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Remarks:

A request for correction of the description has been filed pursuant to Rule 139 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

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(54) **DEVICE FOR INSERTING AND REMOVING STOPPERS FROM BOTTLES**

(57) Device for inserting and removing stoppers (14) from bottles based on a mechanical and pneumatic system which uses the mechanism of air compression and decompression in its inside. The device allows both to insert and to remove stoppers from bottles; it is also easily usable even only with one hand; it allows the operator to avoid contact with the stopper, with the bottle and with its contents; it is not bulky; it is lightweight; it speeds up the closing and opening of the bottle and its parts can be removed to facilitate and improve sterilization.

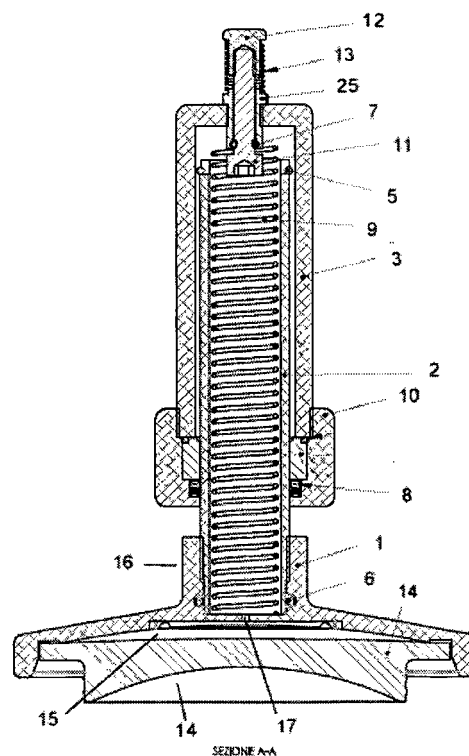


Fig.4

Description

[0001] Of the new industrial invention with the title: "Device for inserting and removing stoppers from bottles."

[0002] On behalf of the company: METALCO SRL, in the person of the pro tempore legal representative - Chairman - Mr. BARTOLOMEI PIER DOMENICO, born in PESCIA (PT) on 20/05/1934, C.F. BRTDPM34E20G491I, who lives in MONTECARLO (LU) VIA CONTEA 24/A, based in Via del Molino n. 44 55015 Montecarlo (LU), c.f./p.VAT /n. registration in the commercial register C.c.I.A.a. of Lucca 01704300464; Nationality: Italian; Inventor: Mr Carlo Brisighelli C. F.: BRSCRL54P05L483O born in Udine on 5th September, 1954, who lives in Barga (LU); Nationality: Italian.

[0003] Technical Field: the invention, object of this application, relates to the technical field of the systems for inserting in and/or removing stoppers from bottles of varying size and shape which must be hermetically sealed or have tight-fitting stoppers. In particular, it deals with bottles designed to contain medicines or bottles that must be kept sterile, and with stoppers made of rubber or semi-rigid material.

[0004] Background art: existing similar systems are mainly constituted by insertion and/or manual extraction, or by bulky and heavy devices which insert or remove stoppers only using both hands. Consequently, their use is unwieldy.

[0005] The existing problems are indicated as follows:

1) relating to the INSERTION of the stopper: in order to be tight-fitting and /or with a seal, the diameters, between the stopper made of rubber or of a similar material for use and flexibility, and the neck of the bottle, are the first longer than the second. Theoretically, being the stopper bigger than the opening of the bottle, the latter could not be inserted in its housing. Since the stopper is made of rubbery or similar material it may be slightly deformed and inserted in the mouth of the bottle. Normally, this operation is manually carried out through a considerable manual pressure of the stopper inside the bottle, which, to be fully accomplished, takes at least ten seconds. This operation can be of little significance for small containers, but it can become a problem for the bigger ones;

2) relating to the REMOVAL of the stopper: this operation too is nowadays carried out manually in sterile environments. In this case the operator wears one or sometimes double or triple layer of gloves. The manual extraction of the stopper has the following risks: A) considering the number of worn gloves, the operator has no sensation in his fingers and so he cannot or it takes him a lot of time to remove the stopper from the bottle; B) during the manual extraction the worn gloves can be damaged by the scrubbing of the gloves themselves on the metallic curl necessary for the capping of the bottle and the hands

too can come into contact with the contents of the bottle thus dirtying and/or getting contaminated and/or vice versa hands can contaminate the contents of the bottle;

3) there are devices that allow both the insertion and extraction of the stopper in the bottle, which are heavy, bulky, and the use of which is not very easy. Such devices, indeed, push the stopper into the bottle neck mechanically and make use of levers to operate simultaneously with the use of both hands.

Technical problem to be solved:

[0006] The invention of the present application aims at providing a device for inserting and removing stoppers from bottles which is easily usable even with only one hand, which prevents the operator's contact with the cap, with the bottle and its contents. Moreover, this device is not bulky, it is lightweight, it speeds up the operation of closing and opening of the bottle and its parts can be removed to facilitate and improve the sterilization.

[0007] The present invention is meant to solve the above problems thanks to the prerogatives of the invention itself, as more clearly described and represented below, albeit in a non-limiting example.

Disclosure of the invention:

[0008] the solution to the above problems has been identified in the device of the present application for inserting and removing stoppers from bottles. What said above, indeed can be accomplished with a mechanical and a pneumatic system thanks to the fact that the device uses the mechanism of compression and decompression of the air in its interior up to its final part. This is obtained thanks to springs, holes and rings suitably positioned, with the presence of an outer sleeve and an inner stem and thanks to the particular concave shape of the part which is in contact with the stopper which must be put or removed from the bottle. The main and consequent advantages of the present invention are the following: a) it allows both to insert and to remove stoppers from bottles; b) it is easily usable even with one hand; c) it allows the operator to avoid contact with the stopper, with the bottle and its contents; d) it is not bulky; e) it is lightweight; f) it speeds up the operation of closing and opening of the bottle g) its parts can be removed to facilitate and improve the sterilization.

Brief description of the drawings:

[0009] the figures in the Tables n. I and n. II attached represent two embodiments of the invention respectively: Fig. 1 the front exploded view of the device which shows its different components; Fig. 2 the front perspective view of the closed device; Fig. 3 the external sectional front view of the closed device; Fig. 4 the internal sectional front view of the invention closed.

Best way for carrying out the invention:

[0010] below you can find the description, albeit in a non-limiting example, of at least two embodiments for implementing the invention with reference to the drawings of the accompanying tables.

[0011] Description Tav. I. To insert and remove the stopper of the bottle through the device of the present application, the operator follows the steps that are described below together with the components of the device and their functions.

(A) The operator holds the device open, through the outer sleeve (3). **(B)** He puts the device on the stopper (14), so that the end plate (1) overlaps the top of the cap (14). The end plate (1) is equipped with a neck (16), dimensioned and internally threaded in a suitable manner to accommodate and anchor the internal stem (2) and the spring (9), which internally passes through the stem itself (2). An o-ring (6) is inserted into a specific housing of the neck (16) of the end plate (1), on a level with the base of the internal stem (2). A retaining ring (5) is positioned in a special housing of the top of the internal stem (2). **(C)** The operator presses down to the stop. The outer sleeve (3) pushes the spring (9), which is compressed. The outer sleeve (3) ends with a support ring (10), which is designed to contain the scraper ring (8) and the internal guide (4). The stem (2) passes inside it. The scraper ring or seal (8) is made of rubber or equivalent material according to the purpose for which it is used. The internal guide (4) is a bushing, but can also be made of PTFE, or other equivalent material for the purpose for which is intended. The support ring (10) ends its path when reaching the neck (16) of the end plate (1). The air comes out. At this point the device has expelled all the contained air, except from a small quantity of residual air at one point in particular, between the outer surface of the stopper (14) and the concavity (15) of the end plate. **(D)** The operator releases the hand from the outer sleeve (3) and then stops the force exerted on the spring (9) which is decompressed creating a sufficient level of depression within the internal stem (2). The end plate (1) is provided with a suitable opening (hole or groove or cavity) (17), adapted to the air passage between the top of the stopper (14) and the concave bottom part (15) of the end plate (1) and the inside of the device. **(E)** Consequently, the small quantity of residual air between the outer surface of the stopper (14) and the concavity (15) of the end plate (1) is sucked into the internal stem (2) through the opening (17) and this creates a suction effect thanks to which the stopper (14), which as mentioned is of rubber or similar material for use and flexibility, adheres to the end plate (1). In this way, the diameter of the stopper (14) is reduced and becomes less than or equal to the di-

ameter of the neck of the bottle. **(F)** The stopper (14), which is completely sucked into the concavity (15) of the end plate (1), is integrally combined with the device and then can be moved at will by the operator and placed for example on the inlet mouth of the bottle where it can be inserted without applying any pressure. **(G)** Once on the mouth of the bottle, the operator presses the vent valve or button (12), which is located on the outer sleeve (3), compressing the spring (13) which surrounds it. The button (12) internally houses an o-ring (7) and an Allen screw (11), through which it is joined to the outer sleeve (3). There is a processed hexagonal bar (25) which acts as a guide to the screw (11). The spring (13) has a suitable diameter to surround the button (12) but smaller than its knob (18) so that it cannot slide out, even when it decompresses and puts the button (12) back to its position. When the operator presses the vent valve (12), the hole in the outer sleeve opens (3) and so, the previously created depression disappears since the inside of the device and the external environment are placed in communication. Consequently, the stopper (14) is left free from the end plate (1) and goes back to its normal diameter. At this point the container is closed hermetically and the device can be moved. All the aforesaid steps take place by holding the device with one hand.

[0012] Description Tav. II. To insert and remove the cap from the bottle through another embodiment of the invention object of the present application, the operator follows the steps that are described below together with the components of the device and their functions.

(A) The operator holds the device, in this case closed, through the outer sleeve (3), which in this case is constituted by the neck of the end plate (1), where the neck is suitably dimensioned also to the use of the outer sleeve (3). Basically, to close the device, the knob (24) and, consequently, the flange (20) have been pushed towards the neck of the end plate (1), that is, up to the stop, and thus the stem (2) and the spring (9) contained in it have been slid in the outer sleeve (3). The support ring (10) is here replaced by the flange (20), which houses the scraper ring (8) and the internal guide (4). The scraper ring (8) and the guide (4) are of the same material indicated in the description of the device's embodiment as referred to Figs. of the Table I. The flange (20), furthermore, is dimensioned and internally threaded in a suitable manner to accommodate and anchor the inner stem (2) and to house the spring (9). In this case the device remains closed due to the fact that the lever (19), positioned on the upper part of the stem (2), through a flange (20) and a screw (21), is stuck in the special groove (22) of a knob (24). The lever (19) remains in tension thanks to a spring (23) placed between it and the flange (20).

(B) The device is placed on the stopper (14) so that the end plate (1) overlaps the top of the stopper itself (14). The neck of the end plate (1), which has the function of outer sleeve (3), also in this case is dimensioned and internally threaded in a suitable manner to accommodate the inner stem (2) and to house and anchor the spring (9), which passes internally into the stem (2) itself. The stem (2) however, is upside down in comparison to the previously described embodiment of the invention in Tab. I and, so, the o-ring (6) is inserted into a special housing of the flange (20), up to the height of the top of the inner stem (2), while the retaining ring (5) is positioned in a special housing of the base of the internal stem (2). (C) In this type of description, the device is already closed, so the spring (9) is already compressed and the air has already come out except from that small quantity necessarily located between the outer surface of the stopper (14) and the concavity (15) of the end plate, but it could be closed once it is positioned on the stopper (14) with a similar result. (D) At this point, to stop the force exerted on the spring (9) and to ensure that this spring (9) decompresses extending upwards and, consequently, creating a sufficient level of vacuum inside of the stem (2), the operator presses the lever (19) towards the sleeve or neck (3), then releasing it from the groove (22) of the knob (24). (E) Consequently, also in this description of the invention, the small quantity of air that was left over between the outer surface of the stopper (14) and the concavity (15) of the end plate (1) is sucked into the inner stem (2) through the opening (17) and this creates a suction effect for which the stopper (14), which as mentioned it is of rubber or similar material for use and flexibility, adheres to the end plate (1). In this way, the diameter of the stopper (14) is reduced and becomes less than or equal to the diameter of the neck of the bottle. (F) The stopper (14) is completely sucked into the concavity (15) of the end plate (1), it is integrally joined with the device, and then can be moved at will by the operator and placed, for example, on the inlet mouth of the bottle, where it can be inserted without applying pressure. (G) Once in the mouth of the bottle, the operator presses the knob (24) downwards, until it stops and then locks the lever (19) in the groove (22) of the knob (24). In doing so, the internal spring (9) compresses and leads the internal stem (2) towards the end plate. The air enters between the concavity (15) of the end plate and the stopper (14) and, consequently, the stopper (14) is left free from the end plate (1) and goes back to its normal diameter. So, at this point the container is closed hermetically. The device at this point can be moved. All the aforesaid steps take place by holding the device with one hand.

[0013] The description above with the accompanying drawings, is only a non-limiting example. Of course, also

what is not directly described or illustrated above, if it falls within the general scope of the present invention itself, is object of the present application.

Claims

1. Device for inserting and removing stoppers from bottles, **characterised in that:**

a) it allows both to insert and to remove stoppers from bottles; b) it is easily usable with one hand; c) it allows the operator to avoid contact with the cap, with the bottle and its contents; d) is not bulky; e) it is lightweight; f) it speeds up the operation of closing and opening of the bottle; g) its parts can be removed to facilitate and improve sterilization. This occurs thanks to the mechanic and pneumatic system which uses the mechanism of air compression and decompression internally up to its bottom part and it consists of the following components: - an outer sleeve (3) which ends with a support ring (10) suitably dimensioned so that a stem can slide internally (2); - an end plate (1), which is concave (15) at its base towards the outside, equipped with a suitable opening (17) adapted to the air passage between the outside and the inside of the device. Wherein the concavity (15) of the end plate (1) and the diameter of the end plate are dimensioned in a suitable way to hold and maintain adhesion to the stopper that will be positioned on the bottle, allowing the stopper itself to reduce suitably its diameter temporarily. Wherein the end plate (1) is equipped with a neck (16) that is dimensioned and internally threaded in a suitable manner to house and anchor the stem (2); an o-ring (6) inserted in a special housing of the neck (16) of the end plate (1); - a rubber scraper ring (8) and an internal guide (4) in PTFE in the specially provided housings of the support ring (10); - a retaining ring (5) positioned in a special housing of the top of the stem (2); a spring (9) which passes internally into the stem (2). Wherein the spring (9) is housed inside the neck (16) of the end plate (1) and inside the outer sleeve (3) and is suitably dimensioned so as to keep the device open when decompressed and to allow the device to reach the stop, and to close when compressed; - a vent valve (12) which is joined to the outer sleeve (3) by means of an Allen screw (11), contained in it together with an o-ring (7). Wherein the vent valve has the function to open and close the hole in the outer sleeve (3), to allow or prevent the contact between the external and internal environment of the device and keep it closed under pressure and vacuum-sealed. There is a processed hex-

agonal bar (25) which acts as a guide to the screw (11); - a spring (13) of suitable diameter to surround the vent valve (12) and smaller than the knob (18) of the valve itself and of a suitable size to bring the valve into position when decompressing. 5

2. Device for inserting and removing stoppers from bottles, as claimed in claim 1), **characterised in that** in this case: - the neck of the end plate (1) is suitably dimensioned to serve as an outer sleeve (3) and then to ensure that the stem (2) can slide inside; - the support ring (10) is replaced by a flange (20), which is not integrally joined to the sleeve (3), but is dimensioned and internally threaded in a suitable manner to accommodate and anchor the top of the stem (2) and has housings designed to contain the scraper ring (8), the inner guide (4) and the o-ring (6) which in this case is then positioned at the top of the internal stem (2); - the spring (9) that passes internally into the stem (2) in this case is housed within the neck of the end plate (1) which in this case constitutes the outer sleeve (3) and is housed within the flange (20); - there is neither vent valve (12) nor the Allen screw (11) nor the corresponding o-ring (7) nor the relative spring (13) nor the related knob (18); - there is a lever (19), joined to the flange (20) by means of a screw (21), which locks and unlocks in the groove (22) of a knob (24) that overhangs and is integrally joined to the flange (20) itself. Wherein the lever (19) remains in tension thanks to a spring (23) placed between it and the flange. 10 15 20 25 30
3. Device for inserting and removing stoppers from bottles, as claimed in claim 1) or 2) **characterised in that** it can be embodied both in the shapes, in the manners and with the materials indicated by way of example in the description and in the accompanying drawings, and with different shapes, manners and/or materials, provided that the scope of the invention is respected. 35 40

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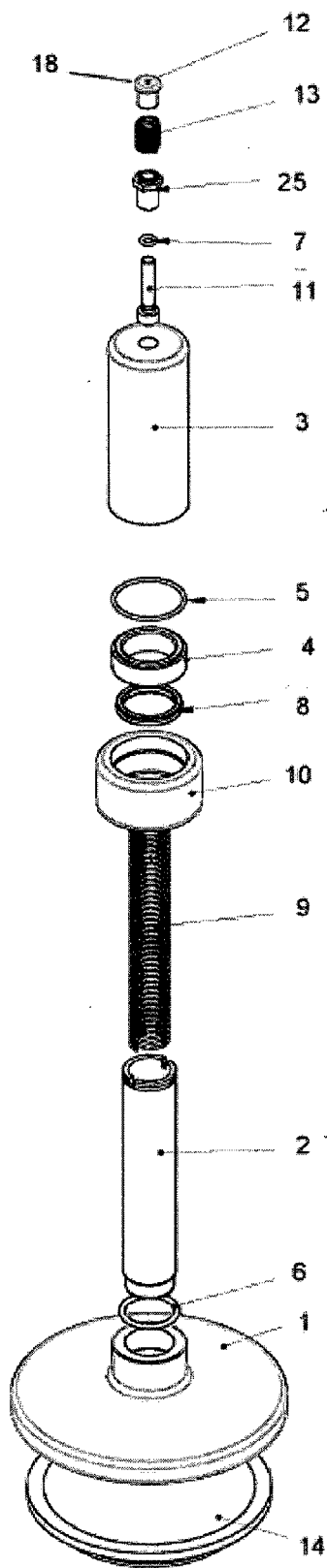


Fig.1

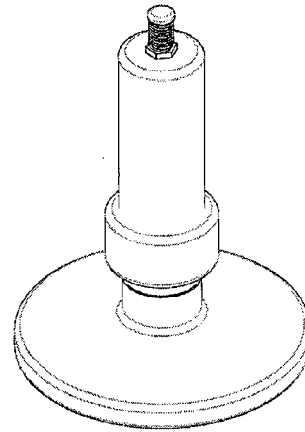


Fig.2

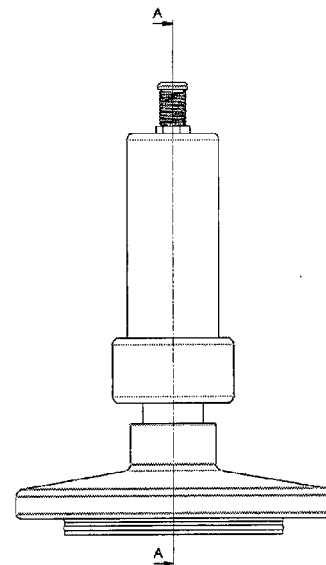


Fig.3

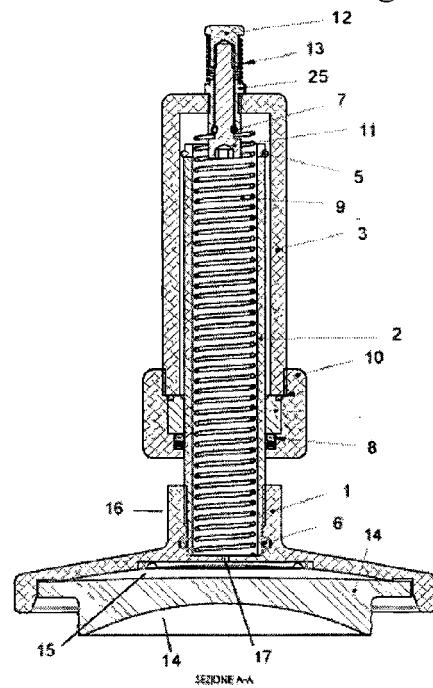


Fig.4

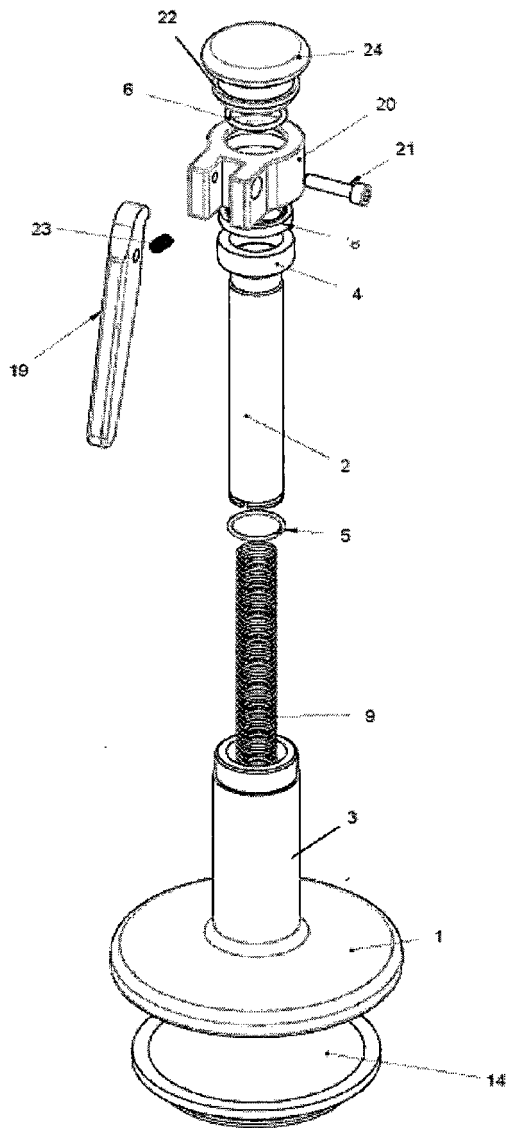


Fig. 5

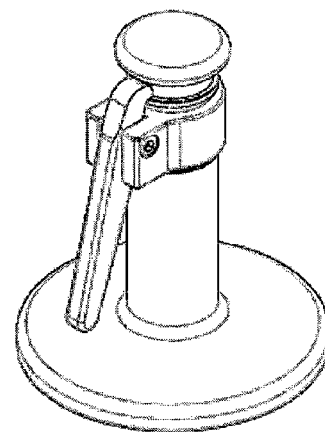


Fig. 6

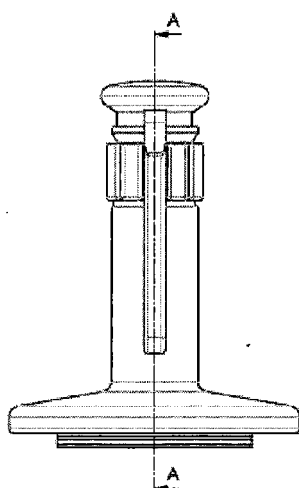


Fig. 7

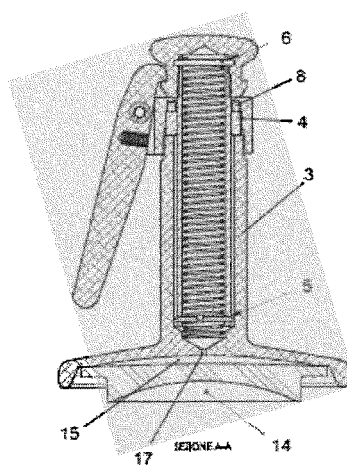


Fig. 8



EUROPEAN SEARCH REPORT

Application Number
EP 15 42 5029

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EPO FORM 1503 03.82 (P04C01)

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X	DE 20 2011 003359 U1 (POLLMUELLER FRITHJOF [DE]) 5 May 2011 (2011-05-05) * paragraph [0007]; figure 1 *	1,2	
			TECHNICAL FIELDS SEARCHED (IPC)
			B67B B65B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 September 2015	Examiner Luepke, Erik
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