

(19)



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(11)

EP 1 724 200 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
22.11.2006 Bulletin 2006/47

(51) Int Cl.:
B65D 39/00 (2006.01)

(21) Application number: **05425341.4**

(22) Date of filing: **18.05.2005**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
AL BA HR LV MK YU

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(54) Synthetic stopper with manual uncorking for bottle for sparkling wine or similar

(57) The invention describes a synthetic stopper with manual uncorking for bottle for sparkling wine or similar, of the type simulating traditional corks, consisting entirely of a polymeric material having a modulus of elasticity between 5 and 20 MPa, and comprising a lower portion (2) which can be inserted in a bottle (10) and an upper

portion (3) which can be gripped for manual extraction of the lower portion (2) from the bottle (10), the lower portion (2) having an upper base (5) adjacent to the upper portion (3) and without dimensional discontinuity with the same and a lateral surface (6) slanting by an angle (α) between 7° and 19° with respect to the longitudinal axis (4) of the lower portion (2).

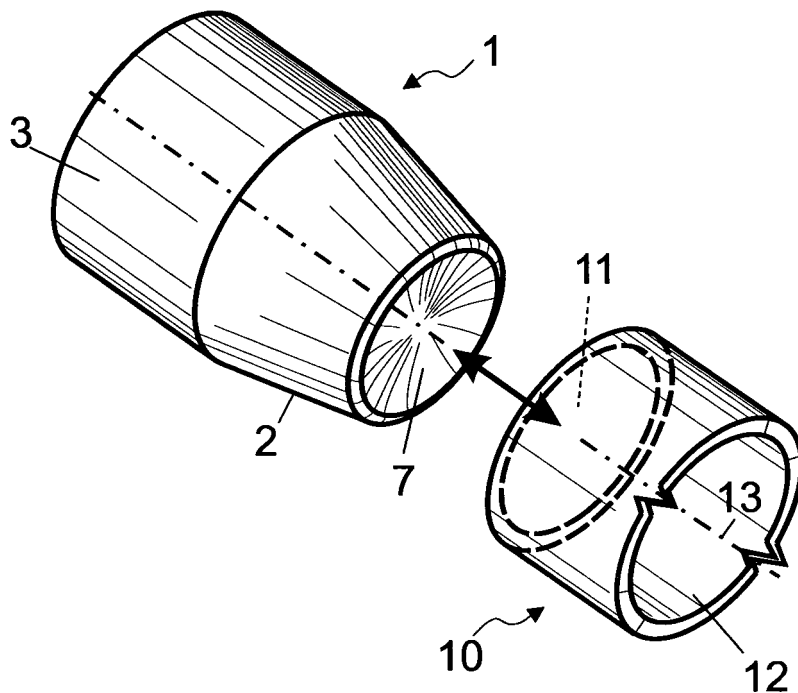


Fig. 2

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Description

[0001] The present invention concerns a synthetic stopper with manual uncorking for bottle for sparkling wine or similar, of the type specified in the preamble of the first claim.

[0002] As is known, currently sparkling wines, champagne and similar are distributed in glass bottles closed by means of corks.

[0003] The stoppers designed for this use counter the outward thrust exerted by the high internal pressure that is created in the bottle due to the presence of carbon dioxide which develops during evolution of the above-mentioned drinks.

[0004] Inside the bottles pressures of around 3 bars (300 kiloPascal [kPa]) develop, and can even reach 6 bars.

[0005] According to the known technique the stopper is compressed and inserted inside the bottle so that the elastic return force which the stopper exerts prevents the cork itself from coming out.

[0006] Again according to the known technique, stoppers for sparkling wines and similar are manually uncorked and have a part outside the bottle, further fastened by means of wire hoods and similar which cling to the outer part of the bottle.

[0007] Uncorking can be obtained by manually removing the hood and then twisting and pulling out which can be performed manually by gripping the part of the stopper outside the bottle.

[0008] This manual extraction process is particularly characteristic of sparkling wines and similar which are very frequently used for parties, opening ceremonies and various other events.

[0009] In order to maintain traditional habits and also for practical reasons, quick easy manual extraction of the stoppers in question is expedient.

[0010] Further characteristics are required of the stoppers in question, in particular: ease of insertion during the bottling phase, gas and liquid seal, low permeability to gases and liquids, no alteration of the organoleptic characteristics of the drink contained and no absorption of flavours.

[0011] To meet said requirements corks are commonly used formed into a substantially cylindrical shape before corking.

[0012] Said corks have a diameter of approximately 30 - 32 mm, a length of approximately 40 - 48 mm and are generally made of two parts: an upper part in agglomerated cork and a lower part consisting of two natural cork washers with total thickness of approximately 10 mm.

[0013] The corking operation is performed by a strong radial compression of the cork in a clamp to a diameter of between 14 mm and 16 mm (approximately half the initial diameter) and introduction of the cork into the bottle at the required depth, so that the washers are inside the bottle and approximately half the height of the cork is

outside the neck of the bottle.

[0014] The classic mushroom shape of these corks is obtained by means of the radial compression referred to, which is performed only on the lower part of the cork.

[0015] Adhesion between the cork and the inside of the neck of the bottle is guaranteed by the high elasticity of the washers which provide a good seal against gases and liquids and the necessary radial pressure which enables the cork to resist the outward thrust due to the high internal pressure.

[0016] The agglomerated cork part inserted in the bottle does not have any specific seal function at the interface between cork and bottle as it has a very low elasticity, but constitutes mainly a connection between the lower washers and the part that remains outside the bottle.

[0017] The part made of agglomerated cork, in fact, although more rigid, has a lower elasticity and a high viscosity. Consequently this upper part undergoes semi-permanent deformation which produces a moderate elastic thrust on the neck of the bottle.

[0018] As a result of these mechanical characteristics, said part made of agglomerated cork permits manual extraction of the cork, in fact if this part were too soft, it would lead to excessive deformation of the body of the cork when twisted with consequent danger of breakage of the same.

[0019] It is also of fundamental importance, for rapid and economic bottling, that the corking operation can be performed in automatic plants at industrial level.

[0020] Said operation consists of several phases, such as positioning the cork by means of optical or mechanical positioners, placing the cork in a clamp for radial compression, insertion of the cork into the bottle and application of the hood.

[0021] The known technique referred to above has some important drawbacks.

[0022] One of the main drawbacks deriving from use of these corks consists in a possible alteration of the taste of the drink due in particular to mould contained in the corks or to the material itself, of vegetable origin, of which said corks are made.

[0023] Furthermore the traditional corks do not guarantee constant mechanical characteristics and can therefore have a different effect on evolution of the wines from bottle to bottle due to different radial seal.

[0024] Said lack of uniformity of the physical-mechanical characteristics of the traditional corks can also result in occasional breakages of the corks during extraction or, on the contrary, difficulty in extraction.

[0025] Last but not least, there is the disadvantage that said corks are costly to produce and the raw materials are expensive, due in particular to the increasing difficulty in locating supplies of cork.

[0026] Attempts have already been made to solve the above problems by means of rigid synthetic mushroom-shaped stoppers made of thermoplastic material. Said stoppers have poor adhesion and seal, however, and

considerable differences, also visual, with respect to natural corks. In fact, these stoppers are used only for sparkling wine or similar of low quality.

[0027] Furthermore synthetic stoppers of shapes and dimensions different from the traditional ones do not permit use of the traditional automatic bottling plants at industrial level.

[0028] In this situation the technical function of the present invention is to produce a synthetic stopper with manual uncorking for bottles for sparkling wine and similar able to overcome the above drawbacks.

[0029] In the context of said technical function, an important aim of the invention is to produce a synthetic stopper overall substantially similar to the traditional corks which can be used substantially in the same way.

[0030] Another important aim of the invention is to provide a synthetic stopper able to guarantee a good seal for the gases and liquids contained in the bottle and withstand the pressures generated inside the bottle during evolution of the sparkling wine until said stopper is extracted.

[0031] A further aim of the invention is to obtain a synthetic stopper able to ensure easy extraction by means of traditional manual uncorking and which at the same time has a high physical structural integrity during said extraction operation.

[0032] Last but not least, a further aim of the invention is to produce an inexpensive synthetic stopper which is easy to produce and which can be easily used on traditional automatic bottling plants, without substantial modifications to the same.

[0033] The technical function and the aims specified are achieved by a synthetic stopper with manual uncorking for bottle for sparkling wine and similar as claimed in the attached Claim 1.

[0034] Preferred embodiments are highlighted in the dependent claims.

[0035] Further characteristics and advantages of the invention are better clarified below by the detailed description of a synthetic stopper with manual uncorking, with reference to the attached drawings in which:

Fig. 1a shows a traditional cork inserted in the neck of a bottle;

Fig. 1b is a graph showing the radial force $[\sigma_r]$ in MegaPascal [MPa] exerted by each individual cross section of the cork in Fig. 1a;

Fig. 1c is a graph that shows on the Y axis the force necessary to move corks similar to the one in Fig. 1a in the direction of extraction and on the X axis the total length by which said corks are extracted;

Fig. 2 is an axonometric illustration of a synthetic stopper according to the invention and a portion of a neck of a bottle;

Fig. 3 highlights the median section of a bottle stopper according to the invention;

Fig. 4 is a graph showing on the Y axis the force necessary to move the stopper according to the in-

vention illustrated in Fig. 2 and 3 in the direction of extraction and on the X axis the total length by which said stopper is extracted.

[0036] With reference to the Figures referred to, the synthetic bottle stopper according to the invention is indicated overall by number **1**, and is shown in Fig. 2 and 3.

[0037] It presents a lower portion **2** designed to be inserted in a bottle **10** for sparkling wine, champagne or similar.

[0038] In particular the lower portion 2 obstructs, when in position, an aperture **11** of the bottle 10. From the aperture 11 an inlet **12** develops which constitutes the neck of the bottle 10 and defines an axis of development **13**.

[0039] As known, the neck of the bottle 10 has a section, parallel to the axis 12, of circular shape. This circular section has a minimum diameter near the aperture 11, increasing as it moves away from the same.

[0040] This increase in diameter is very slight in the part near the aperture consisting of the inlet 12. In fact at 10 mm from the aperture the diameter of the inlet 12, initially approximately 18 mm, has on average increased by only approximately 0.3 mm, and at 20 mm from the aperture the diameter of the inlet has increased only by a further 0.6 mm approximately.

[0041] Consequently the inlet 12 can be likened, for the sake of simplicity of calculation, to a substantially cylindrical form.

[0042] Below, the inlet will be defined substantially cylindrical, substantially cylindrical meaning an inlet with said dimensional characteristics.

[0043] The lower portion 2 is adjacent to an upper portion **3** which when in position remains outside the bottle 10 and can be grasped to manually remove the stopper 1.

[0044] Advantageously the synthetic stopper 1 has substantially the same overall dimensions as the traditional corks **1a**.

[0045] Before corking, the same are substantially cylindrical and have an overall length of approximately 40-48 mm on average and an average diameter of approximately 30-32 mm.

[0046] After corking the traditional corks 1a have a lower part **1b** embedded in the neck or inlet 12 and an upper part **1c** outside the bottle 10 which can be grasped manually.

[0047] The upper part 1c has an average development of approximately 20-25 mm.

[0048] Since the traditional cork dimensions are substantially maintained in stoppers 1 according to the invention, it is possible to use automatic bottling plants of known type and also not to change the traditional known outer form of the corks for sparkling wines.

[0049] Studies carried out by the same applicant have further qualified important physical characteristics of the traditional corks 1a, such as the radial pressure of the same and the extraction force required for uncorking.

[0050] In particular the studies of the applicant are geared to corks of the most widespread type, illustrated

in Fig. 1a. These traditional corks 1 a have an upper part 1 c in agglomerated cork and the lower part 1 b provided with two washers 1 d made of natural cork.

[0051] As regards the radial pressure exerted on the neck or inlet 12, the measurements were performed on a few dozen samples using appropriate loading cells in which the containment of the cork 1 a inside the inlet 12 was simulated, and which permitted assessment of the radial pressure exerted by the cork 1 a calculated as mean value distributed over the entire length inserted.

[0052] Said tests provided a mean value of 3.8 MPa with a standard deviation of 1.2 MPa.

[0053] Similar measurements performed on corks in which the washers 1 d were eliminated provided a mean radial pressure value of 1.5 MPa with a standard deviation of 0.6 MPa.

[0054] Suppose now that along the entire thickness of the washers 1 d the pressure exerted is constant, and that the same situation is present also on the part of agglomerated material inside the bottle, it can be assessed that the radial pressure near the area affected by the presence of the washers 1 d is equal to approximately 8.5 MPa, therefore considerably higher than the mean pressure exerted by the agglomerated part, equal to approximately 1.5 MPa. The situation is accurately illustrated in the graph in Fig. 1b, next to Fig. 1a, where a traditional cork 1 a inserted in a bottle is schematised.

[0055] The graph of Fig. 1b shows a diagram indicating the trend of the radial force σ_r , in MegaPascal [MPa] exerted by each individual cross section of the cork.

[0056] As can be seen from the pressure curve 1e, the radial pressure exerted by a cork is actually concentrated in the area in which the washers are present.

[0057] As regards the extraction force necessary for uncorking, the same is highlighted in Fig. 1c, which shows on the Y axis the force necessary to move traditional corks 1 a similar to that of Fig. 1a in the direction of extraction and on the X axis the total length by which said corks are extracted.

[0058] As said, the traditional corks do not guarantee constant characteristics and for this reason three curves of force 1e, 1f and 1g are highlighted corresponding to three averagely frequent situations.

[0059] In all cases an initial peak of maximum force is recorded, necessary to overcome the initial or static friction, between 50 and 60 kgW (kilogram weight, 1kgW = 9.81N), followed by a kinetic friction which remains below the static friction and which has a relatively, constant course and high force before decreasing very rapidly.

[0060] The extraction force indicated was identified by means of traction and forced mechanical translation of the corks in the extraction direction, i.e. parallel to the development axis 13 of the inlet 12.

[0061] Obviously the movements imposed manually during uncorking are more complex: manual uncorking involves not only axial cork movements but also rototranslatory or rotatory movements.

[0062] Therefore not only axial traction forces but also

torsion forces come into play.

[0063] However, the extraction forces indicated in Fig. 1 c can be accepted as adequately indicative of the forces applied to the corks during extraction.

5 [0064] Common experience shows that traditional corks withstand said forces well, due to the fact that their upper part 3a is made of an agglomerated material with low elasticity and high viscosity, which tends to deform only very gradually. The forces applied manually to the
10 upper part 1c of the corks are therefore transmitted without yielding to the lower part 2a embedded in the inlet 12 and in particular to the washers 1d that exert the greatest seal pressure.

15 [0065] These forces, which provide for a maximum extraction force substantially between 50 and 60 kgW, are suited to the capacity of any user.

[0066] It is also common experience that the seal of traditional corks, exerting a mean pressure of approximately 3.8 MPa on the inlet 12, is normally sufficient to prevent leaks from the corks.

20 [0067] Contrary to said traditional corks, which combine a substantially rigid material with an elastic material, the synthetic stopper 1 according to the invention is made of one single polymeric material, i.e. a synthetic elastomer.
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[0068] The use of one single material provides important advantages such as reduced cost and relatively simple rapid production, for example via one single moulding phase.

30 [0069] One single material is the preferable technical solution when replacing a traditional cork with a synthetic stopper which is cheaper and more widely available, while maintaining characteristics as similar as possible to those of a traditional cork.

35 [0070] However, the use of one single material for the entire length of the stopper 1, also maintaining the dimensions of a traditional cork 1 a so that the usual corking machines can be used, involves some problems.

40 [0071] It must be possible to insert the stopper until it has a section diameter of almost half the initial diameter and in these conditions it must maintain an adequate elastic reaction inside the inlet 12 of the bottle.

[0072] The elastic seal reaction is then exerted by all the lower portion embedded in the bottle and not only by end sections like the washers of the traditional corks.

45 [0073] In this situation there may be incompatibility and conflicting needs between the lower portion 2 and the upper portion 3 of the synthetic stopper 1.

50 [0074] In fact, the polymeric material forming the synthetic stopper must, as its primary purpose, ensure an overall pressure inside the bottle similar to that of a traditional cork. A lower pressure would make the stability of the stopper uncertain and a higher pressure would make uncorking difficult and unpleasant as it would require greater manual extraction forces than usual.

55 [0075] The considerable deformability required and the fact that the entire lower portion 2 of the synthetic stopper 1 exerts a pressure on the inlet 12 means that

total pressures similar to those of traditional corks can be obtained only with materials that are substantially soft and easily deformable. This can be easily understood in the light of the fact that traditional corks exert their seal pressure mainly by means of the end washers made of highly deformable cork.

[0076] A similar soft material is not acceptable for the upper portion 3, as it is not easy to grip and above all because it deforms considerably and is easily damaged or splits even with normal uncorking forces, previously described.

[0077] On the contrary, a sufficiently rigid material which is pleasant to touch on the upper portion 3 determines a very strong elastic reaction in the lower portion 2 and therefore very high uncorking forces, substantially incompatible with traditional manual uncorking.

[0078] The applicant has solved these conflicting needs in an original manner.

[0079] On the one hand it has identified as suitable for the whole synthetic stopper 1 a rigid material sufficient to withstand manual forces similar to those involved in uncorking of traditional corks without yielding or breaking and therefore satisfactory for the needs of the upper portion 3. This material partly reproduces the apparent characteristics of the traditional agglomerated material with low elasticity and high viscosity, which tends to deform only very gradually. On the other hand, to bring the pressure exerted by the lower portion 2 on the neck or inlet 12 to the traditional levels, the same lower portion has been appropriately modified in shape. Advantageously, furthermore, the shape modifications are of the type designed to maintain continuity between the upper portion 3 and the lower portion 2, to permit automatic corking by means of traditional machinery.

[0080] More specifically, experiments were performed to determine the modulus of elasticity of the material forming the synthetic stopper 1.

[0081] The lower portion 2 designed to be inserted in the inlet 12 was permanently blocked and an axial traction force of between 50 and 60 kgW, i.e. substantially similar to the extraction force required for uncorking traditional corks, shown in Fig. 1c, was applied to the upper portion 3, which remains outside the bottle 10. As already said, the axial traction of the traditional corks in the direction of extraction does not correspond exactly to the movements performed manually during uncorking. The latter are more complex and also comprise rototranslatory or rotatory movements. Therefore not only axial traction forces but also torsion forces come into play. However, the axial traction forces can be accepted as adequately indicative of the forces that are applied on the stoppers during extraction.

[0082] These experiments highlighted that synthetic elastomers can have a modulus of elasticity similar to or higher than 5 MPa, in particular substantially between 5 and 20 MPa, preferably between 5 and 8 MPa.

[0083] In fact, if the synthetic stopper 1 has said mechanical characteristics, when subjected to said axial

traction force its upper portion 3 presents sufficiently reduced deformations during uncorking.

[0084] Furthermore, no breaking or splitting of the material occurs.

[0085] The polymeric materials preferred for production of the synthetic stopper 1 with a modulus of elasticity of the said type are the highly ramified polyolefins with very low density, if necessary with the addition of styrene-based thermoplastic elastomers such as SEBS, SEPS, SEEPS, in a percentage not exceeding 30%. Said materials have a density of between 0.75 and 0.92 kg/dm³, and furthermore are processed preferably by injection moulding using known expanding agents, of both chemical and physical type; the density of the finished product therefore has values of between 0.25 and 0.7 kg/dm³.

[0086] The production of a cylindrical synthetic stopper 1 with elastomers with a modulus of elasticity similar to or higher than 5 MPa nevertheless results in an excessive adhesion force of the stopper to the bottle, even if the modulus of elasticity has been chosen by identifying the minimum sufficient values.

[0087] Said high adhesion force does not permit manual uncorking of the synthetic stopper. In fact, unlike the traditional cork 1a which adheres to the bottle substantially by means of the washers 2a only, a synthetic stopper 1 made of one single material adheres via the whole of its lower part 2 to the bottle 10.

[0088] To remedy this serious drawback the synthetic stopper 1 according to the invention has a lower part 2 at least mainly with appropriately modified shape.

[0089] Preferably the lower part 2 has at least mainly a substantially tronco-conical shape, the longitudinal axis of which is indicated by number 4 in Fig. 3.

[0090] Advantageously the upper base 5 of the lower portion 2 is adjacent to the upper portion 3 and has no dimensional discontinuity, i.e. gaps, steps, notches and similar, with respect to the same upper portion 3.

[0091] The lateral surface 6 of the lower tronco-conical portion 2 has, with respect to the longitudinal axis 4, an angle α of incidence, which determines the dimension of the lower base 7 of the lower tronco-conical portion 2.

[0092] In particular it was found that angles of incidence between 7° and 19° are adequate because they determine an overall pressure on the neck or inlet 12 similar to the overall pressure exerted by the traditional corks and consequently a maximum extraction force similar to the one required for traditional corks.

[0093] The choice between 7° and 19° depends on the maximum extraction force required, which can vary between 50 and 60 kgW, on the precise modulus of elasticity of the material, variable between 5 and 8 MPa, and also on the precise overall dimensions of the stopper, which can also vary slightly as required.

[0094] The technical solution consisting in shaping of the lower portion 2 to give it a slightly tronco-conical shape, in addition to the advantage of continuity with the upper cylindrical portion 3, which considerably reduces the risks of local breakage, also has the advantage of

making the extraction operation quick and easy.

[0095] In fact, as the synthetic stopper 1 is extracted, the pressure on the inlet 12 decreases rapidly as the diameter of the lower portion 2 still inserted decreases.

[0096] This fact is clearly confirmed by the graph shown in Fig. 4.

[0097] The above graph shows how the uncorking force evolves as the section of stopper extracted increases, in the case of a synthetic stopper made of material with a modulus of elasticity of approximately 5 MPa and an angle of incidence α of approximately 10° .

[0098] The uncorking force is identified by means of the same procedures as those of the graphs of Fig. 1c and the curve of the forces 8 has an initial peak of maximum force, necessary to overcome the static friction, of between 50 and 60 kgW, followed by a much lower kinetic friction which from approximately 30 kgW gradually and rapidly decreases.

[0099] The above indications relating to the overall dimensions of the synthetic stopper 1 and the angle of incidence α can be translated into lower base dimensions.

[0100] The lower portion 2 can have a height of between approximately 20 mm and 25 mm and a minimum cross dimension, which coincides with the lower base 7, between 24 mm and 29 mm.

[0101] Furthermore the lateral surface 6 is preferably provided with knurling, parallel to the longitudinal axis 4, said knurling facilitating manual uncorking.

[0102] Lastly the lower base 7 has a preferably concave surface.

[0103] Said surface takes on a flat shape after the lower portion 2 has been deformed following insertion of the same in the cylindrical inlet 12. This prevents unattractive swelling of the lower base 7 towards the outside.

[0104] The stopper 1 according to the invention is used on traditional bottling plants that compress the lower part 2 and insert it in the bottles 10 so that the longitudinal axis 4 coincides substantially with the axis of development 13.

[0105] The invention offers important advantages.

[0106] The polymeric materials used eliminate the problems due to the use of traditional corks 1a, in particular wines bottled with said stoppers are not affected by modification of their organoleptic properties and bouquet due to the presence of mould or other.

[0107] A further advantage is the fact that the physical-chemical properties of the stoppers are constant and do not vary from stopper to stopper.

[0108] This characteristic also permits a precise evolution of the sparkling wine or similar in the bottle and therefore a precise determinable quality.

[0109] A further advantage of the present synthetic stopper 1 is that it guarantees good adhesion and therefore good seal along the entire profile of the lower tronco-conical portion 2 and therefore better gas seal.

[0110] Furthermore the synthetic stopper 1 has an external appearance similar to the traditional corks 1a and permits the same type of manual uncorking with the same

intensity of initial force.

[0111] This permits traditional uncorking of bottles of sparkling wine, champagne and similar. In addition, as illustrated in Fig. 4, after an identical initial force, the force necessary to expel the synthetic stopper 1 is less than the force required to move the traditional cork 1a. This guarantees quicker and more convenient manual uncorking.

[0112] The ease of manual uncorking is also further increased by the knurling, which ensures a firmer manual grip on the stopper 1.

[0113] A further advantage is provided by the fact that during manual uncorking the synthetic stopper 1 does not risk breakage or excessive deformation, since the same is made of a material with a modulus of elasticity similar to or higher than 5 MPa, and there are no dimensional discontinuities that can trigger breakage.

[0114] Last but not least is the advantage that the synthetic stopper 1 has lower production costs and is made of cheaper raw materials.

[0115] In addition the similarity of shape between the synthetic stoppers 1 and the traditional corks permits use of the same in automatic bottling plants.

Claims

1. Synthetic stopper with manual uncorking for bottle for sparkling wine or similar, said bottle (10) including a substantially cylindrical inlet (12) and said synthetic stopper (1) comprising a lower portion (2) which can be inserted in said inlet (12) and an upper portion (3) designed to provide a support external to said bottle (10) and which can be gripped for the extraction of said lower portion (2) from said inlet (12), **characterised in that** it consists entirely of a polymeric material having a modulus of elasticity substantially between 5 and 20 MPa, and **in that** said lower portion (2) has a longitudinal axis (4) and a lateral surface (6) at least mainly slanting by an angle (α) between 7° and 19° with respect to said longitudinal axis (4).
2. Stopper as claimed in Claim 1, in which said polymeric material has a modulus of elasticity of substantially 5 MPa and said lateral surface (6) is at least mainly slanting by an angle (α) of substantially 10° with respect to said longitudinal axis (4).
3. Stopper as claimed in Claim 1, in which said lower portion (2) has an upper base (5) adjacent to said upper portion (3) and substantially without dimensional discontinuity with respect to said upper portion (3).
4. Stopper as claimed in Claim 1, in which said polymeric material consists of highly ramified polyolefins with specific weight between 0.25 and 0.92 kg/dm³.

5. Stopper as claimed in Claim 4, in which styrene-based thermoplastic elastomers in a percentage not exceeding 30% are added to said polymeric material.
6. Stopper as claimed in Claim 4, in which said polymeric material is injection moulded with the aid of expanding agents. 5
7. Stopper as claimed in Claim 1, in which said upper portion (3) is substantially cylindrical with axis substantially coinciding with said longitudinal axis (4) of said lower portion (2). 10
8. Stopper as claimed in Claim 7, in which said upper portion (3) is provided with knurling substantially parallel to said longitudinal axis (4). 15
9. Stopper as claimed in Claim 1, in which said lower portion (2) has an upper base (5) adjacent to said upper portion (3) and having a dimension similar to said upper portion (3) in a crosswise direction to said longitudinal axis (4), a length between 20 mm and 25 mm, and a lower base (7) having a minimum dimension between 24 mm and 29 mm in a crosswise direction to said longitudinal axis (4). 20
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10. Stopper as claimed in Claim 9, in which said upper portion (3) is substantially cylindrical and has a diameter substantially between 30 mm and 32 mm and in which said lower portion (2) and said upper portion (3) define an overall length of said stopper substantially between 40 mm and 45 mm, said stopper being dimensionally similar to traditional corks for sparkling wine. 30
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11. Stopper as claimed in Claim 9, in which said lower base (7) has a concave surface. 40

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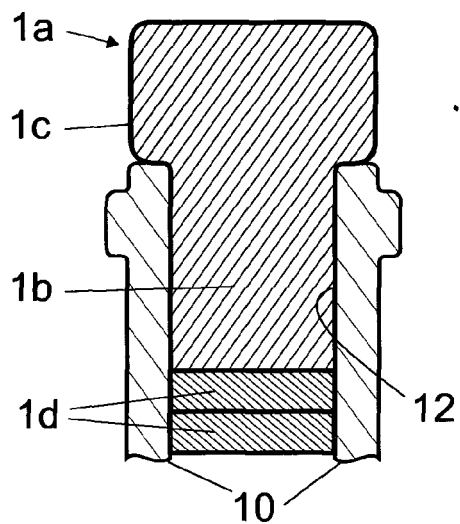


Fig. 1a

(Technical background)

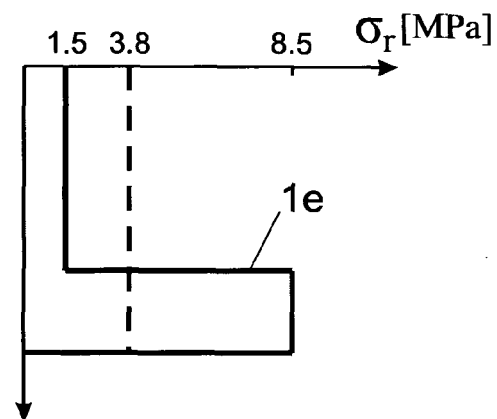


Fig. 1b

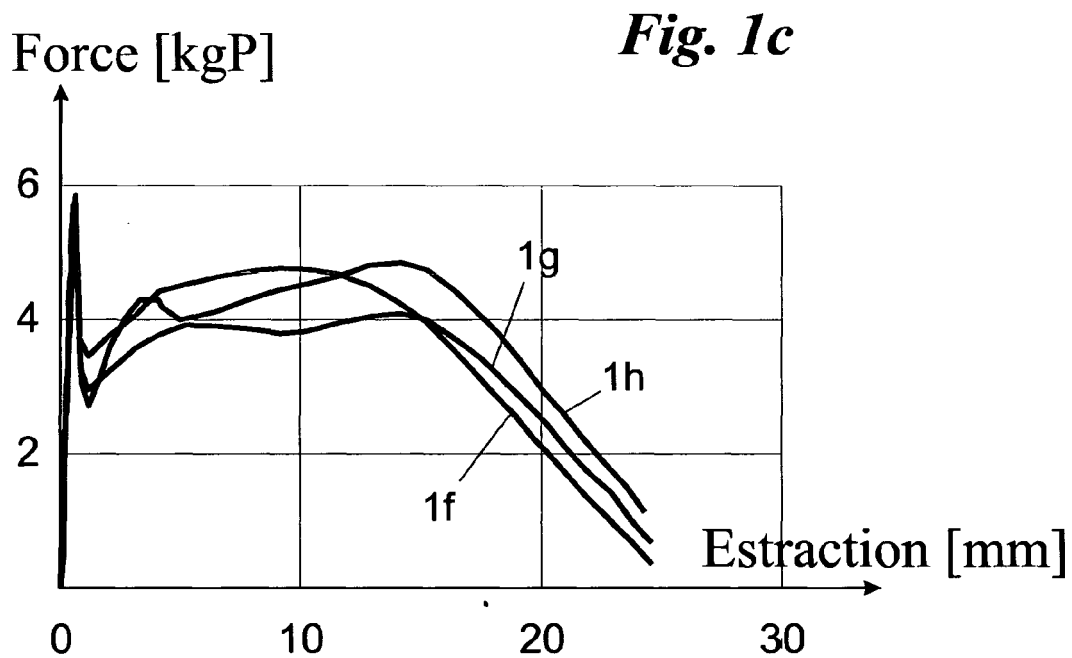


Fig. 1c

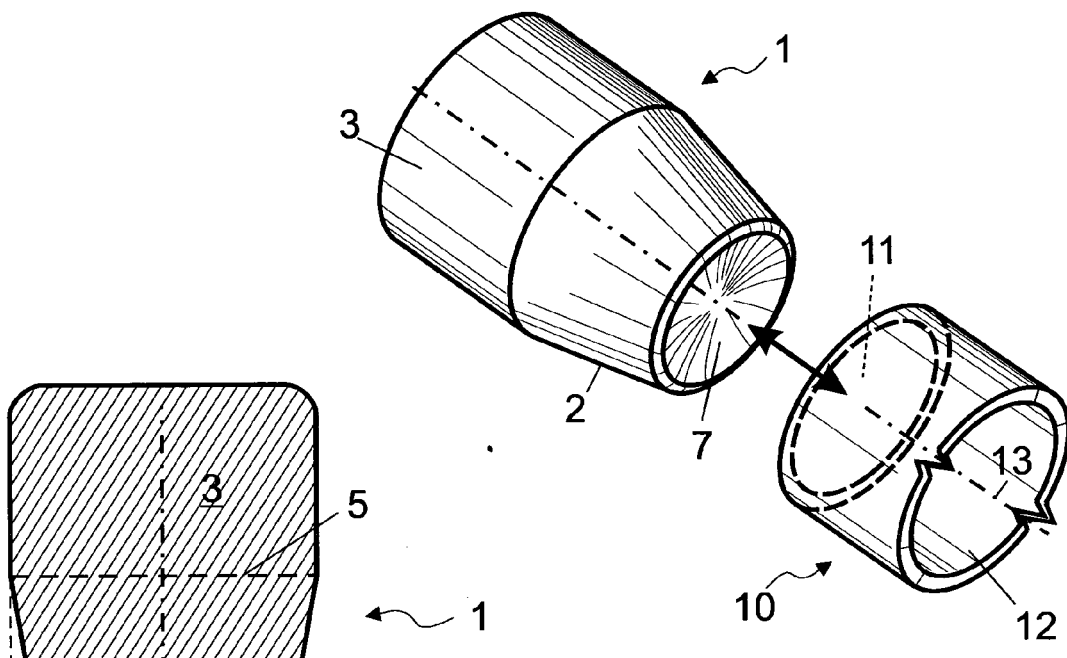


Fig. 2

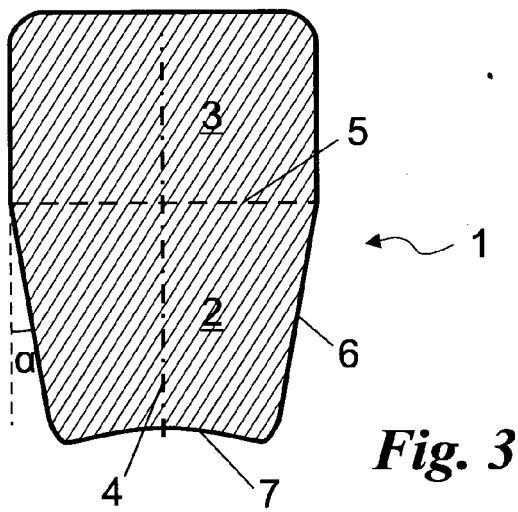


Fig. 3

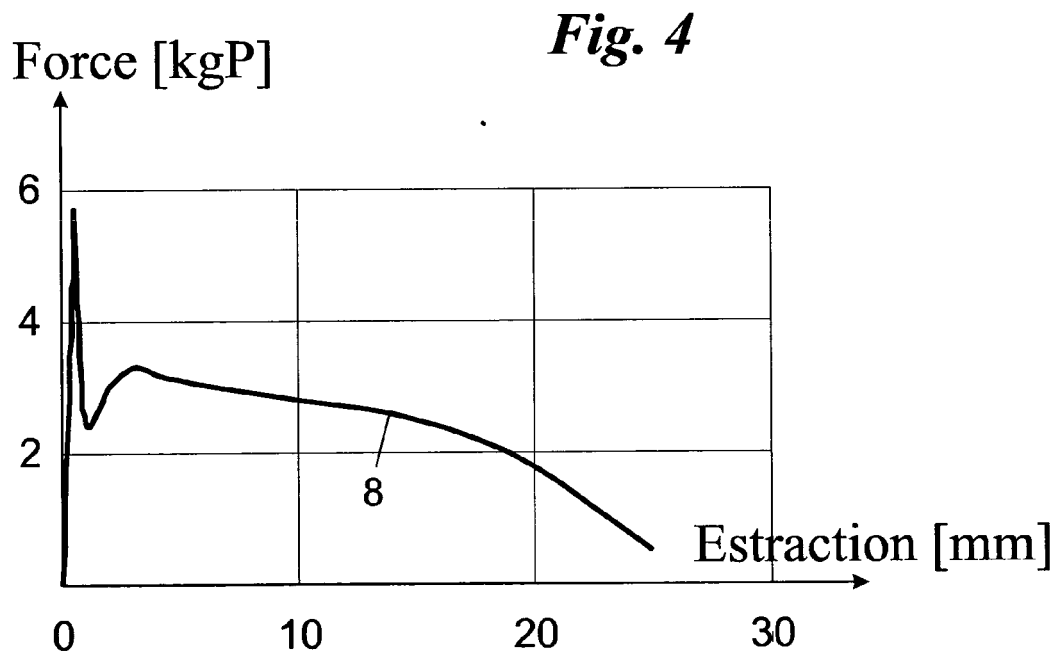


Fig. 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 42 5341

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 2 634 014 A (KIMBER GEORGE A) 7 April 1953 (1953-04-07) * column 2, line 15 - line 33 * * column 3, lines 23-28,40-45 * * figures 1,2 *	1-3,6-11	B65D39/00
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