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(54) Dispensing device for fluid substances

(57) A dispensing device (1) for fluid substances, comprising a movable base (3) container housing (2) a fluid substance to be dispensed and, for hermetically closing said container, an element (6) associated with a hermetic dispensing pump (7), characterised by comprising a compression element (9) associated with said closure element (6) and with said pump (7) to vent any residual air present in the container, by sinking into the fluid at the moment of installing the closure element (6) on said container (2).

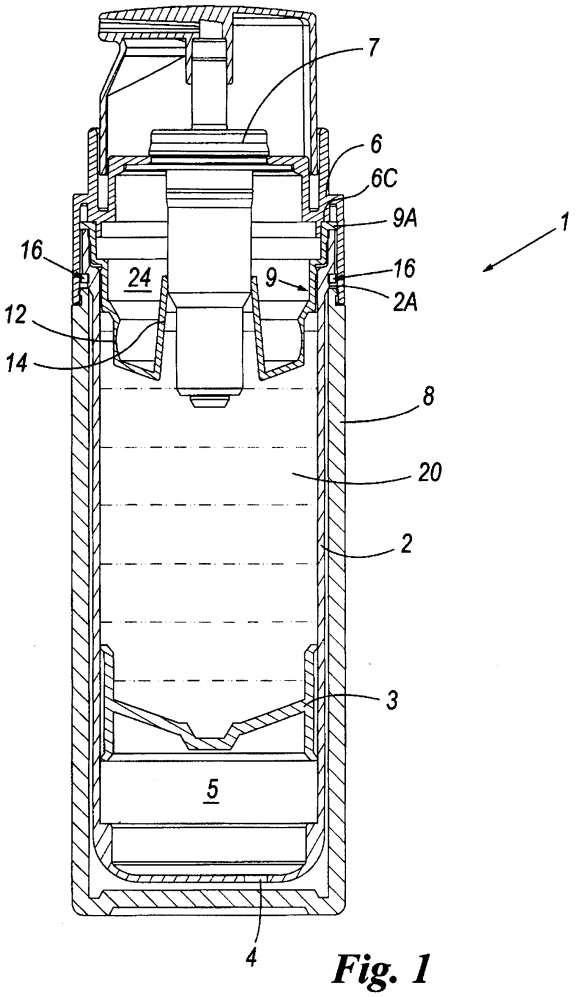

Fig. 1

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Description

[0001] The present invention relates to a dispensing device for fluid substances.

[0002] In particular it relates to a movable base type of dispensing device with pump dispensing, which enables the fluid for dispensing to remain isolated from the surrounding air until dispensed, so avoiding fluid contamination.

[0003] Containers with a movable base are known, usually associated with a hermetic pump.

[0004] The characteristic feature of a hermetic pump is to dispense the product while not enabling air to enter the container interior. In practice hermetic pumps do not present venting passages. The result is that the container is put under vacuum at each dispensing operation. This causes the base to rise, with consequent reduction in the volume dedicated to housing the fluid to be dispensed, which gradually decreases after each dispensing operation.

[0005] A drawback of these types of devices is that when they have been filled with fluid for dispensing and then closed, air can remain in the container. This air can cause dispensing discontinuities.

[0006] A further drawback deriving from the presence of air in the container can be the possible incompatibility of air with the product contained in the device. A possible example is creams which can dry out or other products which can alter on contact with air.

[0007] To obviate this drawback it has been thought to close the container under vacuum. In other words, the container is filled with dispensable fluid and closed by a closure element with an inserted pump, within an environment entirely under vacuum. This creates considerable technical complications deriving from the need to form a region under vacuum, with its consequent problems of high costs and low manufacturing rates.

[0008] An object of the present invention is to simplify the operations related to the closure of movable base-type hermetic devices by making them less complex, less costly, and quicker.

[0009] This and other objects are attained by a device and method in accordance with the technical teachings of the accompanying claims.

[0010] Further characteristics and advantages of the invention will be apparent from the description of a preferred but non-exclusive embodiment of the device and method, illustrated by way of non-limiting example in the accompanying drawings, in which:

Figure 1 is a section through the device of the present invention in its utilization configuration;

Figure 2 is an enlarged section through a detail of the device of Figure 1 during a first step of its closure;

Figure 3 is an enlarged section through a detail of the device of Figure 1 during a second step of its closure; and

Figure 4 and Figure 5 show alternative embodiments of the compression element.

[0011] With reference to said figures, these show a dispensing device indicated by the reference numeral 1.

[0012] The device 1 comprises a container 2 presenting a movable base 3 sealedly slidable therewithin. An air passage 4 is present on the container base, enabling air to enter the region 5 below the base.

[0013] The device 1 also presents a ring cap 6 to which a manually operable hermetic pump is snap-connected. The hermetic pump is of conventional type and will not be further described. The pump is sealedly fixed to the ring cap 6 in totally conventional manner. The ring cap/pump unit forms a closure element for the container 2.

[0014] The container 2 is snap-inserted into a casing 8 to which it is also fixed by means of the ring cap 6. In particular, the ring cap 6 presents a recess 6A which snap-cooperates with an undercut on an annular tooth 8A provided on the casing 8. The container 2 has a conical surface 2A which abuts against a corner 8b of the casing 8. A flange 9A of a compression element 9 rests on the top of the container 2; when the container is closed the flange is compressed between a step 6C of the ring cap and the container itself, and hence remains locked.

[0015] A first cylindrical wall 9B extends from the flange 9A of the compression element 9 and is connected by a step 9C to a second cylindrical wall 9E which presents on its outer surface a projecting rim 10 acting as a seal element cooperating with the inner surface of the container 2.

[0016] A conical wall 11 extends from the second wall 9E to connect said wall via a deformable portion 12 to a discoidal portion 13 from which a frusto-conical surface 14 diverging towards the container interior extends.

[0017] In cross-section, the deformable portion has a smaller thickness than the rest of the compression element 9, which hence enables it to deform such as to preload the fluid inside the container. The compression element 9 presents a unidirectional valve element which enables the air present above the fluid to be expelled during container closure.

[0018] A description has just been given of an example of an embodiment of the deformable portion 12 which essentially has to deform to exert a pressure on the fluid inserted in the container, such as to facilitate expulsion of any air present therein.

[0019] Other embodiments of the deformable portion can be provided, which can take any form suitable for the purpose. Figures 4 and 5 show for example other embodiments of the compression element, which are indicated therein by the reference numerals 90, 91. In Figure 4 the deformable portion 120 is formed as an outward swelling of the wall, which is only slightly thinner than the rest of the element wall. This improves the yieldability of the deformable portion which, given its shape, tends to "yield" before the other portions.

[0020] In Figure 5 the illustrated compression element 91 comprises an outward swelling as in the previous em-

bodiment. However, in this case, at the swelling 121 a greater thinning of the wall can be noted, to the certain advantage of deformation.

[0021] As stated, three constructional examples of the deformable portion are shown, however others can be conceived; for example the deformable portion could be of bellows type, or a sufficiently elastic material could be chosen for making the compression element which would make the provision of a region dedicated to deformation superfluous. In that case, the overall elastic element would then deform at several points, to compress the fluid to the desired extent.

[0022] The valve element 15 can be formed in various ways obvious to the expert of the art, however in the present embodiment it is formed as an elastically deformable interface surface provided at the top of the frusto-conical portion, which is mounted about the cup-shaped body of the pump. In particular, the frusto-conical portion 14 is mounted about a portion of the cup-shaped body of greatest radius, i.e. about that region of the cup-shaped body within which the stem slides. This enables the seal between the compression element and pump to be formed along a major diameter, so best utilizing the elastic properties of the constituent material of the compression element. In particular and preferably, this latter is made by injection moulding a plastic material, such as PP, or PE, or thermoplastic filled with rubber, or elastomers.

[0023] Advantageously, the unit formed by the compression element and the pump bottom has a shape substantially complementary to that of the movable base, in order to be able to maximize the product quantity dispensed by reducing to a minimum the spaces between the base and the pump/compression element.

[0024] To complete the description of the invention, it should be noted that the compression element seals against the container 2, while a snap connection is provided between the casing 8 and the container by means of a tooth 2A which engages in an undercut provided in the casing 8. Air passages 16 are provided In that portion in which the snap connection takes place, to feed the region 5 present below the movable base.

[0025] The operation of the invention is substantially as follows:

The container 2 is filled with the fluid 20 to be dispensed. For example this product can be such that the presence of air can compromise its stability, such as creams, foundation cream, gels, etc.

The container 2 is then closed by applying to it the unit comprising the ring cap 6, pump and compression element 9. In particular, the compression element and pump partially sink into the fluid to cause its level to rise inside the container. As can be seen in Figure 2, in a first step the air present above the fluid (between the fluid and the compression element 9) is vented through a passage 21 formed between the wall 9E and the compression element 9. This passage remains open while the seal element 10 remains detached from the inner wall of the container 2.

[0026] As soon as the rim 10 seals against the container 2, the air present in the interspace 22 between the pump body and the compression element begins to undergo compression both by the lowering of the closure element and by the consequent raising of the fluid within the container. When a determined pressure has been reached inside the container, the surface of the elastically deformable interface of the compression element 9 deforms to open a passage 23 grazing the pump surface, enabling the residual air above the fluid to escape. The same result can be obtained by any valve element suitable for the purpose. When the device has terminated air venting and its closure position has been attained, the elastically deformable interspace elastically returns to seal against the cup-shaped body.

[0027] Advantageously the deformable portion, however formed, enables the fluid contained in the container interior to be slightly precompressed, so minimizing any air quantity trapped within it.

[0028] During the closure step it is certainly possible, on termination of air expulsion, for a small fluid quantity to also escape from the valve element 15. This ensures that air is no longer present inside the container 2. Any fluid which has escaped is deposited in the compartment 24 which is isolated from the outside. Consequently this does not create any type of problem, not even if the container is inverted.

[0029] A preferred embodiment has been described, however others can be conceived by utilizing the same innovative concept; for example the movable base container can be replaced by a container housing a deformable/collapsible bag.

Claims

1. A dispensing device for fluid substances, comprising a movable base container housing a fluid substance to be dispensed and, for hermetically closing said container, an element associated with a hermetic dispensing pump, **characterised by** comprising a compression element associated with said closure element and with said pump, to vent any residual air present in the container by sinking into the fluid at the moment of installing the closure element on said container.

2. A device as claimed in the preceding claim, **characterised in that** said compression element presents a seal element arranged to cooperate with said container, said residual air being vented via a passage present between said container and said element before said seal element seals against the container.

3. A device as claimed in claim 1, **characterised in that** said compression element presents a flange which when the container is closed is sandwiched between said container and said closure element.

4. A device as claimed in claim 1, **characterised in that** said compression element presents a unidirectional valve means enabling said residual air to vent.

5. A device as claimed in the preceding claim, **characterised in that** said valve means comprises an elastically deformable interface surface mounted about the cup-shaped body of said pump.

6. A device as claimed in the preceding claim, **characterised in that** said interface surface is the top of a portion of frusto-conical configuration diverging towards the container interior.

7. A device as claimed in claim 5, **characterised in that** said interface surface has a diameter such as to externally surround the cup-shaped body about a portion within which the piston slides.

8. A device as claimed in one or more of the preceding claims, **characterised in that** said compression element presents a yieldable portion able to elastically deform at the moment of installing the closure element on said container, in order to load the fluid present in said container.

9. A device as claimed in one or more of the preceding claims, **characterised in that** said compression element comprises a discoidal portion projecting from the frusto-conical portio, an annular portion connected to the flange, where said seal element is provided, said yieldable portion being provided between said discoidal portion and said annular portion.

10. A device as claimed in one or more of the preceding claims, **characterised in that** said compression element has a shape complementary to that of said movable base.

11. A device as claimed in one or more of the preceding claims, **characterised in that** said compression element is made of PP and/or PE and/or thermoplastic filled with rubber, and/or elastomers.

12. A method of venting air present in a movable base container equipped with a hermetic dispensing pump, comprising the step of plunging a compression element into said fluid during the closure of said container in such a manner as to enable the residual air to vent to the outside thereof.

13. A method as claimed in the preceding claim, **characterised in that** said air is vented in a first step through at least one passage provided between said compression element and said container.

14. A method as claimed in claim 12, **characterised in that** said air is vented in a second step through a unidirectional valve element, preferably a passage formed by the deformation of an interface between said compression element and said pump, said deformation being originated by the pressure of said air within the container.

15. A method as claimed in one or more of the preceding claims, **characterised in that** said first step and said second step take place in succession during the closure of said container.

16. A method as claimed in claim 12, **characterised by** precompressing said fluid by deforming an elastically yieldable portion of said closure element.

17. Dispersing device or method according to one or more of the preceding claims, wherein the movable base container is replaced with a container housing a collapsible bag.

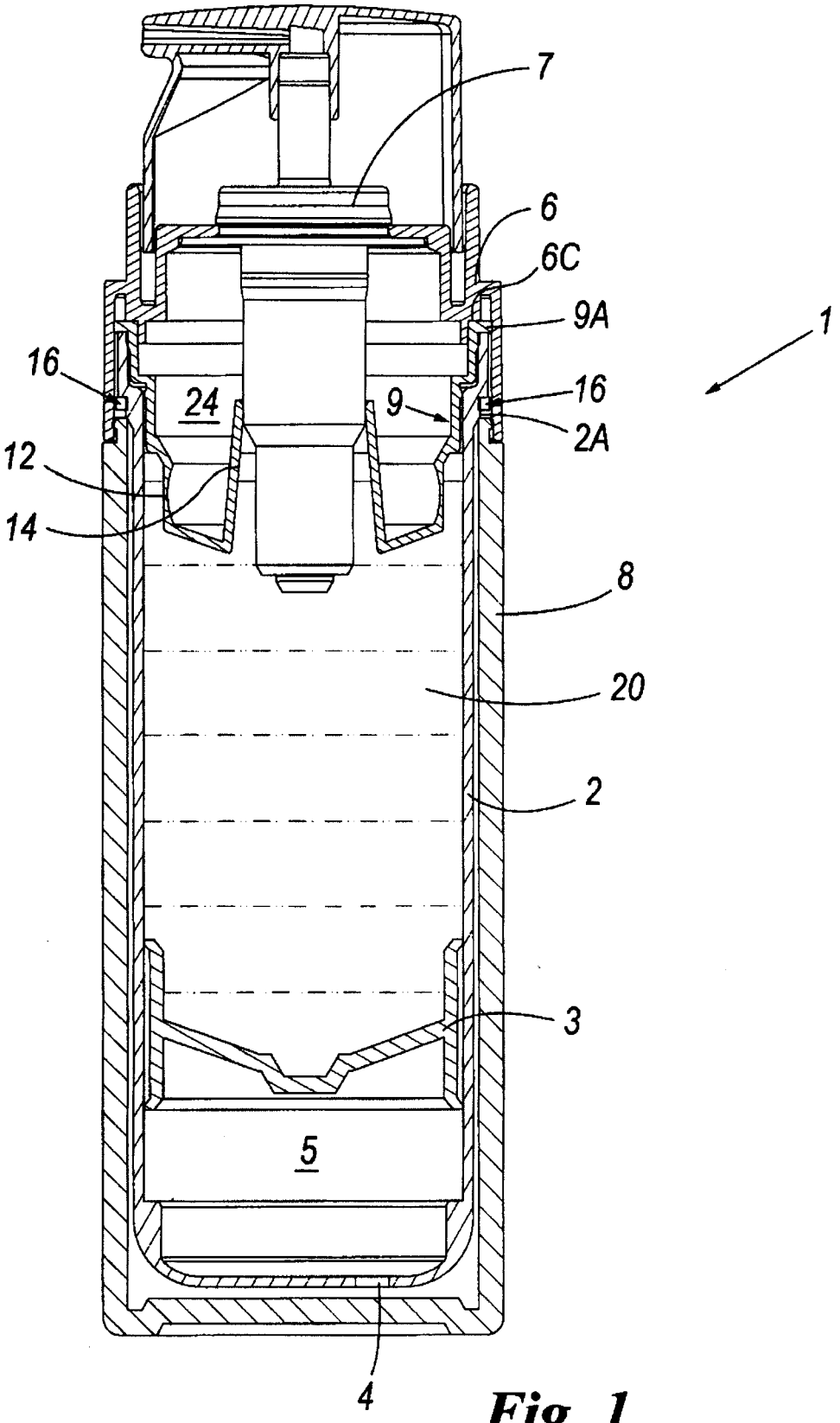

Fig. 1

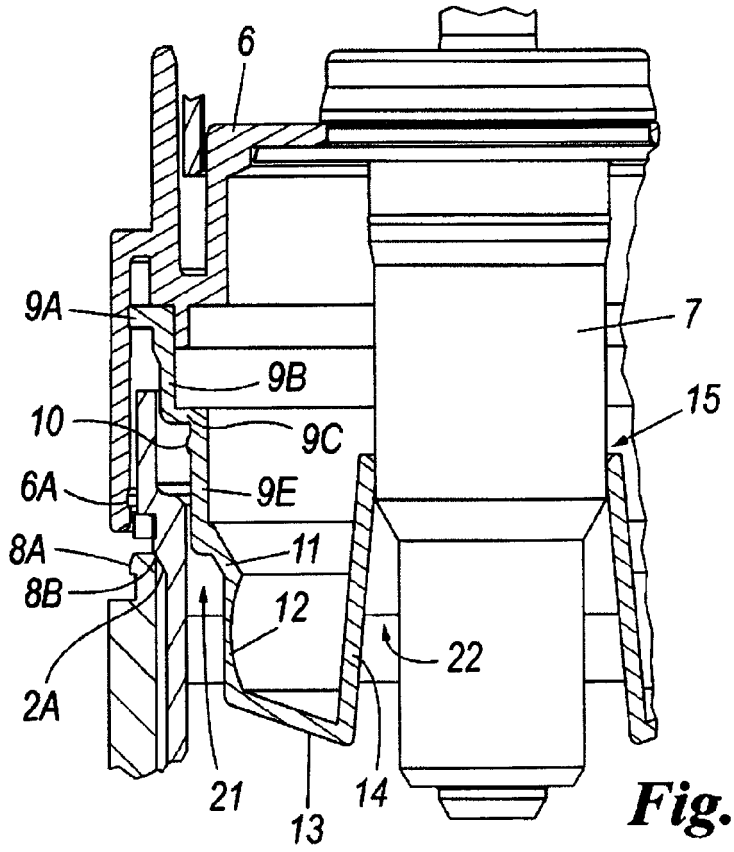

Fig. 2

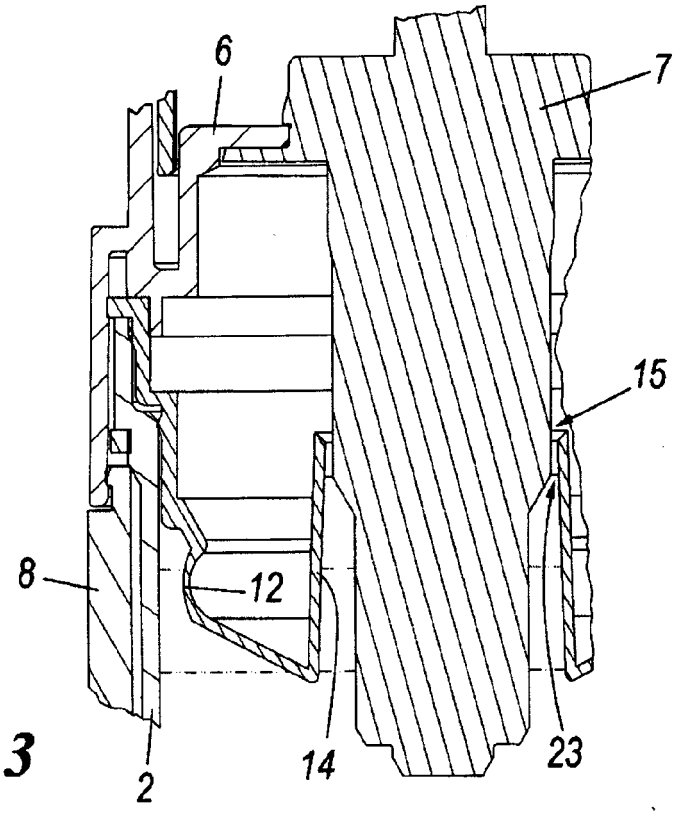

Fig. 3

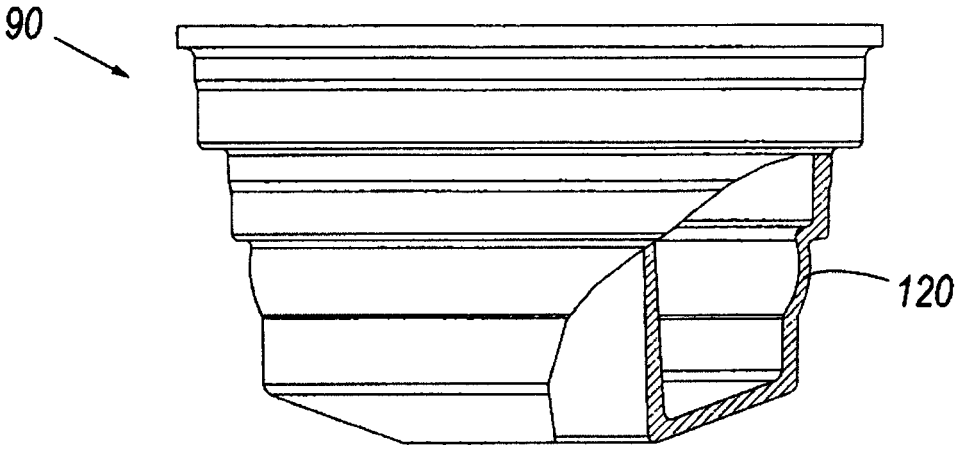

Fig. 4

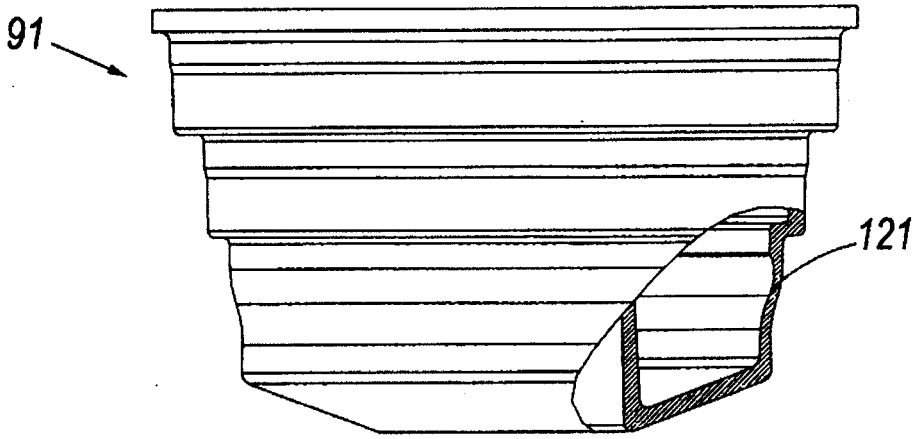

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 09 16 7093

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 November 2009	Endrizzi, Silvio

CATEGORY OF CITED DOCUMENTS

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