



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.07.2014 Bulletin 2014/30

(51) Int Cl.:
B65D 85/816 (2006.01)

(21) Application number: **14150408.4**

(22) Date of filing: **08.01.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
 Designated Extension States:
BA ME

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(30) Priority: **17.01.2013 CH 1952013**

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(54) **Capsule part for a coffee capsule**

(57) Coffee capsule (2) containing a capsule part (1). The capsule part (1) is a frustoconical plastics part with a conical side wall (4), and has a top part (5) integrally formed on the small frustoconical diameter and an outwardly protruding peripheral flange (3) integrally formed on the large frustoconical diameter. The peripheral flange (3) has a surface (8) on the top part side as well as an outlet clamping surface (9) opposing the surface on the

top part side and a peripheral external thickened portion (10). A tearable membrane (12) is welded onto the outlet clamping surface (9). A radially extending bellows (13) between the welding surface (11) and the peripheral external thickened portion (10) can be plastically and/or elastically deformed, having a sealing effect with radial and axial tolerance compensation for a brewing chamber-closing device of the espresso machine.

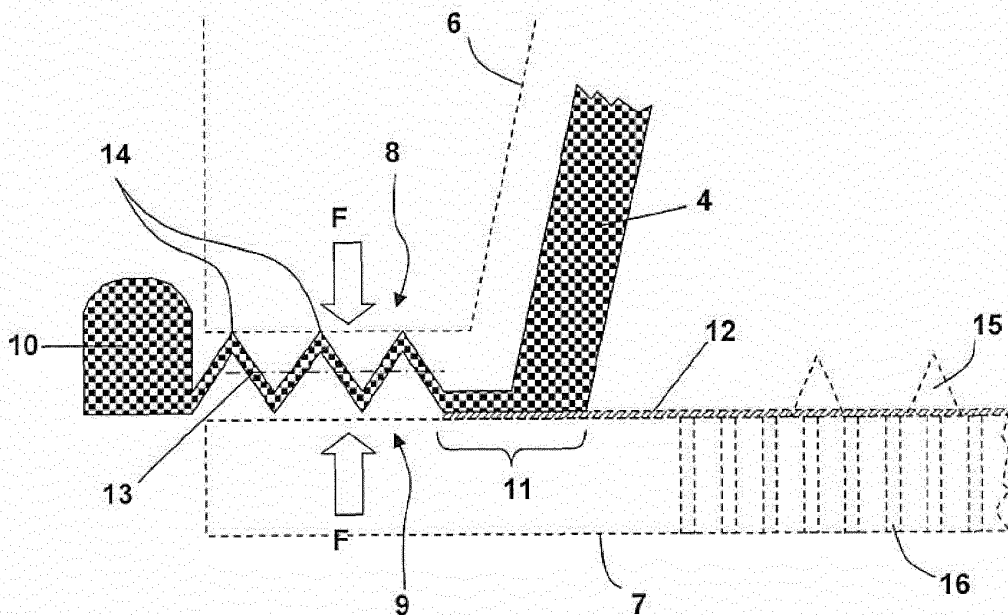


Fig. 2

Description

[0001] The present invention relates to a capsule part for a coffee capsule consisting of the capsule part and a membrane attached thereto according to Claim 1, the coffee capsule being configured to receive roasted and ground coffee and being suitable for preparing an espresso beverage using pressurised hot water in an espresso machine. The invention further relates to a coffee capsule according to Claim 6 comprising a capsule part according to the invention.

[0002] Coffee capsules of this type are known in principle, in particular from the portion packs for coffee preparation from Nestlé SA for espresso machines. The capsules thereof, as well as compatible products, in principle contain a capsule part which is a substantially frustoconical metal or plastics part, with a conical side wall, a top part integrally formed on the small frustoconical diameter and an outwardly protruding peripheral flange integrally formed on the large frustoconical diameter. The peripheral flange thus has a surface on the top part side and an outlet clamping surface opposing the surface on the top part side. Additionally, the peripheral flange has a peripheral external thickened portion as a centring aid and a peripheral welding surface on the outlet clamping surface, onto which a tearable membrane is able to be welded.

[0003] During operation, in other words during the preparation of a coffee beverage in the espresso machine, the coffee capsule is located in a so-called brewing chamber which is also of frustoconical shape and which is kept shut by a counterpressure plate. The counterpressure plate is provided with puncture teeth or perforation teeth in order to puncture the tearable membrane of the coffee capsule under the action of the pressure built up in the capsule after closing the brewing chamber and thereby to permit the brewed coffee beverage to flow out. Additionally, the counterpressure plate also has outlet openings through which the coffee beverage is able to enter a beverage dispensing channel. In the brewing state, the peripheral flange of the coffee capsule is clamped and centred between the brewing chamber and the counterpressure plate. Naturally, the result of this design is that the seal at the clamping point between the brewing chamber, the peripheral flange of the coffee capsule and the counterpressure plate has to be ensured during operation, as otherwise undesired leakages or bypass flows occur at this point. An at least partial seal may naturally already be achieved by a sufficiently high clamping pressure between the brewing chamber and the counterpressure plate. In principle, however, various other measures may be provided to achieve the desired seal, either on the coffee capsule or on the espresso machine itself.

[0004] The sealing means on the espresso machine may, for example, consist in the pressure chamber and/or the counterpressure plate being able to be provided with sealing rings or similarly acting means. A drawback with

these solutions is that they wear relatively rapidly or become untight due to soiling.

[0005] For this reason, although sealing means are preferably used on the coffee capsules themselves, they have the drawback that they increase the cost of producing the capsules. The known and currently marketed Nespresso coffee capsules made of aluminium from Nestlé, however, have no additional and/or separately and locally applied sealing elements in the projection region of the flange. A sufficient seal in this case is produced by other means about which no further details will be provided here as the solution has practically no common features with the present invention (in any case, the capsule according to the invention is a capsule made substantially from plastics material and is not a capsule made of aluminium).

[0006] In the area of sealing means which are suitable for the capsule, however, appropriate solutions have been proposed. Thus, for example, EP-1 654 966 reveals a solution in which, for example, rubber-elastic seals are attached to the surface of the flange on the top part side in order to achieve the desired seal at least in this partial region. As already mentioned, the capsules thus produced naturally become more expensive as additional materials and operations are required during production.

[0007] However, it has been clearly shown that the problem of the seal in the capsule region is becoming increasingly significant. On the one hand, this is because Nespresso-compatible coffee capsules are increasingly used where the capsules and the brewing chamber do not coincide exactly in size or in shape. This means that undesired bypass paths might occur and that, due to the pressure difference which is to be expected in principle between the capsule inlet and capsule outlet, said bypass paths have the effect of increasing the problem. As Nespresso-compatible coffee capsules are also increasingly made of plastics material, naturally also the problem of the dimensional stability of the capsules themselves is intensified, as said capsules are still able to be deformed further when welding-on or attaching the membrane, for example. Added to this are the production tolerances of the brewing chamber closing device which are in any case present and the appearance of wear and soiling in the sealing region, i.e. between the brewing chamber and the counterpressure plate closing the brewing chamber. All these tolerances have to be taken up by a suitable design of the coffee capsule and namely such that, even with different types of design of the frustoconical part of the capsule part, a seal which is as efficient as possible is achieved in the problem area described.

[0008] It is, therefore, the object of the invention to provide a novel design for a capsule part of a coffee capsule which has the greatest possible sealing effect, with radial and axial tolerance compensation for a brewing chamber-closing device of an espresso machine.

[0009] This object is achieved by the combination of features of Claim 1.

[0010] With a generic coffee capsule and/or a capsule part which the coffee capsule contains, the solution is that a radially extending bellows is present between the welding surface thereof which is arranged on the inside and the peripheral external thickened portion, said bellows being able to be plastically and/or elastically deformed and having a sealing effect with radial and axial tolerance compensation for a brewing chamber-closing device of the espresso machine.

[0011] Naturally, the main advantages of such a design are that a sealing means which is suitable for a capsule is provided, said sealing means not requiring additional and/or separate and locally applied sealing elements in the projection region of the flange and, due to its capacity for high radial and axial tolerance compensation, being suitable for a plurality of different capsule designs made of plastics material. Naturally, a cost advantage is thus also achieved due to the simple production.

[0012] A radially extending bellows has an improved capacity for radial and axial tolerance compensation relative to the sealing action as namely a number of multiple sealing points may be formed on the sealing edges, said multiple sealing points being repeated concentrically and thus increasing in their effect and dealing much more effectively with the local conditions between the brewing chamber and the counterpressure plate than the previous usual flange designs which have much less clearance for plastic and/or elastic deformability.

[0013] The radially extending bellows itself may naturally also be designed differently according to requirements. Thus it may have a different number of sealing edges and the sealing edges in turn may be produced from cross sections of, for example, zig-zag shaped or wave-shaped design or even a design consisting of a mixture of shapes.

[0014] Moreover, the bellows may be arranged relative to the welding surface with different axial offsets. By combining and varying these means, the compatibility and sealability of the coffee capsule may be further improved according to requirements.

[0015] A preferred exemplary embodiment of the invention is described in more detail hereinafter with reference to the drawings, in which:

Fig. 1 shows a side view of a capsule part with a flange according to the invention,

Fig. 2 shows a partial section in the flange region of a capsule part according to Fig. 1 in an arrangement between a brewing chamber and a counterpressure plate, and

Fig. 3 shows an alternative offset arrangement of the bellows relative to the welding surface.

[0016] Fig. 1 shows a side view of a capsule part 1 according to the invention of a coffee capsule 2 with a flange 3. The capsule part 1 in this case is a substantially

frustoconical plastics part with a conical side wall 4. The capsule part 1 has a top part 5 integrally formed on the small frustoconical diameter, whilst the outwardly protruding and peripheral flange 3 is integrally formed on the large frustoconical diameter. The partial region A marked with a circle is shown in more detail in Figure 2. The complete coffee capsule 2 consists of the capsule part 1 and the membrane 12 attached thereto.

[0017] Fig. 2 shows a partial section in the flange region of a capsule part 1 according to Fig. 1. The partial region A marked in Fig. 1 is shown. The view shows the arrangement of the coffee capsule 2 between a brewing chamber 6 and a counterpressure plate 7 during a brewing process in an espresso machine. A brewing chamber closing device (not shown) of the espresso machine ensures that the brewing chamber 6 and the counterpressure plate 7 during the brewing process are mutually pressed together by compressive forces F.

[0018] It is visible here that the peripheral flange 3 has a surface 8 on the top part side and an outlet clamping surface 9 opposing the surface 8 on the top part side. Moreover, the peripheral flange 3 has a peripheral external thickened portion 10 which serves for centring the coffee capsule 2. Additionally, the outlet clamping surface 9 has an internally arranged peripheral welding surface 11 onto which a tearable membrane 12 is able to be welded.

[0019] In order to ensure correct welding of the membrane 12, even with slight deformations of the capsule part 1, it is provided that the width of the welding surface 11 is intended to be at least double the size of the wall thickness of the conical side walls 4 of the capsule part 1.

[0020] A radially extending bellows 13 is present between the welding surface 11 and the peripheral external thickened portion 10, said bellows being able to be plastically and/or elastically deformed and having a sealing effect with radial and axial tolerance compensation for the brewing chamber-closing device of the espresso machine.

[0021] In the present exemplary embodiment, the radially extending bellows 13 has a zig-zag shaped cross section. Other cross sections extending in principle in a wave-shaped manner or even a mixture of shapes of different types of cross section are naturally also possible (for example combinations of zig-zag shaped and wave-shaped paths).

[0022] It is also visible from Fig. 2 that the bellows 13 has so-called sealing edges 14. During a brewing process, said sealing edges 14 form the contact points of the surface 8 on the top side and the outlet clamping surface 9 of the flange 3 relative to the brewing chamber 6 and relative to the counterpressure plate 7 and thus they act as multiple sealing points. In the present exemplary embodiment, therefore, at least two alternately opposing sealing edges 14 extending concentrically are obtained.

[0023] It has been mentioned that the bellows 13, for example, may also have a wave-shaped cross section. Although in wave-shaped cross sections it is not possible

to speak of actual edges, the contact points at the minimum and maximum points of these shapes naturally also have the effect of multiple sealing points and thus are also denoted the same, i.e. also as sealing edges.

[0024] Finally, for the sake of completeness, it should also be mentioned that the counterpressure plate 7 is provided with puncture teeth or perforation teeth 15. Under the pressure of the water flowing into the capsule 2, the tearable membrane 12 of the coffee capsule is deformed and is pressed onto the counterpressure plate 7. At the same time, it is punctured by the perforation teeth 15 and thus it is possible for the brewed coffee beverage to flow out. To this end, the counterpressure plate 7 also has outlet openings 16 through which the coffee beverage is able to enter a beverage dispensing channel (not shown).

[0025] Fig. 3 finally shows a further alternative offset arrangement of the bellows 13 relative to the welding surface 11. For example, if the relative position of an imaginary centre line 17 of the wave-shaped cross section of the bellows 13 is viewed in comparison with the position of the welding surface 11, it is visible from Figures 2 and 3 that in this case the bellows 13 has a different axial offset relative to the welding surface 11. In the solution according to Fig. 2, the imaginary centre line 17 of the bellows 13 is located in a plane above the plane in which the welding surface 11 is located whilst in Fig. 3 the imaginary centre line and/or centre plane is located in the plane of the welding surface 11.

[0026] The person skilled in the art will recognise without difficulty that parameters are available in the disclosed embodiments, i.e. in the design of the bellows cross section and in the choice of offset, and by varying said parameters the best possible seal may be achieved in the problem area described.

[0027] It may also be easily seen that, compared to the usual capsule designs, a radially extending bellows designed according to the invention and which is able to be plastically and/or elastically deformed has a markedly improved capacity for high radial and axial tolerance compensation for a plurality of different capsule designs, as the formation of multiple sealing points which has been described above will prove effective even if the bearing surfaces and/or contact surfaces on the brewing chamber and on the counterpressure plate already have stuck-on deposits.

List of reference numerals:

[0028]

- | | |
|---|-----------------------|
| 1 | Capsule part |
| 2 | Coffee capsule |
| 3 | Flange |
| 4 | Conical side wall |
| 5 | Top part |
| 6 | Brewing chamber |
| 7 | Counterpressure plate |

- | | |
|-------|--------------------------------------|
| 8 | Surface (of flange) on top part side |
| 9 | Outlet clamping surface (of flange) |
| 10 | Thickened portion |
| 11 | Welding surface |
| 5 12 | Membrane |
| 13 | Bellows |
| 14 | Sealing edge |
| 15 | Puncture teeth |
| 16 | Outlet openings |
| 10 17 | Centre line |
| F | Compressive force |
| A | Partial region |

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Claims

1. Capsule part (1) for a coffee capsule (2) consisting of the capsule part and a membrane (12) attached thereto, the coffee capsule being configured to receive roasted and ground coffee and being suitable for preparing an espresso beverage using pressurised hot water in an espresso machine,

25 - the capsule part (1) being a frustoconical plastics part with a conical side wall (4), which has a top part (5) integrally formed on the small frustoconical diameter and an outwardly protruding peripheral flange (3) integrally formed on the large frustoconical diameter,

30 - the peripheral flange (3) having a surface (8) on the top part side and an outlet clamping surface (9) opposing the surface on the top part side and a peripheral external thickened portion (10), and

35 - the outlet clamping surface (9) having a peripheral welding surface (11) onto which the tearable membrane (12) is able to be welded, **characterised in that**

40 a radially extending bellows (13) is present between the welding surface (11) which is arranged on the inside and the peripheral external thickened portion (10), said bellows being able to be plastically and/or elastically deformed and having a sealing effect with radial and axial tolerance compensation for a brewing chamber-closing device of the espresso machine.

45 2. Capsule part according to Claim 1, **characterised in that** the bellows (13) has a zig-zag shaped cross section, a wave-shaped cross section or a cross section formed from a mixture of shapes.

50 3. Capsule part according to Claim 1 or 2, **characterised in that** the bellows (13) on the surface (8) on the top part side and on the outlet clamping surface (9) has in each case at least two concentric sealing edges (14) alternately opposing one another, which

form multiple sealing points.

4. Capsule part according to one of Claims 1 to 3, **characterised in that** the bellows (13) is arranged axially offset relative to the welding surface (11). 5
5. Capsule part according to one of Claims 1 to 4, **characterised in that** the width of the welding surface (11) is at least double the size of the wall thickness of the capsule part (1). 10
6. Coffee capsule (2) for preparing an espresso beverage using pressurised hot water in an espresso machine with a capsule part (1) according to Claim 1, a filling consisting of roasted and ground coffee and a tearable membrane (12) closing the coffee capsule (2) and applied to the welding surface (11). 15
7. Coffee capsule (2) according to Claim 6, **characterised in that** the frustoconical capsule part (1) and the membrane (12) have aroma-preserving properties. 20
8. Coffee capsule (2) according to Claim 7, **characterised in that** a coating with aroma-preserving properties is present. 25
9. Coffee capsule (2) according to Claim 8, **characterised in that** the coating is sprayed onto the inside or outside. 30

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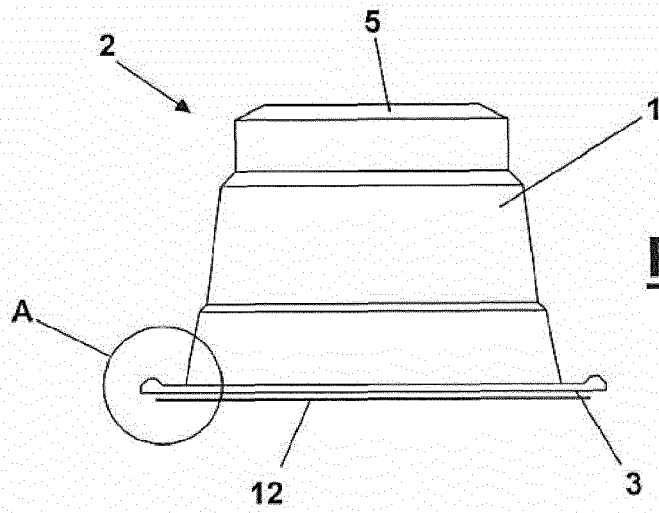


Fig. 1

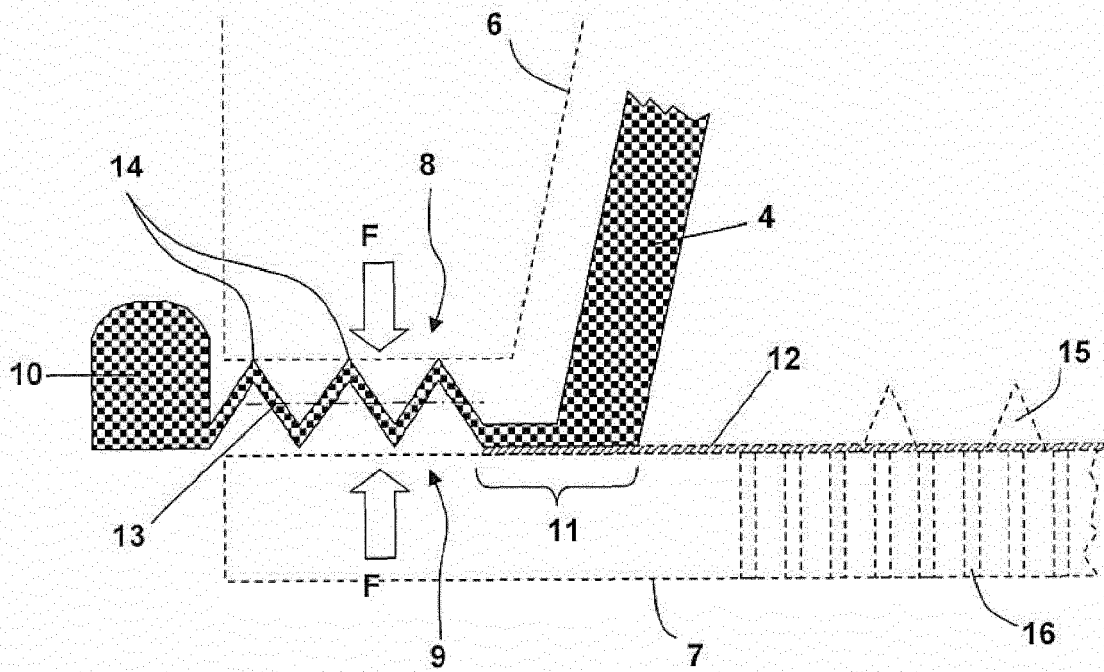


Fig. 2

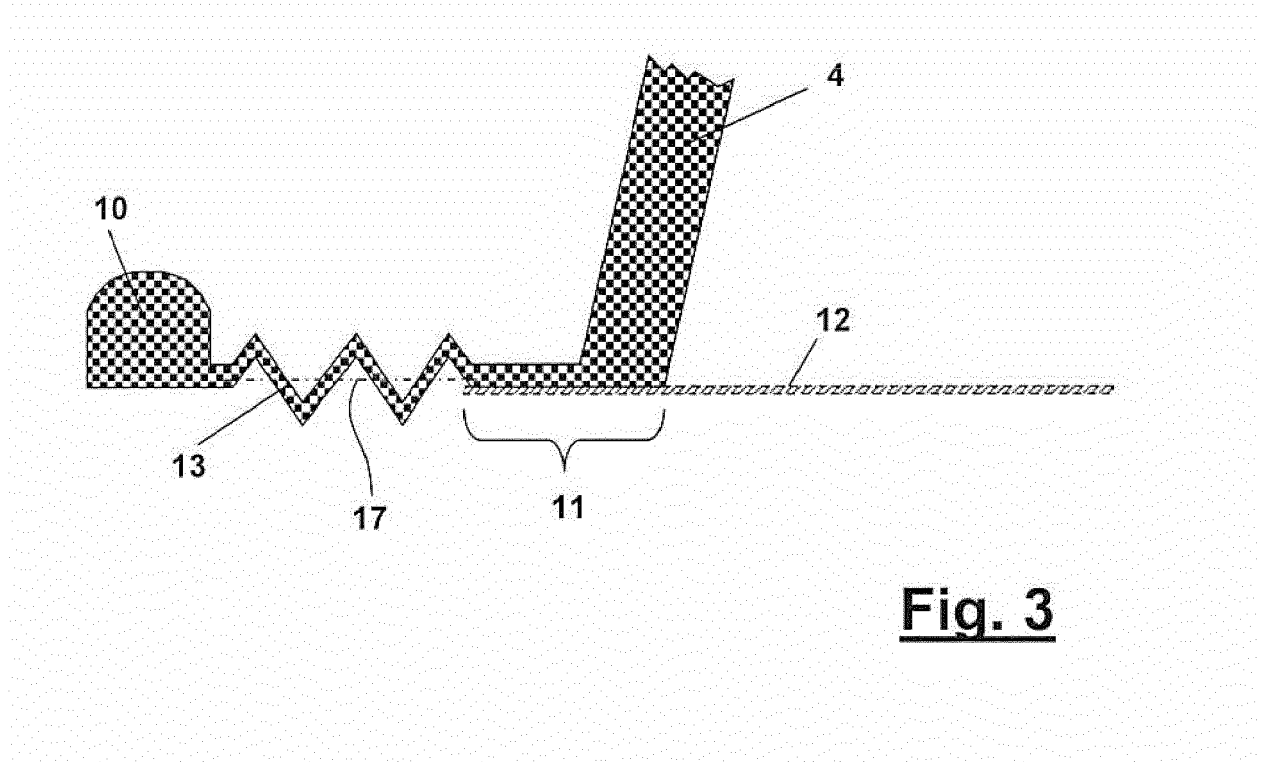


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 14 15 0408

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2012/137052 A1 (TAPLAST SRL [IT]; SANTAGIULIANA EVANS [IT]) 11 October 2012 (2012-10-11) * page 6, line 23 - page 12, line 27 * * figures 1-12a * -----	1-9	INV. B65D85/816
X	ES 1 075 815 U (INVENTOS PARA SIST S VENDING S L [ES]) 12 December 2011 (2011-12-12) * page 6, line 26 - line 30 * * figures 1-3 * -----	1,2,4-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 2 May 2014	Examiner Duc, Emmanuel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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

EP 14 15 0408

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-05-2014

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2012137052 A1	11-10-2012	EP 2694403 A1	12-02-2014
		WO 2012137052 A1	11-10-2012

ES 1075815 U	12-12-2011	EP 2650234 A1	16-10-2013
		ES 1075815 U	12-12-2011
		WO 2013060918 A1	02-05-2013

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1654966 A [0006]