(54) Title: CLOSURE, PARTICULARLY FOR WINES, LIQUEURS AND OILS, WITH IDENTIFIABILITY CHARACTERISTIC AND MANUFACTURING METHOD THEREOF

(57) Abstract: A closure (1), particularly for bottles of wine, liqueurs, oils and the like, comprising internally at least one identification element (2) which can be detected by radio frequency, the identification element (2) being embedded in a rigid supporting element (3) that is in turn embedded within said closure (1).
CLOSURE, PARTICULARLY FOR WINES, LIQUERS AND OILS, WITH IDENTIFIABILITY CHARACTERISTIC AND MANUFACTURING METHOD THEREOF

Technical Field

The present invention relates to a closure, particularly for wines, liqueurs and oils, having identifiability characteristics. More particularly, the invention relates to a closure of the "smart" type, which can be identified automatically by identification systems without requiring the intervention of an operator.

Background Art

As it is known, in the world of beverages and more particularly of wines, liqueurs and oils, it is extremely important to be able to guarantee the content of a bottle or container in general, thus allowing the consumer to make a purchase confidently.

Bottles with high-value content may in fact be tampered with before being put on sale and their content may be replaced with lower-quality content without the consumer being able to notice it in any way.

Fraudulent tampering with bottles of wines, liqueurs, oils and the like cannot be checked at present, since available systems provide uniquely for the application of bar codes on labels, on the bottle glass or on the closures, which allow only to identify a number but not to read several items of information offline.

Moreover, in addition to the problem of ensuring the authenticity of the content of the bottle, it is important to be able to track the path of the product, from its bottling to its preservation and distribution up to complete automation of the data related to its sale and subsequent preservation.

Disclosure of the Invention

The aim of the present invention is to provide a closure which has an identifiability characteristic which allows to ensure the originality, and therefore the quality, of the product contained in the bottle on which the closure is applied.
Within this aim, an object of the present invention is to provide a closure which is itself an element for identifying the bottle on which it is applied.

Another object of the present invention is to devise a method for providing a closure with identifiability characteristics as described above.

Another object of the present invention is to provide a closure and a method for manufacturing it which are highly reliable, relatively simple to provide, and at competitive costs.

Yet another object of the present invention is to provide a closure and a method for manufacturing it which guarantee the element for identifying the bottle on which it is applied is protected against the action of the contents of the bottle.

This aim and these and other objects, which will become better apparent hereinafter, are achieved by a closure, particularly for bottles of wine, liqueurs, oils and the like, characterized in that it comprises internally at least one identification element which can be detected by radio frequency, the identification element being embedded in a support element that is in turn embedded in the closure. Preferably, the support element is made of rigid material.

**Brief description of the Drawings**

Further characteristics and advantages of the invention will become better apparent from the following detailed description of preferred but not exclusive embodiments of the closure and of the corresponding manufacturing method, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of a first embodiment of the closure according to the present invention;

Figure 2 is a perspective view of a second embodiment of the closure according to the present invention;

Figure 3 is a sectional view of the closure of Figure 2;
Figure 4 is a perspective view of a variation of the second embodiment of Figures 2 and 3;

Figure 5 is a perspective view of another preferred embodiment according to the present invention.

Ways of carrying out the Invention

With reference to the figures, a closure or sealing element according to the present invention, generally designated by the reference numeral 1, comprises a closure, which can be made of cork or be of the synthetic type, and in this case is made of thermoplastic materials, such as for example mixtures of PE/EVA, PE/SEBS, PE/EVA/SEBS, SEBS/EVA, adapted for contact with foodstuffs and appropriately mixed together. In case the closure is used in bottles not containing food or drinks, like shampoos, bath foams or the like, even thermoplastic materials not suitable for food can be used.

More in detail, the closure can be made of thermoplastic polymers, coloured and lightened by means of expanding agents. The thermoplastic polymers can be rubbers, polyolefine and materials suitable for food, while the expanding agents may be both of the chemical or the physical kind, like microspheres containing gas, for instance penthan or n-penthan.

The pigments used to dye the closure can be organic, inorganic or a combination of the two.

The closure according to the invention is provided internally with at least one identification element which can be detected by radio frequency, commonly known as transponder or tag, designated by the reference numeral 2.

The identification element can be embedded directly within the closure 1, or it is possible to provide a supporting element 3 of the rigid type, which constitutes an insert, provided for example with a hollow tubular shape, to which the transponder 2 is applied and which, being
inserted appropriately within the closure 1, prevents the jaws of the capping machine from damaging irreparably the transponder by compressing the closure in order to be within the neck of the bottle as a consequence of the bottling operation.

The insert may also have a different shape, for instance it may be a cube, a parallelepiped or a faceted solid.

To ensure that the insert 3 is not dislocated during use, a plurality of ribs 7 is preferably provided on the external surface of the insert, as shown in Figure 5. Such ribs provide the support with additional rigidity and ensure the support is tightly fixed inside the closure.

Figure 1 illustrates a first embodiment, in which the identification element 2 is embedded directly within the closure 1, at the portion of closure that enters the neck of the bottle. In this manner, removal of the closure by means of an ordinary corkscrew damages the closure irreparably.

Figure 2 illustrates a second embodiment of the closure, in which the identification element 2 is supported by the cylindrical supporting element 3. Figure 3 is a transverse sectional view of the closure of Figure 2, showing that the closure is made of soft material 6 while inside the insert 3 there is a filling material which is different from the material 6.

Figure 4 instead illustrates the case in which the identification element 2 is arranged within the closure, along the vertical axis of such closure, differently from what is shown in Figure 2, in which the identification element 2 adapts to the shape of the cylindrical surface of the insert 3.

As an alternative, the identification element 2 can be arranged transversely with respect to the vertical axis of the closure.

Use of the closure with the corresponding transponder according to the invention, applied to a bottle, can be as follows.

A portable static reader emits a signal, by means of an electromagnetic field generated through a portable or fixed antenna; such
signal allows to charge (if a so-called "passive" transponder is used) the internal components that constitute the power supply circuit, and in an extremely short time the transponder, once it has recognized the pertinence of the read operation, emits toward the reader a signal which contains its identification code and other data contained within its memory.

In this manner, without the aid of any operator, as would occur in the case of a bar code arranged on the bottle or on the closure, which must be read by a reader that the operator brings into contact with the bar code, the bottle, with the corresponding closure, can be identified automatically.

This allows several advantages, including first of all the assurance of authenticity of the product contained within the bottle provided with the closure according to the invention, since if fraudulent tampering with the bottle and therefore with its closure were attempted, the operation for extracting the closure from the bottle would damage the transponder irreparably, and said transponder therefore would no longer be able to emit its identification code, and therefore the bottle, possibly resealed with the closure according to the invention, would no longer provide the signal that the reader expects, and this would be irrefutable evidence of tampering.

Moreover, each transponder constitutes, regardless of the information possibly written in its memory, a unique and non-repeatable identification element.

The closure according to the invention allows to increase efficiency in all the chain of production, from the moment when the wine or other liquid is bottled, to its preservation, to its distribution, to the complete automation of the data in its sale and subsequent preservation.

In association with RFID (Radio Frequency Identification System) read and write systems, and with sensors which detect the variation of the preservation variables of the liquid, it is further possible to ensure the correct preservation of the content, which is a fundamental variable as regards the quality of the finished product.
Passive identification, without the need to identify the bar code on the label (therefore without the intervention of an operator), allows to read or write data individually or simultaneously on bottles provided with a closure according to the present invention.

Moreover, the closure with the corresponding transponder can be used advantageously if the bottles are stored on shelves.

The resupply of wines, liqueurs and the like is in fact fundamental in order to be able to manage larger or smaller distributions. The bottles, arranged vertically or tilted (or in any other position), can be read easily from shelves provided with read/write antennas at any time.

The antennas, connected to concentrators (readers), can be provided with an IP or be connected directly to systems or networks capable of communicating with each individual bottle, determining the status of the bottle, its position, tampering or sale.

Therefore, individual operators may check remotely, for example over the Internet, and therefore even with a simple mobile phone, any indication related to inventory or shortages, with the possibility of automatic reordering.

Moreover, the closure according to the invention allows to carry out a check from production locations to distributors, as regards bottles ready for sale but still contained in cardboard boxes or wood/PVC crates, without altering the structure of the crates.

It is in fact possible, by means of a reader, to intercept, control (or optionally write) the bottles provided with the closure according to the invention.

Conveniently, the transponder 2 that is used is of the type preferably with memory, capable of storing supplementary information in addition to an identification number, and it is preferably made from low-cost flexible antennas.

The antenna layout may comprise one loop only, as shown in figure 1
to 4, or multiple loops, like the double loop shown in Figure 5. The latter solution increases the read capabilities of the system, in that, when the antenna lies inside a cylindrical surface or, in any case, when bent, the space between the spirals that constitute the antenna is reduced and the surface of the antenna is not evenly distributed inside the closure. This problem is therefore overcome by dividing the antenna spiral into two or more loops.

The transponder 2 can be inserted within the closure 1 in different manners.

The closures, in addition to being made of cork, can be usually made of synthetic material, as described earlier.

The transponder 2 must be inserted within the closure by modifying the closure after or during the step for providing said closure.

The most widely used systems for obtaining an ordinary synthetic closure are the following: injection, extrusion and compression.

The closure according to the invention can be provided by means of an appropriate preliminary provision of a hole in the closure, after which the transponder is inserted in the hole thus provided and then the closure is inserted again in an adapted mold and the hole formed previously is closed by overmolding with suitable thermoplastic material.

As an alternative, instead of embedding the transponder within the closure 1, therefore directly in contact with the closure, it is possible to provide, as described above, for the presence of the hollow cylindrical insert 3, which is inserted in the hole formed in the closure, so that the insert supports internally the transponder 2. At this point, the closure is overmolded again in order to close the hole.

The presence of the rigid support or insert 3 prevents the jaws and the closure fitting unit from causing irreparable damage to the transponder during the bottling step by compressing the closure in order to be able to insert it in the neck of the bottle.

In both manners described above for manufacturing the closure, the
hole in the closure can be obtained either during the step for the production of the closure with an appropriately sized male plug or at a later time, by reworking the ordinary synthetic closure and providing the hole to size with ordinary automatic perforation systems.

Another embodiment of the method for manufacturing the closure described above uses a press dedicated to the production of synthetic closures in which, before filling the individual cavity in order to provide the synthetic closure, the rigid cylindrical insert 3 is inserted, the transponder 2 being accommodated therein. The insert is retained within the mold so that it rests at one end of said mold and is locked by an air suction system.

Once the insert has been inserted and locked, the mold is filled normally and after a cooling step the closure is extracted, thus obtaining the finished product.

In any case, regardless of the production method that can be used, the closure according to the invention provides as a particular characteristic that of accommodating internally, or of embedding therein, or of supporting on a rigid insert, a transponder which is adapted to send identification information regarding the bottle and therefore its content when it is queried via radio frequency.

In practice it has been found that the closure according to the invention fully achieves the intended aim and objects, since it allows to ensure freedom from tampering of the bottle provided with said closure, thus providing an assurance of authenticity of the content of the bottle and therefore of quality. It has also been found that embedding the identification element inside a support of rigid material which is in turn embedded in the closure protects the identification element from the content of the bottle, most noticeably from the attack of alcoholic vapours that permeate through the closure.

The closure thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all
the details may further be replaced with other technically equivalent elements.

In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to requirements and to the state of the art.

The disclosures in Italian Patent Application No. MI2005A000059 from which this application claims priority are incorporated herein by reference.
CLAIMS

1. A closure (1), particularly for bottles of wine, liqueurs, oils and the like, internally comprising at least one identification element (2) which can be detected by radio frequency, characterized in said at least one identification element (2) is embedded in a rigid supporting element (3), said rigid supporting element (3) being in turn embedded within said closure (1).

2. The closure according to claim 1, characterized in that said identification element (2) is a transponder.

3. The closure according to claim 2, characterized in that said rigid supporting element (3) is a cylindrical hollow supporting element, said transponder (2) being applied to the internal wall of said supporting element, adapting to the curved surface of said supporting element.

4. The closure according to claim 2, characterized in that said transponder (2) is arranged along the vertical axis of said closure (1).

5. The closure according to claim 2, characterized in that said transponder (2) is arranged on a plane which is perpendicular to the vertical axis of said closure (1).

6. The closure according to any of claims 2 to 5, characterized in that said transponder (2) comprises an antenna having a single loop.

7. The closure according to any of claims 2 to 5, characterized in that said transponder (2) comprises an antenna having two or more loops.

8. The closure according to one or more of the preceding claims, characterized in that it is made of cork.

9. The closure according to one or more of the preceding claims, characterized in that it is made of thermoplastic material.

10. The closure according to claim 9, characterized in that said thermoplastic material comprises a mixture of thermoplastic materials selected among PE/EVA, PE/SEBS, PE/EVA/SEBS, SEBS/EVA and the like.
11. The closure according to one or more of the preceding claims, characterized in that said supporting element (3) comprises ribs (7).

12. A method for manufacturing a closure according to one or more of the preceding claims, characterized in that it comprises the steps of:

- providing a closure (1) and a rigid supporting element (3);
- inserting a transponder (2) within said supporting element (3);
- forming a hole within said closure (1);
- inserting said rigid supporting element (3) within said hole;
- overmolding said hole.

13. A method for providing a closure according to one or more of claims 11 or 12, characterized in that it comprises the steps of:

- inserting in a mold a rigid insert (3) which supports a transponder (2);
- locking said insert (3) with respect to the mold;
- filling said mold;
- extracting the finished closure (1) which contains said transponder (2).
**A. CLASSIFICATION OF SUBJECT MATTER**
B65D39/00

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)
B65D

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 practical, search terms used)
EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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Further documents are listed in the continuation of Box C.

**Date of the actual completion of the international search**
31 March 2006

**Date of mailing of the international search report**
11/04/2006

**Name and mailing address of the ISA**
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2000, Tx. 31 651 epo nl, Fac. (+31-70) 340-3010

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