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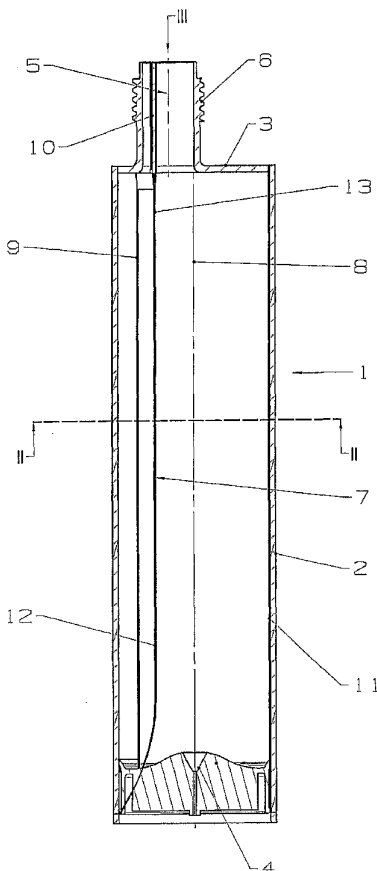
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(54) Title: MULTICOMPONENT CARTRIDGE

(54) Bezeichnung: MEHRKOMPONENTEN-KARTUSCHE



(57) Abstract: The inventive multicomponent cartridge (1) for separately storing and for jointly pressing out at least two components of a free-flowing substance comprises at least one cylinder (2) for holding the substance with at least one pressing plunger (4) for pressing out the substance and at least one outlet (5) for the substance. The components of the substance are stored in separate chambers (8, 9) inside the cylinder (2) that extend in the longitudinal direction of the cylinder (2). An inner area (12) of a film (7) forms a partition (13) of the cylinder (2) between the chambers (8, 9) of the multicomponent cartridge (1). An outer area (11) of the film (7) is integrally joined to the cylinder. According to the inventive method for producing the inventive multicomponent cartridge (1), the outer area (11) of the film (7) is encapsulated during the injection molding of the cylinder (2) for the multicomponent cartridge (1).

(57) Zusammenfassung: Die erfindungsgemäße Mehrkomponenten-Kartusche (1) zum getrennten Aufbewahren und zum gemeinsamen Auspressen von mindestens zwei Komponenten einer fließfähigen Masse weist wenigstens einen Zylinder (2) zur Aufnahme der Masse mit wenigstens einem Auspresskolben (4) zum Auspressen der Masse und wenigstens eine Austrittsöffnung (5) für die Masse auf. Die Komponenten der Masse werden in voneinander getrennten Kammern (8, 9) im Zylinder (2) aufbewahrt, welche sich in Längsrichtung des Zylinders (2) erstrecken. Ein Innenbereich (12) einer Folie (7) bildet eine Trennwand (13) des Zylinders (2) zwischen den Kammern (8, 9) der Mehrkomponenten-Kartusche (1). Ein Außenbereich (11) der Folie (7) ist mit dem Zylinder (2) stoffschlüssig verbunden. Beim erfindungsgemäßen Verfahren zur Herstellung der erfindungsgemäßen Mehrkomponenten-Kartusche (1) wird der Außenbereich (11) der Folie (7) beim Spritzgießen des Zylinders (2) für die Mehrkomponenten-Kartusche (1) umspritzt.

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**Erklärungen gemäß Regel 4.17:**

— hinsichtlich der Berechtigung des Anmelders, ein Patent zu beantragen und zu erhalten (Regel 4.17 Ziffer ii)

— hinsichtlich der Berechtigung des Anmelders, die Priorität einer früheren Anmeldung zu beanspruchen (Regel 4.17 Ziffer iii)

— Erfindererklärung (Regel 4.17 Ziffer iv)

**Veröffentlicht:**

— mit internationalem Recherchenbericht

Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

I, SALLY LESLEY HEDLEY, B.A., M.C.I.L., M.I.T.I, of 29 Parkholme Road, London E8 3AG, United Kingdom, do hereby declare that I am well acquainted with the English and German languages and certify that to the best of my knowledge and belief the following is a true translation of the certified copy of the original German Patent Specification No. 10 2005 017 599.6, dated 16th April, 2005, and of the Official Certificate attached thereto.

  
Sally Hedley

Dated this 18th day of September, 2007

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**Priority certificate  
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relating to the filing of a Patent Application**

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**Title:** Multi-component cartridge

**IPC:** B 29 C, B 65 D

**The attached documents are a correct and accurate reproduction of the original supporting documents of this Patent Application.**

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Description

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**Multi-component cartridge**

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The invention relates to a method of producing a multi-component cartridge which is used for the separate storage and for the common discharge of at least two components of a flowable composition, the multi-component cartridge having a cylinder with at least two chambers that are separate from one another for the separate storage of the components of the composition. The invention relates also to a multi-component cartridge for the separate storage and for the common discharge of at least two components of a flowable composition, having at least one cylinder for accommodating the composition, having at least one discharge piston for discharging the composition and having at least one outlet opening for the composition, the components of the composition being stored separately from one another in at least two chambers of the cylinder, which chambers extend in the longitudinal direction of the cylinder of the multi-component cartridge. A flowable composition is to be understood as meaning especially a paste-form material having paste-form components, such as, for example, multi-component adhesives, multi-component synthetic resins or multi-component mortars.

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Cartridges are used for injecting adhesives or sealants and for that purpose are inserted into cartridge applicators. For storing and for discharging two-component compositions there are used cartridges having a cylinder divided into two chambers in which the two components are introduced and stored separately from one another. By means of one or two discharge pistons, the components located in the chambers can be discharged through the outlet opening together in a preset mixing ratio. The discharged components are mixed together in a static mixer mounted at the outlet opening.

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DE 39 13 409 A1 discloses a two-component cartridge which has the shape and structure of a one-component cartridge and which can accordingly be used in conventional cartridge applicators for one-component cartridges. For configuration as a two-component cartridge, a cylinder of the known cartridge is divided into two chambers arranged one next to the other by a longitudinally arranged flexible partition that is

material-bonded to the cylinder and cartridge walls. When the components are being discharged, the flexible partition is successively separated from the cylinder and cartridge walls by the discharge piston and received in a cavity in the discharge piston.

5 DE 102 07 763 A1 discloses a two-component cartridge which has two separate tubular containers that extend over sectors of a circle and together make up a full circle, so that the cartridge has the shape of a cylinder. For discharging, the containers are inserted, assembled, into a cylinder of a cartridge applicator and compressed in the longitudinal direction by a discharge piston of the cartridge applicator.

10 To ensure that cartridges that have not yet been used have a long storage life, it is necessary for the components to be protected from environmental influences. This is generally achieved by introducing the components into plastics cylinders, the filling and outlet openings of which are sealed. Conventional cartridges are preferably made from polyolefinic plastics materials. They have limited barrier properties in respect of the  
15 diffusion of water into or out of the cartridge, which is not sufficient for hybrid mortars or PU systems or requires a thick cartridge wall to reduce the diffusion of water vapour to an acceptable level. In such compositions, the diffusion of water vapour plays a crucial role in the shelf life of the components of the composition stored in the cartridge, because one of the components reacts with water, with the result that the composition  
20 becomes unusable.

The problem underlying the invention is therefore to propose a multi-component cartridge for the separate storage and for the common discharge of two or more  
25 components of a flowable composition which to a very great extent prevents diffusion of water vapour between the chambers of the multi-component cartridge and/or into the cartridge from the outside and which is inexpensive to produce. The invention is also based on the problem of proposing a method of producing such a multi-component cartridge.

30 That problem is solved according to the invention by means of a method of producing a multi-component cartridge having the features of method claim 1 as well as by means of a multi-component cartridge produced by that method having the features of the independent apparatus claim 5. Further advantageous configurations can be found in  
35 the respective appended subsidiary claims.

The method according to the invention for producing a multi-component cartridge which is used for the separate storage and for the common discharge of at least two components of a flowable composition, the multi-component cartridge having a cylinder with at least two chambers that are separate from one another for the separate storage  
5 of the components of the composition, is characterized by the following steps:

- a.) preparing a film;
- 10 b.) laying the film in a longitudinally extending recess of a first part of a mould insert of an injection mould for the cylinder of the multi-component cartridge;
- 15 c.) inserting a second part of the mould insert of the injection mould into the recess of the first part of the mould insert, an inner region of the film being located between the two parts of the mould insert and an outer region of the film being located on an outer side of the mould insert of the injection mould for the cylinder;
- 20 d.) introducing the mould insert with the film into a mould cavity of the injection mould for the cylinder, the outer region of the film being located in the mould cavity of the injection mould for the cylinder;
- 25 e.) injection-moulding the cylinder of the multi-component cartridge, wherein, during filling of the mould cavity of the injection mould for the cylinder with plastics material, injection-moulding takes place around the outer region of the film and the outer region of the film is substance-bonded to the cylinder; and
- 30 f.) demoulding the cylinder of the multi-component cartridge and removing the two parts of the mould insert from the cylinder.

In that procedure, the cylinder need not have the shape of a geometric cylinder having a circular cross-section, but the cylinder is tubular (for example also a polygonal tube) with  
35 a cross-section constant over its length.

A possible embodiment of the multi-component cartridge according to the invention has a plastics cylinder which is divided by a film into two chambers that are separate from one another for accommodating two components of a flowable composition. The film is substance-bonded to the cylinder, the thermoplastic plastics material of the cylinder having been injected-moulded around the film. For the production of such a multi-component cartridge, in a first step a film is prepared of a size corresponding to the multi-component cartridge. The film can be produced in the form of a film blank from a film sheet or a film tube. The film is then laid in a longitudinally extending recess of a first part of a mould insert of an injection mould for the cylinder of the multi-component cartridge. For that purpose, the mould insert is advantageously removed from the injection mould and the film is laid in the insert outside a mould cavity of the injection mould. In the next step, a second part of the mould insert of the injection mould is inserted into the recess of the first part of the mould insert, the second part of the mould insert covering a portion of the film so that a portion of the film is located between the two parts of the mould insert. Accordingly, an inner region of the film is located between the two parts of the mould insert and an outer region of the film is located on an outer side of the mould insert of the injection mould for the cylinder of the multi-component cartridge. The outer region of the film is formed by edges of the film that protrude from the assembled parts of the mould insert. The edges of the film can totally or partially enclose the mould insert or can project away from the mould insert. It is also possible for the first or the second part of the mould insert to be encased in a film tube, or for the edges of a film strip to be laid, overlapping, around the mould insert. The assembled mould insert with the film is next introduced into the mould cavity of the injection mould for the cylinder and the injection mould is closed. In the next step, the mould cavity of the injection mould surrounding the mould insert is filled with thermoplastic plastics material and plastics material is injected-moulded around the mould insert as well as around the outer region of the film projecting into the mould cavity, with the result that the outer region of the film is substance-bonded to the cylinder. After the plastics composition has cooled, the cylinder of the multi-component cartridge is demoulded and the parts of the mould insert located in the cylinder are removed from the multi-component cartridge. In an advantageous configuration of the invention, a diffusion-proof film is used in this method.



The multi-component cartridge according to the invention for the separate storage and for the common discharge of at least two components of a flowable composition has at least one cylinder which is divided by a diffusion-proof film into at least two chambers that are separate from one another for accommodating the components. The diffusion-proof film extends over the length of the cylinder, an inner region of the film dividing the cylinder into longitudinally extending chambers and an outer region of the film having the plastics material of the cylinder injected-moulded around it. The outer region of the film is substance-bonded to the cylinder and separates the components of the multi-component cartridge stored in the chambers from one another. The film forms a diffusion barrier for water and/or water vapour and prevents moisture from entering the chambers and/or escaping from the chambers. It also prevents the moisture from one chamber diffusing into another chamber of the multi-component cartridge. The film can be produced from metal or plastics material or from other diffusion-inhibiting materials. It is also possible for the chambers of the multi-component cartridge to be totally or partially lined with the outer region of the film. A film strip or a film tube can be used as the film.

The film advantageously has a metal layer as diffusion barrier. Metals are especially suitable as diffusion barrier against water vapour by virtue of their low permeability to water. The metal layer preferably consists of aluminium, because aluminium is easy to work and inexpensive to obtain. Aluminium is corrosion-resistant and substantially stable chemically. It is also possible to use other corrosion-resistant metals. The film can be produced totally from metal or it can have a metal layer on a support material.

In an advantageous development of the invention, the film is produced from a composite material. The composite material consists of a first layer of plastics material and, arranged on top, a second layer of metal. The first layer of plastics material need not necessarily be diffusion-inhibiting, because the metal layer acts as diffusion barrier. By virtue of its very low permeability to water vapour and its low cost, an aluminium composite film is especially suitable.

In a further advantageous embodiment of the invention, the inner region of the film is spaced apart from the cylinder, the inner region forming a partition extending in the longitudinal direction of the cylinder. The inner region of the film which is spaced apart from the cylinder divides the cylinder into chambers arranged one next to the other

extending in the longitudinal direction of the cylinder. The chambers so formed are used to accommodate different components of the flowable composition. When the components are being discharged, the inner region of the film forming the partition is pressed against the cylinder or sheared off by the discharge piston from the inside and the components of the composition are forced through the outlet opening. Transverse to the cartridge, a peripheral portion of the partition is at least as long as a corresponding peripheral portion of a chamber of the cylinder against which the partition is pressed when the components are being discharged, so that all of the partition is in contact with the cylinder.

Advantageously, the film divides the cylinder of the multi-component cartridge into separate chambers extending in the longitudinal direction of the cylinder. Depending upon the arrangement of the film, the cylinder can be divided into two or more chambers. Chambers that are completely covered by the film exhibit especially good diffusion protection.

In a further advantageous configuration of the invention, the outlet opening of the multi-component cartridge has a transverse rib to which the film is fixed by a forward edge. The film is joined sealingly, preferably by a substance-bond, to the transverse rib, which forms an intermediate wall of the outlet opening. The intermediate wall can be flat or curved and one end thereof can project into the cylinder. The intermediate wall keeps the components of the composition apart from one another until the components have been discharged from the outlet opening. The intermediate wall of the outlet opening advantageously extends as far as a forward end of the outlet opening, so that the chambers of the multi-component cartridge can be closed simply, for example, by screwing a closure cap onto the multi-component cartridge.

The chambers of the cylinder are preferably closed sealingly by means of the discharge piston at the end opposite from the outlet opening. This has the advantage that the chambers of the cartridge can be filled in one operation from the end opposite from the outlet opening. By virtue of the large filling openings of the chambers at that end, large-diameter filling tubes can be used, which reduces the filling time. After filling, the filling openings of the chambers are closed by introduction of the discharge piston, the inner region of the film that is spaced apart from the cylinder being pressed against the cylinder by the discharge piston, so that the chambers are sealed with respect to one

another. The discharge piston is advantageously so configured that the discharge piston does not cut into the film when the components are being discharged. This can be achieved by suitable shaping or by selection of the material of the discharge piston. It is also possible for the film forming the partition to be sheared off by the discharge piston, but this involves the risk of a reduction in the diffusion impermeability, particularly between the chambers.

The invention is described in greater detail below with reference to an exemplary embodiment shown in the drawings:

Figure 1 is an axial section through a multi-component cartridge according to the invention;

Figure 2 is a cross-sectional view of the multi-component cartridge along line II - II in Figure 1;

Figure 3 is an end view of the multi-component cartridge according to arrow III in Figure 1;

Figure 4 is a diagrammatic end view of an injection mould for the method according to the invention with a film projecting out of the mould insert; and

Figure 5 is a further diagrammatic view of the injection mould from Figure 4 with a film enclosing the mould insert.

The multi-component cartridge 1 according to the invention shown in Figure 1 is used for the separate storage and for the common discharge of two components of a flowable composition and has a cylinder 2, a head piece 3 and a cylindrical discharge piston 4. An outlet opening 5 is formed on the head piece 3, the outlet opening having an external thread 6 for fitting attachments (not shown). As attachments, a closure cap or a static mixer, for example, can be fixed in place on the external thread 6 of the head piece 3. The cylinder 2 is divided by a film 7 into two chambers 8, 9 arranged one next to the other. The chambers 8, 9 serve for the separate storage of different components of a flowable composition (not shown). The film 7 extends over the length of the cylinder 2,

an inner region 12 of the film 7 forming a partition 13 between the chambers 8, 9 of the multi-component cartridge 1. The inner region 12 of the film 7 is spaced apart from the cylinder 2 and is curved in the transverse direction with respect to the cartridge 1. The length of the inner region 12 in the transverse direction with respect to the cartridge 1 corresponds to the corresponding peripheral portion of the chamber 9 of the cylinder 2.

In the outlet opening 5 there is arranged a transverse rib 10 which extends in the longitudinal direction of the outlet opening 5 and forms an intermediate wall to which the film 7 is sealingly fixed. An outer region 11 of the film 7 is substance-bonded to the cylinder 2 and completely lines the chamber 8. At the end of the multi-component cartridge 1 opposite from the outlet opening 5, the discharge piston 4 presses the film 7 against the cylinder 2 and tightly seals the chambers 8, 9.

The film 7 is diffusion-proof, it prevents diffusion of water vapour between the chambers 8, 9 of the multi-component cartridge 1. If it completely encloses one of the two chambers 8, 9, the film 7 seals that chamber so that it is diffusion-proof. The film 7 consists of a composite material having a support film of plastics material with a metal layer as diffusion barrier. Aluminium, for example, is used as the metal.

Figure 2 shows a cross-section through the cylinder 2 of the multi-component cartridge 1 according to the invention. The cylinder 2 is divided into the chambers 8, 9 by the intermediate wall 13 formed by the inner region 12 of the film 7. The outer region 11 of the film 7 is substance-bonded to the cylinder 2 and completely lines the chamber 8 of the multi-component cartridge 1.

Figure 3 shows an end view of the multi-component cartridge 1 according to the invention. The outlet opening 5 is arranged eccentrically on the head piece 3. The outlet opening 5 is divided by the transverse rib 10. The transverse rib 10 is curved in the same way as the partition 13, arranged offset relative to a notional centre axis of the outlet opening 5 and is aligned with the partition 13 of the cylinder 2.

Figures 4 and 5 show a diagrammatic end view of an injection mould 15 for the production of a cylinder 2 (not shown) of the multi-component cartridge 1, as described above, in accordance with the method of the invention. On the centre axis of the injection mould 15 there is arranged a cylindrical mould insert 16 which extends in the

longitudinal direction of the injection mould 15. The mould insert 16 is of two-part construction and is removable from the injection mould 15. The mould insert 16 is divisible and consists of a first part 17 and a second part 18 of the mould insert 16, the first part 17 having a longitudinally extending recess 19 for receiving the second part 18.

5 Around the periphery of an outer side 20 of the mould insert 16, a mould cavity 21 for the cylinder 2 is formed between the mould insert 16 and the injection mould 15. In the recess 19 of the first part 17 of the mould insert 16, the film 7 has been laid between the first part 17 and the second part 18 of the mould insert 16. An inner region 12 of the film 7 is located between the two parts 17, 18 of the mould insert 16 and an outer region 11

10 of the film 7 protrudes from the mould insert 16 and projects into the mould cavity 21 of the injection mould 15.

During injection-moulding of the cylinder 2 of the multi-component cartridge 1, the mould cavity 21 is filled with thermoplastic plastics material (not shown), injection-moulding

15 taking place around the outer region 11 of the film 7 which is thus substance-bonded to the cylinder 2. The two parts 17, 18 of the mould insert 16 form spaces for the chambers 8, 9 of the multi-component cartridge 1 and are removed from the chambers 8, 9 of the cylinder 2 after demoulding of the cylinder 2. The inner region 12 of the film 7 forms a partition 13 for the cylinder 2 and divides the cylinder 2 into the two separate chambers

20 8, 9 which serve to accommodate the components of the composition.

Figure 4 shows a first advantageous embodiment of the invention in which the outer region 11 of the film 7 protrudes only very slightly from the mould insert 16 and injection-moulding takes place around the outer region 11 of the film 7 on all sides when the

25 cylinder 2 is being injection-moulded. The outer region 12 of the film 7 becomes completely embedded in the plastics material of the cylinder 2, so that in the multi-component cartridge 1 only the partition 13 is formed by the film 7.

Figure 5 shows a further advantageous embodiment in which the outer region 11 of the film 7 completely encloses the first part 17 of the mould insert 16 and the ends of the

30 outer region 11 overlap. The outer region 11 of the film 7 is in contact with the outer side 20 of the first part 17 of the mould insert 16. During injection-moulding of the cylinder 2, plastics material is injection-moulded around the outer region 11 on the side opposite from the mould insert 16, so that a chamber 8 of the cylinder 2 is entirely lined with the

35 film 7. The film 7 is preferably diffusion-proof.

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Patent claims

1. Method of producing a multi-component cartridge (1) which is used for the separate storage and for the common discharge of at least two components of a flowable composition, the multi-component cartridge (1) having a cylinder (2) with at least two chambers (8, 9) that are separate from one another for the separate storage of the components of the composition, **characterized by** the following steps:

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a.) preparing a film (7);

b.) laying the film (7) in a longitudinally extending recess (19) of a first part (17) of a mould insert (16) of an injection mould (15) for the cylinder (2) of the multi-component cartridge (1);

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c.) inserting a second part (18) of the mould insert (16) of the injection mould (15) into the recess (19) of the first part (17) of the mould insert (16), an inner region (12) of the film (7) being located between the two parts (17, 18) of the mould insert (16) and an outer region (11) of the film (7) being located on an outer side (20) of the mould insert (16) of the injection mould (15) for the cylinder (2);

25

d.) introducing the mould insert (16) with the film (7) into a mould cavity (21) of the injection mould (15) for the cylinder (2), the outer region (11) of the film (7) being located in the mould cavity (21) of the injection mould (15) for the cylinder (2);

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e.) injection-moulding the cylinder (2) of the multi-component cartridge (1), wherein, during filling of the mould cavity (21) of the injection mould (15) for the cylinder (2) with plastics material, injection-moulding takes place

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around the outer region (11) of the film (7) and the outer region (11) of the film (7) is substance-bonded to the cylinder (2); and

5 f.) demoulding the cylinder (2) of the multi-component cartridge (1) and removing the two parts (17, 18) of the mould insert (16) from the cylinder (2).

2. Method according to claim 1, **characterized in that** the film (7) is diffusion-proof.

10 3. Method according to claim 1, **characterized in that** edges of the film (7), forming the outer region (11) thereof, project out of the assembled parts (17, 18) of the mould insert (16) and into the mould cavity (21) of the injection mould (15) for the cylinder (2), which mould cavity (21) surrounds the mould insert (16).

15 4. Method according to claim 1, **characterized in that** the film (7) encloses the first part (17) or the second part (18) of the mould insert (16).

20 5. Multi-component cartridge (1) for the separate storage and for the common discharge of at least two components of a flowable composition, having a cylinder (2) for accommodating the composition, having a discharge piston (4) for discharging the composition and having at least one outlet opening (5) for the composition, the components of the composition being stored separately from one another in at least two chambers (8, 9) of the cylinder (2), which chambers extend in the longitudinal direction of the cylinder (2) of the multi-component cartridge (1), **characterized in that** the cylinder (2) has a diffusion-proof film (7) which extends over the length of the cylinder (2), an inner region (12) of the film (7) forming a partition (13) which divides the cylinder (2) into the longitudinally extending chambers (8, 9), and an outer region (11) of the film (7) having the plastics material of the cylinder (2) injected-moulded around it and being  
25  
30 substance-bonded to the cylinder (2).

6. Multi-component cartridge according to claim 5, **characterized in that** the film (7) has a metal layer as diffusion barrier.

7. Multi-component cartridge according to claim 6, **characterized in that** the film (7) is produced from a composite material.

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8. Multi-component cartridge according to claim 5, **characterized in that** an inner region (12) of the film (7) is spaced apart from the cylinder (2) and forms the partition (13) extending in the longitudinal direction of the cylinder (2) which divides the cylinder (2) into the chambers (8, 9), and the discharge piston (4) presses the partition (13) against the cylinder (2) when the components of the composition are being discharged.

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9. Multi-component cartridge according to claim 5, **characterized in that** the outlet opening (5) has a transverse rib (10) to which the film (7) is fixed.

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10. Multi-component cartridge according to claim 5, **characterized in that** the chambers (8, 9) of the cylinder (2) are closed sealingly by the discharge piston (4) at the end opposite from the outlet opening (5).



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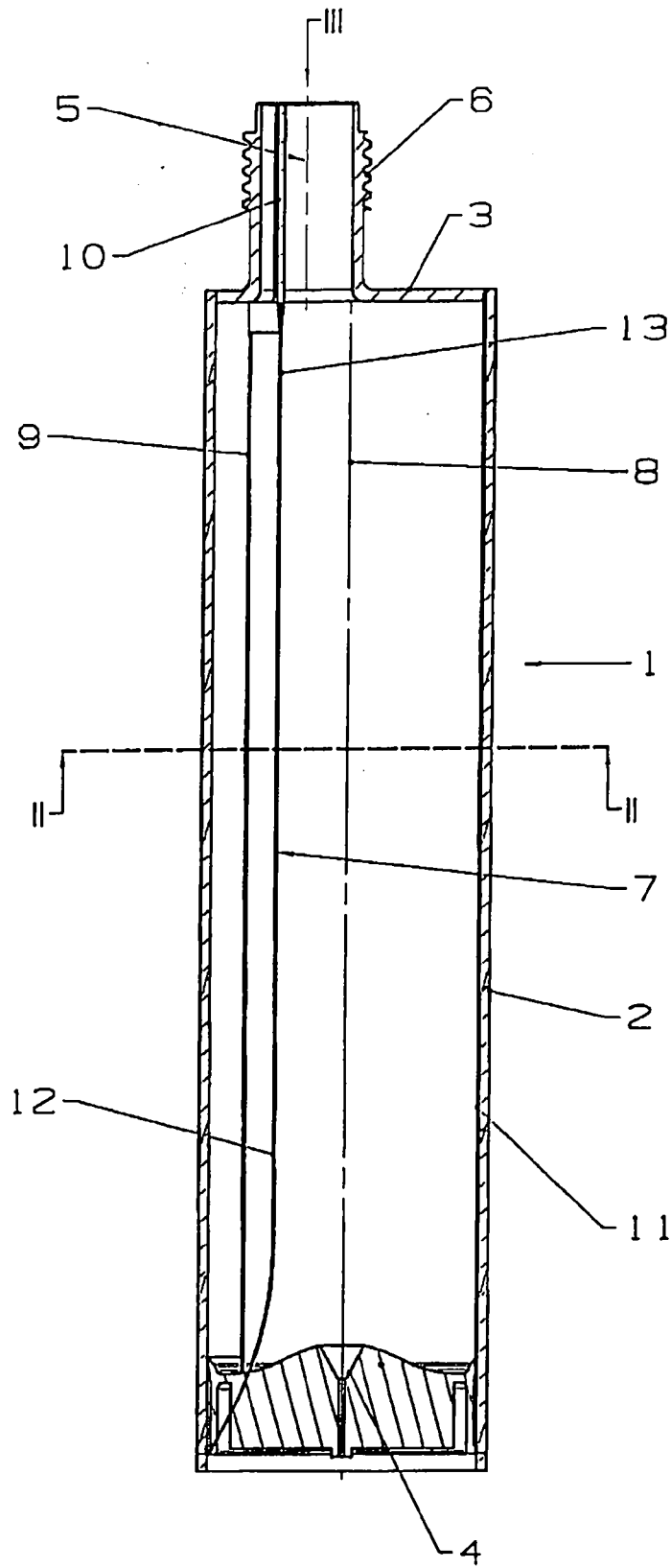


Fig. 1

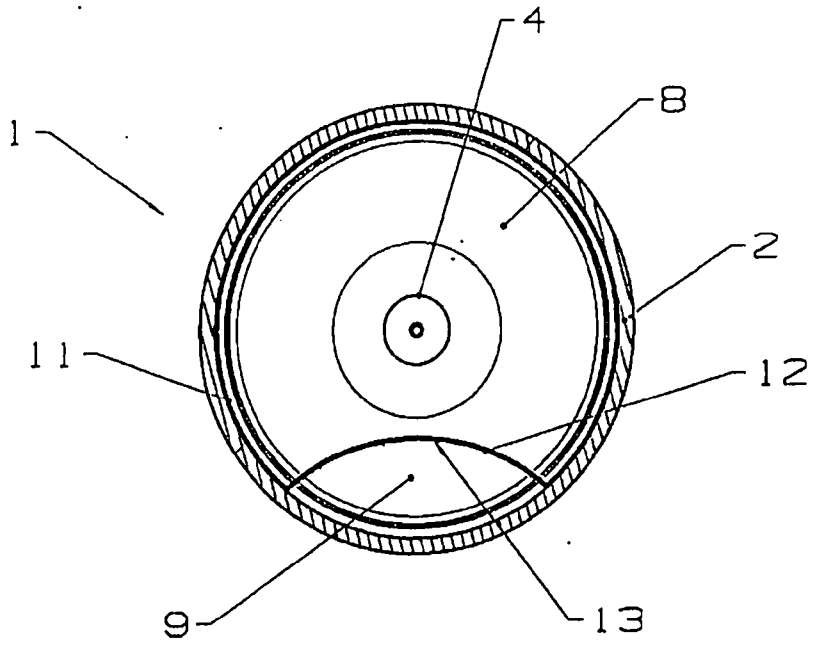


Fig.2

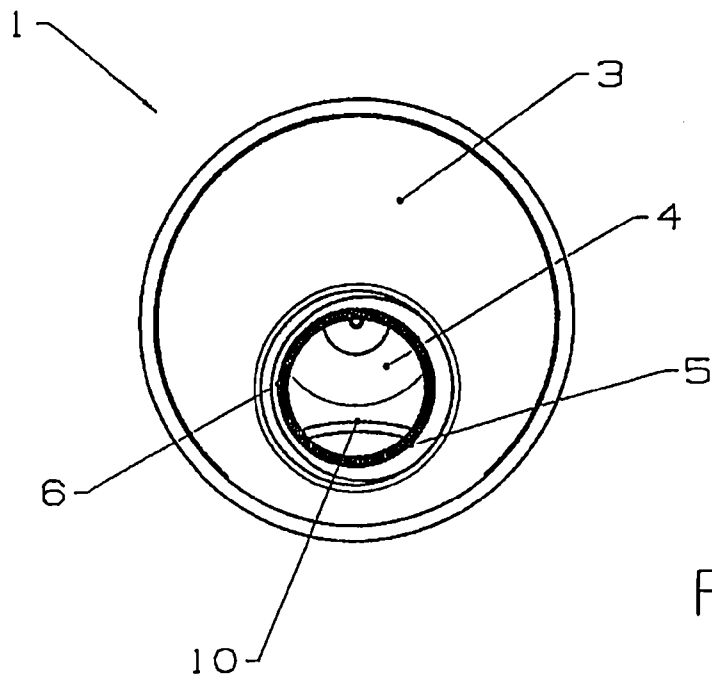


Fig.3

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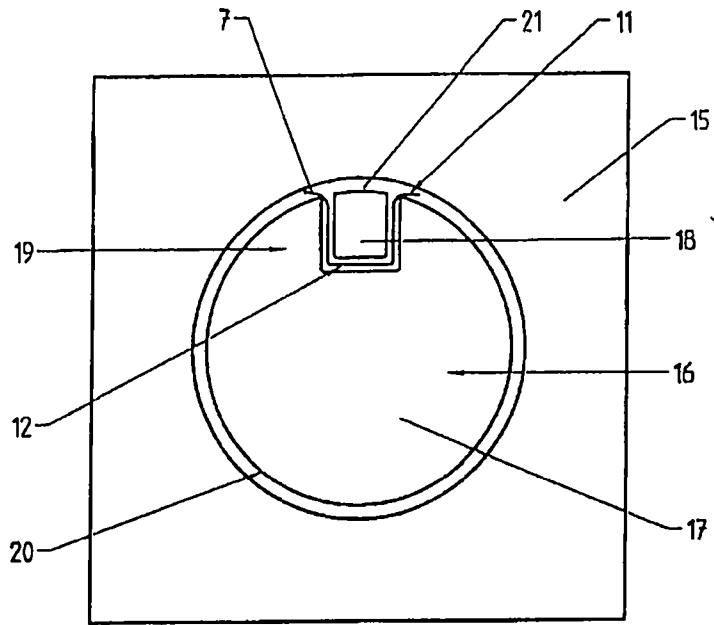


Fig. 4

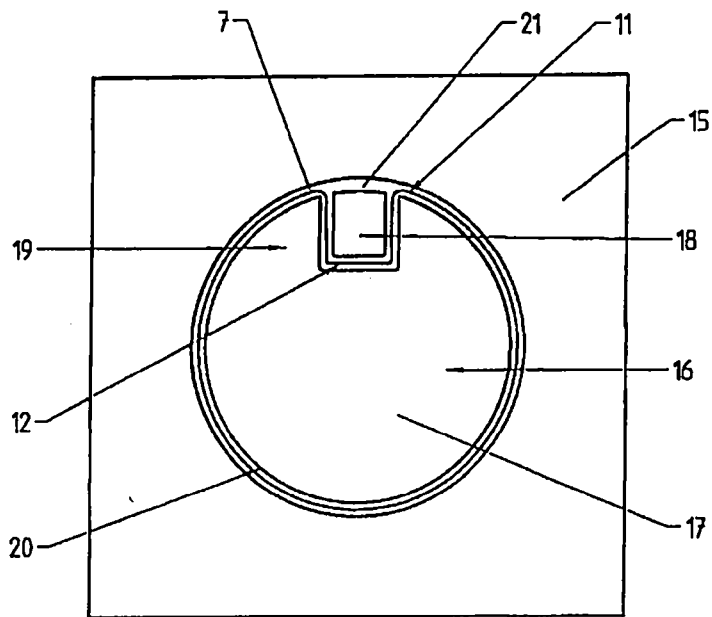


Fig. 5