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(54) **DEVICE AND PROCESS TO USE THE QUALITY OF CORK STOPPERS**

(57) The present invention relates to a novel device and process to use cork stoppers including a support platform (1), a device (2) capable to rotate a cork stopper, at least three digital chambers (3,4 and 5) capable of obtaining images of the stopper's surface (body and extremities), two means of support (6) and (7), a device for

discharging stoppers (8) and a cutting device (9) capable for separating at least one cork stopper into two halves.

The present invention provides the selection of the best quality cork's surface, the final result of the process being a cork stopper composed of two or more parts of better quality from two or more cork stoppers.

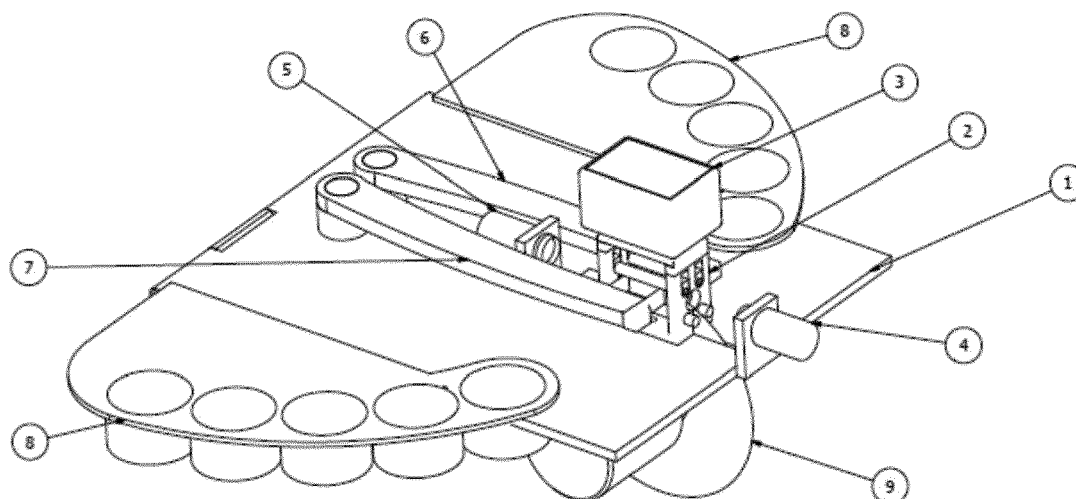


Fig.1

Description

Introduction

[0001] Natural cork stoppers, obtained exclusively using the bark from cork oak, are subsequently selected, according to lenticel size and quantity, into several, usually nine, distinct qualities.

[0002] Unlike the good quality corks (the first 4 categories), the medium and low quality corks (last 5 categories) are not products with appealing aspect and consequently are products not much appreciated by the market.

[0003] In addition to the question of lenticels size and quantity, some cork stoppers are affected by so-called critical defects (slits, darker zones, softer zones, top-to-bottom crevices, Green zones, Bug zones, Dry Year Cork and long cavities). These defects, in addition to the bad visual aspect they originate, cause the stopper to lose its sealing property, causing leakage of liquid in the bottle that is sealed by it.

[0004] The profitability of the cork industry depends on the use and maximum valorization of the raw material (cork). Since the cork stopper is a product that can vary from 1 to 100 (in relation to its quality/size), it is fundamental to maximize the product value by eliminating critical defects or decreasing the size/quantity of lenticels in each stopper.

[0005] In summary, the real problem is the quantity and size of the pores in the medium and low quality corks, as well as the existence of critical defects.

[0006] On the other hand, the cork industry professionals know that in all corks there is one side with a better quality (normally the side of the cork originally leaning against the trunk of the tree is of better quality (less and smaller lenticels and less critical defects (cracks and sits)) than the side of the cork that is toward the outside the tree (immediately after the bark).

State of the art

[0007] Conscious of the problem described above, the cork industry has tried to solve this problem by sealing (filling lenticels) the medium and low quality stoppers (with a larger quantity/size lenticels) and even rejecting stoppers wherein there are critical defects (in order to prevent the use of corks that give rise to liquid leakage).

[0008] Although the sealing process improves the performance and visual appearance of medium- and low-quality cork stoppers, the resulting cork stoppers continue to be low-value products. On the other hand, the rejection of stoppers wherein there are critical defects, leads to a strong devaluation of the raw material.

[0009] Patent application PT 103749 discloses a quality control system for cork stoppers, which uses a light source, a laser device and among other technical features, means to obtain 2D and 3D images. The main differences between this application (PT 103749) and the

present application are at the level of use of the cork stoppers formed by the two halves of better quality, constituting a huge advantage and innovation in relation to the existing state of the art.

Detailed description of the invention

[0010] The present invention consists of a device comprising a support platform (1), a device (2) capable of rotating a cork with precision, at least one digital camera (3) capable of acquiring 2D or 3D images of the stopper's body, at least two digital cameras (4) and (5) capable of 2D or 3D image acquisition of each of the stopper's tops, two support means (6) and (7) equipped with at least two elements (B) and (c) at the extremities, capable of holding and of moving at least one half of a stopper, a stopper discharge device (8) and a moveable cutting device (9).

[0011] Another object of the present invention is to implement a method of exploiting the best quality of cork stoppers, during which the following steps are extremely important:

Device (2), capable of rotating a stopper, includes four rotating cylindrical means (A) which are rotated by a precision engine (servo-motor/stepwise engine).

[0012] The stopper is placed among the four rotatable cylindrical means (A) of the device (2) able to rotate the stopper. The stopper then rotates while an optical reading of the cork surface (body and tops) is carried out by means of color digital cameras and/or depth sensors (3), (4) and (5).

[0013] The data read is communicated to a computer equipped with software capable of processing the received data and identifying which part of the surface of the cork has better quality (less and smaller lenticels and/or absence of critical defects). After this identification, the computer leads the four rotating cylindrical means (A) of the device (2) to rotate the stoppers, so as to place the stopper in the cut position. The two support means 6 and 7 equipped with the support elements b and c at their extremities, capable of holding and moving a half-stopper are then driven so that one of the elements, (b) or (c), holds the half of the stopper with the best quality and the other element (c) or (b) holds the half of the stopper with the lowest quality. A cutting device capable of movement (9) is then driven, separating the half-stopper with better quality from the half-stopper with the worse quality.

[0014] Also according to the analysis of the quality of the stopper, both the better quality half-stopper and the lesser quality half-stopper are deposited into one of the holes of the stopper discharge device (8), according to the size/quantity of the lenticels in each half-stopper.

[0015] It is yet another object of the present invention to provide a cork stopper comprising two halves of better quality, previously selected by the recovery device and

provided by the respective above mentioned process.

[0016] In summary, the invention may classify according to quality, each of the half-stoppers processed into one of 5 or more distinct classes.

[0017] Subsequently, the top quality half-stopper is glued to another half-stopper of better quality, extracted from another stopper. The end result is a stopper made of two or more pieces of "better quality parts" of two or more stoppers.

[0018] The process of bonding the two halves of the stopper is then performed manually by the operator, which places food glue on each of the stopper-halves and attaches them to each other.

Legend

[0019]

- 1- Supporting platform
- 2- Device capable of rotating a stopper
- 3- Digital camera for the capture of the image of the stopper body
- 4- and 5- Digital cameras for the capture of the stoppers' tops
- 6- and 7- support means
- 8- Device for discharging stoppers
- 9- Utin device
- a- Cylindrical means
- b and c - support elements

Brief description of the figures

[0020]

Fig.1 represents a perspective view of the system to use the quality of cork stoppers, with its main constitutive elements.

Fig.2 represents a detail of the system, especially the support means (6) and (7), the elements (b) and (c) and the digital cameras.

Claims

1. A device to use the quality of cork stoppers, **characterized by** including:

- a device (2) capable of rotating the stoppers, which contains at least four cylindrical means (A);
- a support platform (1), substantially quadrangular, capable of receiving a device (8) to download stopper on at least two of its extremities;
- at least one digital camera (3) capable of capturing 2D and 3D pictures, and preferably, comprising also two digital cameras (4) and (5) capable of capturing pictures of the stoppers' tops;

- at least two means of support and movement (6) and (7), comprising two support elements (b) and (c) capable to withhold at their extremities any half of a cork stopper;

- a cutting device (9) capable of moving and capable to separate the half stopper exhibiting the best quality from the half-stopper exhibiting the worst quality.

2. A device to use the quality of cork stoppers according to claim 1, **characterized by** the stopper download device (8) comprising various holes capable of receiving each of the halves of the cork stoppers depending on their quality.

3. A device to use the quality of cork stoppers according to claim 1, **characterized by** the cutting device (9) acting after the support elements (b) and (c) have been acting.

4. Process to use the quality of cork stoppers, **characterized by** including the following steps:

- an initial rotation of a cork stopper among at least four cylindrical means (A), due to a device (2) capable of rotating said stopper;
- simultaneously with the rotation of the cork an optical reading of the cork's surface is obtained, by the digital cameras (3, 4 and 5);
- reading the obtained data and transmission of it to a computer possessing software capable of processing said data and identifying the one or more surfaces of the cork exhibiting the best quality;
- placement of the stopper in a cutting position by the rotating means (A);
- acting the support and movement means (6) and (7) so that one of the support elements (b) or (c) holds the half-stopper of better quality and the other support element (b) or (c) holds the half-stopper of worse quality, whilst the cutting element (9) acts, separating the said half-stopper of better quality from the said half-stopper with worse quality;
- ending the process by discharging the half-stoppers into individual holes of the downloading device (8), according to the quality of each of the said halves.

5. Process to use the quality of cork stoppers, according to claim 4, **characterized by**, in the step of moving the stopper to the cutting position, the rotating means (A) being commanded by a computer.

6. Process to use the quality of cork stoppers, according to claims 4 and 5, **characterized by** the cut being made longitudinally, separating the stopper in two halves along its length, one of the halves being the

one having a larger surface with a good quality and the other half having the larger surface with a bad quality.

7. Cork stopper obtained by the process claimed in claims 4 and 5, **characterized by** including the two better quality halves, previously selected by the device for the use of quality of cork stoppers. 5
8. Cork stopper according to claim 6, **characterized by** the two better quality halves having been obtained through a cut along their length, accomplished by the respective device (9). 10
9. Cork stopper according to claims 6 and 7, **characterized by** gluing the two better quality parts immediately after selecting them, manually. 15

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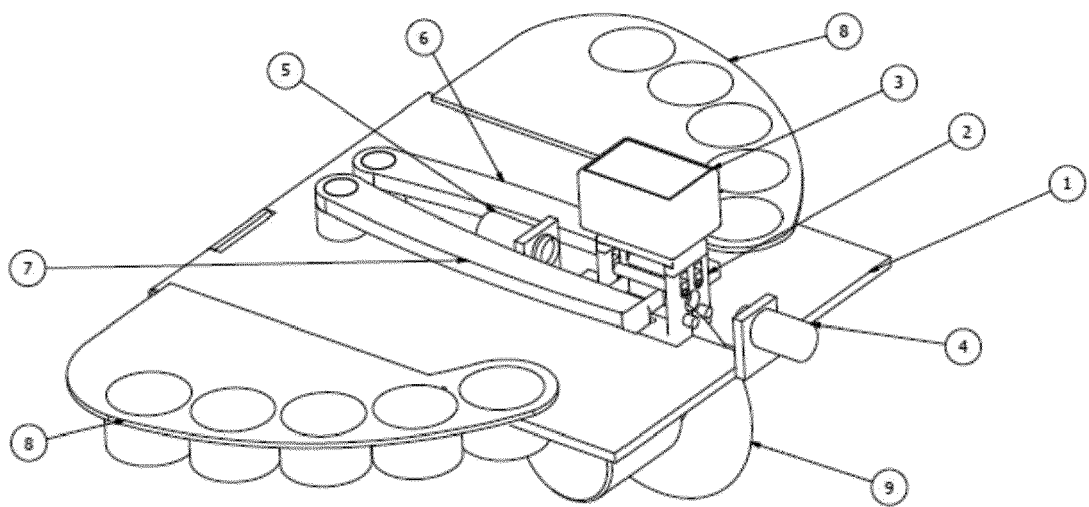


Fig.1

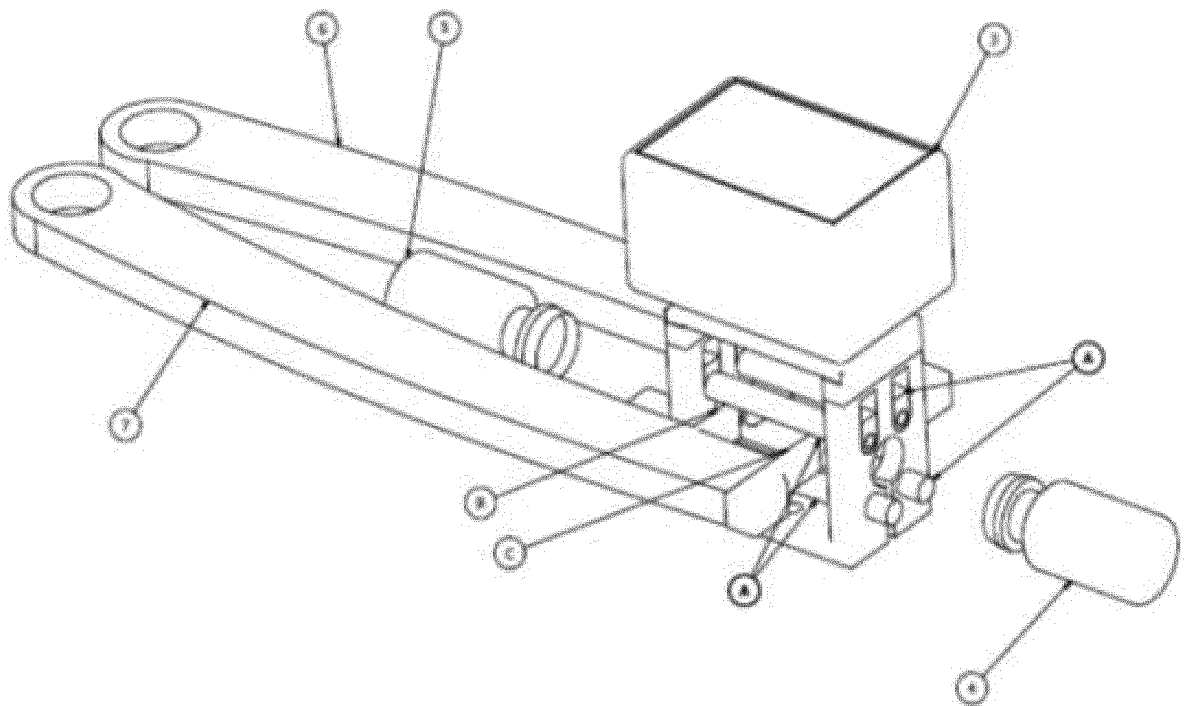


Fig.2



EUROPEAN SEARCH REPORT

Application Number
EP 17 02 0188

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X	PT 103 749 A (IND SOFTWARE E SIST S DE GESTA [PT]) 24 November 2008 (2008-11-24) * abstract * * figures *	1	
A	EP 0 983 830 A2 (MANNONI SALVATORE [IT]) 8 March 2000 (2000-03-08) * the whole document *	1,4	TECHNICAL FIELDS SEARCHED (IPC) G05B B27G B27J B26D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 4 October 2017	Examiner Hamel, Pascal
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 02 0188

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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04-10-2017

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82