two main folds facing each other and sealed at the edges, a bottom fold joined with the main folds and withdrawn between the two main folds along a median line and an opening positioned between the two main folds in a counter--opposed position with respect to the base fold.

These containers are generally defined as "stand-up" and a type of these containers is described in patent document US 2012/0008884 Al, which also describes a system for filling liquids inside the containers.

Patent document US 2011/167763 Al also describes a system which allows the filling and closing by heat sealing, of stand-up type containers.

These machines comprise filling means designed to introduce a predetermined quantity of liquid in the container, closing means designed for closing the opening after introduction of the liquid, as well as means allowing a predetermined quantity of inert gas to be
injected into the container, after introducing the liquid.

It has been found that these machines lack means which allow the perfect shape of the finished container to be obtained and also means which allow the environment for injection of the liquid and the subsequent environment for closing the container to be kept perfectly aseptic.

Due to these drawbacks, the prior art machines do not allow finished containers with a high quality to be obtained and consequently the beverages contained therein are easily perishable especially if they are alcoholic beverages, in particular wine, which is notoriously much more subject to oxidation phenomena and deterioration, compared with other beverages.

Moreover, in the particular case of containers filled with alcoholic beverages, in particular but not exclusively wine, the polylaminate materials conventionally used in the industry for making containers for food products are not adequate to constitute a container which is at the same time robust, sterile and perfectly sealed from the outside environment. In the opinion of the Applicant, there are no systems which are able to produce robust, sterile and perfectly sealed containers filled with alcoholic beverages, in particular wine, on a large scale.

**DESCRIPTION OF THE INVENTION**

The present invention provides a procedure and a machine which makes it possible to eliminate or at least reduce the drawbacks described above.

This is achieved by means of a procedure for filling alcoholic beverages, in particular wine, into stand-up
type containers made from polylaminate material having the characteristics described in the main claim.

The dependent claims describe advantageous embodiments of the invention.

The main advantages of this solution, in addition to those deriving from the construction simplicity, concern the fact that the machine for implementing the procedure according to the invention allows a high standard of quality of the containers finished and ready for use to be obtained, improving the constancy of the production which is made much more reliable compared with that possible with the known solutions.

The machine for implementing the procedure according to the invention substantially comprises means which allow the making in series of containers which can be filled with alcoholic beverages, in particular wine, starting from a continuous sheet of cellulose-based polylaminate material made—paper having an extremely robust laminar structure; it not being possible to use this material according to the prior art procedures and with the prior art machines.

The machine for implementing the procedure according to the invention uses a plurality of workstations, including a station for pre-shaping the container, a station for dosing gas in the presence of ultraviolet ray lamps, a station for dosing the alcoholic beverage, in particular wine, a further station for dosing inert gas positioned immediately upstream of a closing station in which the container is hermetically closed by heat or ultrasound sealing.

DESCRIPTION OF THE DRAWINGS

Other features and advantages of the invention will
become clear on reading the description given below of one embodiment, provided as a non-binding example, with the help of the accompanying drawings, in which:

- Figure 1 illustrates a schematic side view showing the layout of the different workstations of an automatic packaging machine of containers made from polylaminate material filled with an alcoholic beverage, in particular wine;

- Figure 2 illustrates a schematic perspective view of certain operational steps of the machine for implementing the procedure according to the invention;

- Figure 3 illustrates a schematic view from below of a portion of the machine for implementing the procedure according to the invention wherein a filled container is moved through a tunnel for bringing together the open flaps of the container;

- Figure 4 illustrates a schematic perspective view of the structure of the tunnel of Figure 3;

- Figure 5 illustrates a schematic front view of the outlet of the tunnel of Figure 3;

- Figure 6 illustrates a schematic side view of the upper portion of a container made according to the invention, with particular reference to the first sealing of the upper portion;

- Figure 7 schematically illustrates the first sealing operation of the upper portion of the container as shown in Figure 6;

- Figure 8 illustrates a schematic side view of the upper portion of a container made according to the invention, with particular reference to the second sealing of the upper portion;
Figure 9 schematically illustrates the second sealing operation of the upper portion of the container as shown in Figure 8; and

Figures 10A, 10B, IOC and 10D illustrate schematic side views in which the different sealings made on the container are respectively shown according to the procedure of the invention.

DESCRIPTION OF ONE EMBODIMENT OF THE INVENTION

Figure 1 shows a machine for implementing the procedure according to the invention designed for packaging and filling containers made from polylaminate material, indicated overall with the number 10.

The machine for implementing the procedure according to the invention generally comprises a machine for packaging containers made of polylaminate material, where the containers are initially made in known fashion starting from a continuous sheet of cellulose-based polylaminate material which is unwound from a reel 11, which passes between rollers positioned at an initial station 12 in which the sheet is folded into two main flaps alongside each other. A similar machine, with a circular structure, is described in the above-mentioned patent document US 2012/0008884 A1.

A first important feature of the invention is the type of polylaminate material which is used for implementing the procedure according to the invention. In effect, studies, research and experiments carried out by the Applicant have shown that the conventional polylaminate materials used for producing containers, also for single use, for long-life food products are not suitable for the production of containers for alcoholic beverages, in particular wine. It is has been found that
the conventional containers are equipped with a layer of paper with a low basic weight, in particular less than 100g/m², which is not able to adequately withstand the sophisticated sealing procedures to which the containers must be subjected after filling with the aim of guaranteeing the perfect seal, sterility and substantial absence of oxygen inside the container.

These production procedures are supported solely by cellulose-based polylaminate materials wherein the cellulose layer comprises cardboard with a basic weight of between 150 and 250 g/m². Excellent results can be obtained using a cellulose-based polylaminate material wherein the cellulose layer comprises cardboard with a basic weight of 180g/m².

By way of a non-binding example, a sheet made of polylaminate material which can be used for implementing the procedure according to the invention has the following structure, starting from the outer side towards the inner side of the finished container:

- low-density polyethylene (LDPE) 15g/m²;
- pure cellulose cardboard 180 g/m²;
- low-density polyethylene (LDPE) 20g/m²;
- aluminium foil - 6.3 micron 17g/m²;
- ethylene-methacrylic acid copolymer 10g/m²;
- low-density polyethylene (LDPE) 10g/m²;
- linear low-density polyethylene (LLDPE film) 25 micron 23g/m².

The various layers mentioned above can vary in composition and weight. However, it appears essential that the basic weight of the cardboard is never less than that shown above.

Conventionally, the sheet folded previously is intercepted inside a second workstation by a component
which pushes it at its lower folded edge, in such a way as to form a bottom fold folded inside and upwards.

Inside the third workstation 14 of the machine the shaped container, which is still in the form of a continuous sheet which in a vertical section is now substantially "W"-shaped, is subjected to a first heat-sealing process of two counter-opposing vertical edges 40, 41 (see Figures 10A to 10D), using conventional heat-sealing devices, which operate cyclically during the continuous feed of the sheet.

The sheet pre-shaped and with the vertical edges 40, 41 heat sealed is then subjected to operations for separating the various containers by cutting with conventional counter-opposing blades, creating a series of substantially rectangular, closed containers.

The separated containers, each of which has a base with a "W"-shaped vertical cross-section and two vertical heat-sealed sides, are now close to a plurality of further workstations for filling and closing the individual containers.

It should be noted that, due to the selection of the polylaminate material having a cellulose layer with a basic weight of not less than 160g/m2, the container which is formed possesses a rigidity which is much greater than that of conventional containers of the stand-up type used for food products. Experiments carried out by the Applicant have shown that the means conventionally used for opening containers with the aim of being able to fill them, the means comprising a mechanism with suckers acting on the counter-opposing flaps of the container and a jet of air acting in the container (see, for example, patent document US 2012/0008884 A1), are not absolutely sufficient to
guarantee the complete opening of the containers used in the procedure according to the invention, due to the greater rigidity of the latter.

The machine designed to implement the procedure according to the invention therefore has, as well as the conventional system with suckers and a jet of air to perform a preliminary opening of the containers, the following additional workstations, the operation of which is illustrated in Figures 1 and 2:

1. Station 15 wherein the mouth of the opening 21 is mechanically opened by inserting in the mouth of each container a truncated cone-shaped tool with an elliptical cross section, that is hollow inside, as well as sending a high pressure jet of air inside the truncated cone-shaped tool with the aim of further widening the base of the container;

2. Station 16 for injecting sterilising gas, in particular nitrogen, inside each container 21. It should be noted that the prior art systems, for example that described in patent document US 2012/0008884 A1, have a single nozzle which blows an inert gas, for example nitrogen, inside the container 21 with the aim of reducing the presence of oxygen inside the container 21. In the case of the procedure and the machine according to the invention, which describes the filling of containers with alcoholic beverages, in particular wine, the elimination of the oxygen inside the container must be as accurate as possible with the aim of avoiding the formation of oxidation reactions of the product inside the containers once they are closed. As shown in Figure 2, the station 16 comprises an elongated cylindrical
nozzle 25 which is inserted to the bottom inside each container 21 and emits a high pressure jet of inert gas, in particular nitrogen, at the base of the container. This allows a further final opening of the base of the container, and guarantees the almost total elimination of the oxygen present inside the container. Lastly, with the aim of guaranteeing the sterility of the procedure in progress, the nozzle 25 during its movement is subjected to the action of a pair of UV lamps 26 which guarantee the constant disinfection;

3. station 17 of the conventional type, for filling the containers 21, in which a predetermined quantity of the alcoholic beverage, in particular wine, is injected inside each container, in which there is a modified atmosphere, using a vertically movable nozzle 28;

4. station 18 for pre-closing the containers 21, at which a pair of movable bars 29 gently move together the upper flaps of each filled container 21, and where there is a nozzle 31 comprising a flat element that is hollow inside, which is movable in the same direction of movement as the containers, which sprays an inert gas in the closing area of the container, with the aim of avoiding the presence of oxygen in the closing area;

5. station 19 for sterilising the closing area, in which the upper portion of each container 21 is inserted inside a sterilising tunnel 35 having a structure with the shape of an elongated tunnel inside of which there is a fork 36 that definitively moves together the upper edges of the container 21 moved forward. The tunnel 35 is also equipped with a series of holes (not
shown in the Figures) through which an inert gas, for example nitrogen, is sprayed in the sealing area with the aim of avoiding the presence of oxygen;

6. pre-sealing station 20, positioned at the outlet of the tunnel 35, and in which the upper part of the container 21 passes through a pair of pre-heating rollers 30 which definitively close the container, preparing it for the entrance into the sealing stations.

In each of the workstations, each container 21 moves forward pushed by gripping means of the conventional type forming part of automatic filling machines for liquid food products.

In the conventional systems for filling containers of the stand-up type there are generally one or two sealing stations, in particular heat sealing, which are typically identical, the aim of the second sealing operation being solely that of strengthening the effects of the first sealing. In the case of the procedure according to the invention, which uses a cellulose-based polylaminate material wherein the cellulose layer has a basic weight of less than 150g/m2, the conventional sealing system is not sufficient to guarantee the total seal of the container filled with an alcoholic beverage, in particular wine.

According to the invention, the machine 10 comprises a sealing station 38 inside of which there are two sealing systems which perform different operations. As shown in Figures 6, 7 and 10B, the first sealing system comprises a sealing unit 55 with counter-opposing plates 56, 56' rotatable about a common pin 57. Each plate 56, 56' is equipped with a shaped sealing area 58, 58' raised
relative to the profile of the plate, which is able to perform high temperature sealing of a predetermined shaped area 60 of the container 21. The high temperature sealing (at about 250°C) allows any liquid residue present in the sealing area to be eliminated, thereby avoiding the formation of possible bubbles which can result in an imperfect seal of the container 21.

The sealing, which acts on a limited surface, can, according to the invention, be performed by heat as described above; however, the sealing can also be performed by ultrasound or by electro-induction.

As shown in Figures 8, 9 and IOC, the second sealing system comprises a sealing unit 65 having a pair of counter-opposing plates 66, 66', which are movable linearly in the same direction and in opposite directions. The action of the plates 66, 66', which operate at a temperature lower than that of the plates 56, 56' of the first sealing system, allow the flaps 67 of the upper portion of the container 21 to be sealed.

As shown in Figure 10D, the final closed container 21 has, in effect, three different types of sealings; more specifically, the initial sealing areas 40, 41 of the vertical edges of the container, the high temperature sealing area 60 of the upper shaped edge of the container, and the low temperature sealing area 67 of the upper flaps of the container.

Lastly, the container reaches a final cutting station 43, wherein a pair of side portions of the upper part of the container 21 are cut and separated from the container, which adopts the shape of a bottle.

The container is then sent to further steps for storage.

As can be seen, this succession of steps ensures
that the filling of the liquid foodstuff, in particular wine, takes place under conditions which are absolutely favourable for keeping it inside the container, creating the ideal conditions for its perfect conservation in this particular type of container created specifically for single-use consumption.

The invention as described above refers to a preferred embodiment. It is nevertheless clear that the invention is susceptible to numerous variations which lie within the scope of its disclosure, in the framework of technical equivalents.
CLAIMS

1. A procedure for filling alcoholic beverages, in particular wine, into stand-up type containers made from polylaminate material comprising the following operational steps:

a) preparing a stand-up type container starting from a continuous sheet in the form of a reel (11) of polylaminate material which is performed inside a machine that subsequently performs a first operation for folding the sheet to form two main folds alongside each other, a second folding operation during which a base fold folded inwards is formed at the folded edge, and a third operation for sealing two counter-opposing vertical edges (40, 41) of the container, in such a way as to form a container (21) closed on three sides and which can be opened on the upper part;

b) mechanically opening the upper part of the container (21) to form a filling space using a system of suckers which from the outside separate the counter-opposing flaps of the container (21) and a jet of air sent at the opening area;

c) injecting an inert gas in the filling space with the aim of reducing the presence of oxygen in the space;

d) introducing a predetermined quantity of liquid foodstuff inside the space;

e) closing without sealing the open edges of the container (21) under the action of an inert gas with the aim of reducing the presence of oxygen in the closing area;

f) sealing the upper part of the container (21) to form a hermetically closed container and containing a liquid foodstuff;

the procedure characterised in that:
- the polylaminate material used comprises a cellulose layer having a basic weight of not less than 150 g/m²;
- the mechanical opening under step b) also comprises the mechanical opening from the inside of the mouth of the container (21) and the deep injection into the container of a high pressure jet of air;
- step c) is performed by inserting inside the container (21) a nozzle (25) which injects a high pressure inert gas, at the base of the container (21), causing the complete unfolding of the base of the container (21) as well as the moving away of the oxygen present inside the space;
- step e) is performed by moving the container (21) filled with an alcoholic beverage, wine in particular, inside a structure comprising a sterilising tunnel (35) in which the open edges of the container are placed alongside each other and an inert gas is emitted inside the tunnel with the aim of keeping the edges placed alongside each other free from the presence of oxygen;
- step f) is performed inside a sealing station (38) in which a first sealing unit (55) performs a hermetic sealing operation fulling sealing a shaped strip inside the upper portion of the container (21) and a second sealing unit (65) seals the remaining upper portion of the container (21) not touched by the first sealing.

2. A procedure according to claim 1, characterised in that polylaminate material comprises at least one outer layer made from low-density polyethylene (LDPE), an inner layer made from linear low-density polyethylene (LLDPE), as well as an intermediate layer comprising an aluminium foil.
3. A procedure according to any one of the preceding claims, characterised in that the mechanical opening from the inside of the counter-opposing flaps of the container (21) is performed using a truncated cone-shaped tool with a substantially ellipsoidal base, which is hollow inside, that is inserted in depth between the counter-opposing walls of the container (21), opening them, and in that a high pressure jet of air is emitted inside the central cavity of the tool with the aim of reaching the base of the container and opening the base of the container.

4. A procedure according to any one of the preceding claims, characterised in that the nozzle (25) for injecting inert gas comprises an elongated cylindrical element movable vertically in such a way as to be able to be inserted in depth inside the container, and in that during the relative movement of the nozzle (25) it is subjected to the action of a pair of counter-opposing ultraviolet light lamps which sterilise the nozzle (25).

5. A procedure according to any one of the preceding claims, characterised in that upstream of the sterilising tunnel (35) there is a nozzle (31) comprising a flat element that is hollow inside which sprays an inert gas in the closing area of the container with the aim of avoiding the presence of oxygen in the closing area.

6. A procedure according to any one of the preceding claims, characterised in that downstream of the sterilising tunnel there is a pair of pre-sealing rollers (30) which position alongside each other the counter-opposing walls of the upper portion of the container (21) thereby arranging them to be sealed.
7. A procedure according to any one of the preceding claims, characterised in that the first sealing unit comprises a pair of counter-opposing plates (56, 56') rotatable about a common pin (57), each plate being equipped with a shaped, raised sealing area (58, 58'), the combined operation of the plates (56, 56') causing the high temperature sealing of the shaped strip.

8. A procedure according to claim 7, characterised in that the sealing is performed on the plates (56, 56') at a temperature of greater than 220°C, preferably at about 250°C.

9. A procedure according to any one of the preceding claims, characterised in that in a further work step the upper part of the container (21) filled and sealed is cut in a cutting station (43) with the aim of giving the container (21) the shape of a bottle, the final container thereby having three different types of sealings, more specifically, a pair of side sealings (40, 41) of the vertical edges of the container, a high temperature shaped sealing strip (60) of a portion of the upper area of the container, and a further sealing area (67) of the upper portion of the container.

10. A procedure according to claim 1, characterised in that the sealing is performed by the first sealing unit (55) by ultrasound or by electro-induction.

11. A procedure according to any one of the preceding claims, characterised in that the inert gas is nitrogen.
### INTERNATIONAL SEARCH REPORT

**PCT/IB2013/056531**

#### A. CLASSIFICATION OF SUBJECT MATTER

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**ADD.**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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| X        | US 2012/008884 AI (MURRAY R CHARLES [US])
12 January 2012 (2012-01-12)
abstract
figures 8, 10, 12, 13
paragraph [0020]
paragraph [0022]
paragraph [0045]
paragraph [0095] - paragraph [0101] | 1-11 |
| A        | US 2011/167763 AI (WALDHERR REINHARD [AT])
14 July 2011 (2011-07-14)
abstract
figures 13, 16 | 1-11 |
| A        | US 2010/288394 AI (LARSEN LARS [BG] ET AL)
18 November 2010 (2010-11-18)
abstract
figures 1-2 | 1-11 |

Further documents are listed in the continuation of Box C.

See patent family annex.

*Special categories of cited documents:*

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