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(54) **CAPSULE**

(57) A beverage preparation capsule (1) comprising a cup-shaped body (6) and a lid (7) to fluid-tightly seal the cup-shaped body (6) and intended to be perforated to allow a fluid to be injected into the capsule (1); the cup-shaped body (6) comprises, at a bottom portion thereof, a beverage outlet (8) and a labyrinth structure (9) surrounding the beverage outlet (8). The beverage preparation capsule (1) further comprises a film (11) fixed to an annular relief (14) of the cup-shaped body (6) to cover the beverage outlet (8) and the labyrinth structure (9), and a film supporting structure (15) arranged between the annular relief (14) and the labyrinth structure (9), and comprising a plurality of ribs (12) mutually spaced apart to define intermediate gaps (16) distributed around the labyrinth structure (9) and projecting upwards beyond the labyrinth structure (9); the film (11) is arranged to extend above, and spaced apart from, the labyrinth structure (9) and to be torn at the ribs (12) under the effect of the increase in the fluid pressure inside the capsule (1).

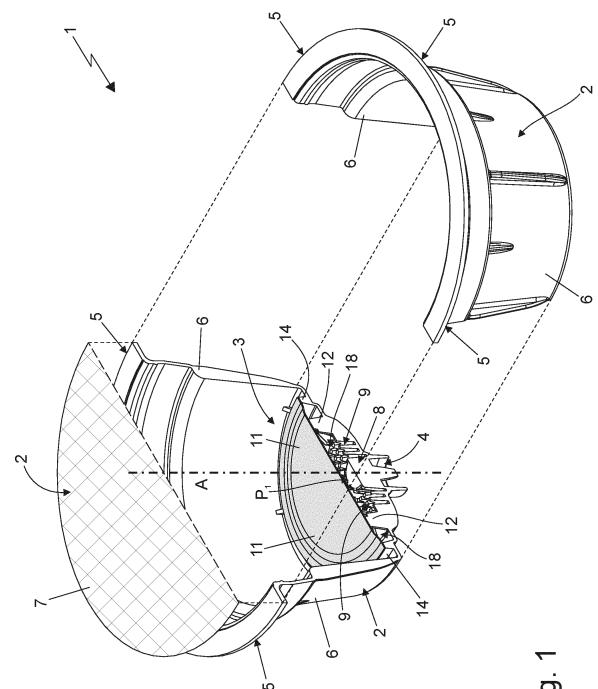


Fig. 1

Description

CROSS-REFERENCE To RELATED PATENT APPLI- CATIONS

[0001] This patent application claims priority from European patent application no. 23203275.5 filed on October 12, 2023, and Italian patent application no. 102024000003652 filed on February 21, 2024, the entire disclosures of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] This invention relates to a capsule for preparing beverages, in particular by means of a pressurised brewing process.

STATE OF THE ART

[0003] As is known, for many, many years now, some types of beverages are produced with the aid of single-use capsules containing a given quantity of soluble or brewable product, generally in a granular, powder, or leaf form. The soluble or brewable product may be, for example, coffee, tea, barley, milk powder, powdered broth, chamomile, or the like.

[0004] Most popular coffee-based beverage preparation capsules on the market currently comprise a rigid or semi-rigid cup-shaped body, which is made of polymer, usually has a truncated-cone or bell shape, and is provided with a radially projecting annular flange that surrounds and delimits an upper opening of the cup-shaped body; an easily perforable disc-shaped lid, which is directly fixed to the annular flange of the cup-shaped body so as to fluid-tightly seal the upper opening; and an insulating film, which is arranged at the bottom of the cup-shaped body and covers a beverage outlet through which the beverage can flow out of the cup-shaped body, or rather the capsule.

[0005] More specifically, in addition to the beverage outlet, the bottom of the cup-shaped body generally also comprises an annular labyrinth structure, which surrounds the beverage outlet and is designed to slow down the flow of the beverage towards the beverage outlet.

[0006] The insulating film is so sized as to cover both the beverage outlet and the labyrinth structure and to divide the inner volume of the cup-shaped body into fluid-tightly insulated upper and lower chambers.

[0007] The upper chamber is intended to house the coffee or other soluble or brewable product. The lower chamber communicates with the outside through the beverage outlet and is designed to temporarily contain the liquid coming from the upper chamber, to homogenise the beverage before it flows out of the capsule.

[0008] In EP 2 238 050, in particular, the insulating film is disc shaped, and a central part thereof is directly welded to the top of the beverage outlet and the labyrinth

structure that surrounds it, while the perimeter of the insulating film is directly welded to the bottom of the cup-shaped body.

[0009] When pressurised water is injected into the upper chamber of the capsule through the lid, the insulating film collapses and tears near the perimetral edge, to allow the liquid mixture formed inside the upper chamber to flow into the lower chamber, to cross the labyrinth structure to the beverage outlet and, finally, to slowly flow out of the capsule.

OBJECT OF THE INVENTION

[0010] The purpose of the present invention is to provide a beverage preparation capsule of the type described above, which represents an improvement compared to the capsules of the same type present on the market, as far as regards the mixing/homogenisation of the beverage before it flows out of the capsule through the beverage outlet.

[0011] According to the present invention, a beverage preparation capsule is provided as disclosed in the appended claims.

BRIEF DESCRIPTION OF THE FIGURES

[0012]

Figure 1 is a perspective, partially exploded view of a beverage preparation capsule according to the present invention, with parts in cross section and parts removed for clarity.

Figure 2 is a perspective view of a component of the capsule in Figure 1.

Figure 3 is a second perspective view of the component in Figure 2, in cross section along the midplane of the capsule.

Figure 4 is a cross-section view of the lower part of the capsule in Figure 1.

Figure 5 is a perspective view, in cross section, of a second embodiment of the capsule in Figure 1, in a different operating condition.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0013] With reference to Figure 1, reference numeral 1 references as a whole a beverage preparation capsule for preparing beverages such as tea, coffee, brews and the like.

[0014] More specifically, the capsule 1 contains a given quantity of a (water) soluble or brewable product, typically in a powder or leaf form, for example ground coffee, and is shaped and structured so to be easily removably insertable in a seat of a known beverage production machine (not shown).

[0015] The capsule 1 comprises a rigid or semi-rigid cup-shaped casing 2 with a longitudinal axis A and internally defining a cavity 3 designed to contain a given

amount of soluble or brewable product and to receive, in use, a brewing liquid, typically pressurised hot water.

[0016] The casing 2 has a beverage spout 4, which communicates with the cavity 3 and is structured/sized to allow, in use, the beverage to flow out of the casing 2, or, rather, from the capsule 1.

[0017] The casing 2 has preferably also an external annular flange 5, which is arranged at the opposite end of the casing 2 with respect to the beverage spout 4 and is intended to rest, in use, on an edge of the seat of the beverage production machine, when the capsule 1 is accommodated therein.

[0018] With reference to Figures 1 and 2, the casing 2 comprises a rigid or semi-rigid cup-shaped body 6 having at an upper opening thereof, the above-mentioned flange 5, and a lid 7, which is fixed, preferably heat-sealed, to the flange 5 so as to fluid-tightly seal the upper opening of the cup-shaped body 6 and is made of a material intended to be perforated in use to allow the brewing liquid to be injected into the capsule 1.

[0019] The cup-shaped body 6 and the lid 7 are preferably made of a barrier material, *i.e.*, impermeable to air and water, with a biodegradable and/or a compostable structure so as to allow the used capsule 1 to be disposed of in an organic waste.

[0020] More specifically, the cup-shaped body 6 preferably has a substantially truncated cone shape and comprises a lateral wall, which extends coaxial to the longitudinal axis A, and a bottom wall, which is generally disc-shaped, is substantially perpendicular to the longitudinal axis A and is seamlessly connected to the lateral wall to defines therewith the cavity 3.

[0021] The beverage spout 4 is preferably arranged on the bottom wall of the cup-shaped body 6, advantageously at a centre thereof, *i.e.*, substantially coaxial to the longitudinal axis A.

[0022] As shown in Figures 1 to 4, the cup-shaped body 6 further comprises a beverage outlet 8 in fluidic communication with the beverage spout 4 to allow the beverage to flow out of the capsule 1, and a labyrinth structure 9 that surrounds the beverage outlet 8 and has the function of slowing down the flow of the beverage towards the beverage outlet 8.

[0023] More specifically, the beverage outlet 8 is preferably arranged at the centre of the bottom wall of the cup-shaped body 6, and preferably terminates with a tubular nozzle, which projects downwards from the bottom wall of the cup-shaped body 6, coaxially to the longitudinal axis A and defines the beverage spout 4.

[0024] The labyrinth structure 9 comprises concentric annular ridges 10, which rise up from the bottom wall of the cup-shaped body 6 at a given distance from each other and surround the beverage outlet 8. The annular ridges 10 are preferably circular and coaxial to the longitudinal axis A. Moreover, each annular ridge 10 may be continuous or discontinuous, namely formed of curved portions arranged at a certain distance from each other along a ring coaxial to the longitudinal axis A.

[0025] The tops of the annular ridges 10 preferably have a crenelated profile and are delimited by respective flat upper surfaces that, preferably, are coplanar with each other and lie on a plane P1 perpendicular to the longitudinal axis A.

[0026] The top of the annular ridges 10 may be substantially coplanar to the top of the beverage outlet 8, as in the embodiment shown in Figures 1-4, or the plane P1 may be arranged at a lower level than the top of the beverage outlet 8, so that the top of the beverage outlet 8 rises above the annular ridges 10, as in the embodiment shown in Figure 5. In the embodiment shown in Figure 5, the top of the beverage outlet 8 is preferably coplanar to the top of the annular relief 14.

[0027] In an alternative embodiment not shown, the annular ridges 10 may have different heights; in this case, for the purposes of this discussion, "plane" P1 is intended to mean the highest plane of the annular ridge/s 10.

[0028] In alternative embodiments not shown, the shape of the labyrinth structure 9 may be different to the example shown in the attached figures and described above. In particular, the concentric annular ridges 10 of the labyrinth structure 9 may be wholly or partially replaced by projections arranged around the beverage outlet 8 according to a configuration so as to form more or less tortuous passages intended, in use, to slow down the beverage that flows through the labyrinth structure 9 to reach the beverage outlet 8. In any case, for the purposes of this description, even in those alternative embodiments, "plane" P1 is intended to mean the plane on which the top of the labyrinth structure 9 or the top of the highest part of the labyrinth structure 9, if the tops of the projections that compose the labyrinth structure 9 are not coplanar, lies.

[0029] With reference to Figures 1 and 4, the capsule 1 further comprises a disc-shaped film 11 arranged inside the cavity 3 and firmly fixed, along an edge thereof, to the top of an annular relief 14 that projects from the bottom of the cavity 3, surrounds the labyrinth structure 9, and is arranged at a higher level than the plane P1 so as to result in the film 11 being taut above, and spaced apart from, the labyrinth structure 9.

[0030] In particular, the top of the annular relief 14 is delimited by a flat annular surface lying on a plane P3, preferably perpendicular to the longitudinal axis A.

[0031] The plane P3 of the tops of the annular relief 14 is arranged at a higher level, and at a distance d2 measured parallel to the longitudinal axis A, from the plane P1 of the top of the labyrinth structure 9.

[0032] As shown in Figure 4, the annular relief 14 preferably has a substantially circular shape and its outer edge is spaced apart from the lateral wall of the cavity 3, at a distance d4 measured in the radial direction.

[0033] Conveniently, the film 11 is fixed to the top of the annular relief 14 by means of hot or ultrasound welding.

[0034] The film 11 hence divides the cavity 3 into an upper chamber designed to contain the coffee or another soluble or brewable product for preparing beverages and

to receive, in use, the brewing liquid, and a lower chamber, into which, in use, the beverage flows, in the manner that will be described below, to reach the beverage spout 4 through the labyrinth structure 9 and the beverage outlet 8.

[0035] The film 11 may be a multi-layer film of the laminated type or composed of several, unbound layers and comprises at least one insulating layer 19 made of a material that provides a strong barrier against external agents, i.e. oxygen and vapours, so as to seal the upper chamber of the capsule 1, and at least one filter layer 20 made of a material that has filtering properties and strong resistance to tearing, such as, for example, a sheet of known non-woven fabric or similar material.

[0036] In an embodiment which is particularly advantageous when the capsule 1 contains a brewing product, the film 11 comprises at least one additional filtering material layer, for example, filter paper.

[0037] As shown in Figure 4, the film 11 preferably adheres to the annular relief 14 by means of the filter layer 20, which is overlapped by the insulating layer 19 and, in sequence, any additional filtering material layer.

[0038] In addition, in a preferred embodiment, the film 11 conveniently has a biodegradable and/or compostable structure.

[0039] As shown in Figures 1 to 4, the cup-shaped body 6 further comprises a film supporting structure 15 arranged between the labyrinth structure 9 and the annular relief 14 and having the function, in use, of cooperating with the annular relief 14 to support the film 11 in a first step of the beverage production process, while keeping the film 11 at least in part raised with respect to the bottom wall of the cup-shaped body 6.

[0040] To this end, the film supporting structure 15 is arranged around the labyrinth structure 9 and rises up from the bottom wall of the cup-shaped body 6 towards the inside of the capsule 1 up to above the top of the labyrinth structure 9, i.e., of the plane P1.

[0041] In a preferred embodiment, shown in the attached figures, the film supporting structure 15 rises up from the bottom wall of the cup-shaped body 6 to even above the top of the annular relief 14 so that, in normal rest conditions, the film 11 is resting on the film supporting structure 15, assuming a slightly convex shape with the curve facing the labyrinth structure 9.

[0042] In an embodiment not shown, the film supporting structure 15 rises up from the bottom wall of the cup-shaped body 6 to above the plane P1, but lower than the plane P3, i.e., the film supporting structure 15 is higher than the labyrinth structure 9 but lower than the annular relief 14.

[0043] In all cases, however, there is no kind of bond between the film 11 and the film supporting structure 15 and the film 11 is simply resting on the film supporting structure 15.

[0044] When the beverage outlet 8 is designed to project beyond the plane P1, as in the embodiment shown in Figure 5, the film supporting structure 15 pre-

ferably projects beyond the top of the beverage outlet 8.

[0045] With reference to the attached figures, in particular to Figure 3, the film supporting structure 15 comprises a plurality of ribs 12 angularly and uniformly distributed around the longitudinal axis A to define therebetween respective intermediate gaps 16.

[0046] The ribs 12 are preferably radial ribs, namely they extend radially from the edge of the labyrinth structure 9 towards the annular relief 14, from which they are separated by an empty space defining a continuous annular gap 17 that surrounds the film supporting structure 15 and communicates with the intermediate gaps 16. More specifically, the ribs 12 are generally plate-like, namely they consist of thin elements lying on respective planes that are radial to the longitudinal axis A and limited, at the top, by respective flat upper surfaces that are coplanar with each other and lying on a plane P2 perpendicular to the longitudinal axis A.

[0047] On its radial plane, each rib 12 also has a generically trapezoid shape and is provided, in the connection area between an inner edge and the flat upper surface, with a recess that forms a kind of step on the top of the rib 12. This has the function of triggering the tearing of the film 11 when, in use, the latter is compressed against the film supporting structure 15 by the pressure inside the capsule 1.

[0048] As shown in Figure 4, the edge of the film supporting structure 15, namely the external edge of the ribs 12, is arranged at a distance d5, measured in the radial direction, from the annular relief 14, while, on the opposite side, the inner edge of the ribs 12 is connected with the outermost annular ridge 10 of the labyrinth structure 9, substantially seamlessly.

[0049] In the example shown, the plane P2 of the top of the ribs 12 is arranged at a distance d1 from the plane P1 greater than the distance d2 between the plane P1 and the other plane P3 of the top of the annular relief 14, namely the ribs 12 project beyond the annular relief 14.

[0050] The distance d1 and d2 preferably range between 2.5 and 5 mm.

[0051] The film 11 conveniently freely slidably rest on the top of the ribs 12, i.e., without any permanent connection bond.

[0052] With reference to figures 2 and 3, the film supporting structure 15 preferably further comprises radial wings 13 uniformly distributed between the ribs 12, inside the intermediate gaps 16, around the longitudinal axis A.

[0053] The tops of the wings 13 are preferably arranged below the tops of the ribs 12, i.e., the height of the wings 13 is lower than that of the ribs 12. In addition, the tops of the wings 13 are preferably coplanar to each other and to the plane P1, namely, they do not project beyond the annular ridges 10 of the labyrinth structure 9.

[0054] In the example shown, the film supporting structure 15 comprises eight ribs 12 and two wings 13 arranged in each intermediate gap 16 for a total of sixteen wings 13.

[0055] In other embodiments, the number of ribs 12

and/or the number of wings 13 may be greater or lower than the example shown in the attached figures.

[0056] Operation of the capsule 1 will be described below, starting from the beverage production process step in which a new capsule 1 is inserted in a seat of the beverage production machine.

[0057] Following injection of a brewing liquid into the upper chamber of the cavity 3 through the lid 7, the pressure inside the upper chamber increases and tends to push the film 11 towards the bottom of the cavity 3.

[0058] Since the connection between the film 11 and the annular relief 14 is such that it resists the traction exerted by the film 11, the latter remains bound along its edge to the annular relief 14, while the remaining part is crushed towards the bottom wall.

[0059] The shape of the film supporting structure 15, against which the film 11 is compressed, ensures that the tension applied to the film 11 is concentrated in the contact zones between the film 11 and the ribs 12 and this causes, when the pressure inside the capsule 1 reaches a certain threshold value, a localised delamination of the film 11 in at least said zones of greater tension, in other words a tear in the insulating layer 19 with resulting formation of openings that enable the passage of the beverage from the upper chamber to the lower chamber and, from here, to the beverage spout 4. In particular, the tear originates at the step recesses between the inner edge and the upper surface of each rib 12.

[0060] Since the filter layer 20 and any additional filter layer/s have a greater resistance to traction than the insulating layer 19, their tearing at the ribs 12 occurs with a given delay compared to the insulating layer 19 and this ensures that, for a given period of time, the film 11 assumes, under the thrust of the pressure, a deformed configuration (not illustrated), wherein it is bent in the central part against the beverage outlet 8 and/or the labyrinth structure 9, but remains raised at the ribs 12 or at least some of these.

[0061] In this deformed configuration of the film 11, the intermediate gaps 16 between the ribs 12 form, with the corresponding portion of the continuous annular gap 17 contiguous to it, respective mixing chambers 18, in which the beverage, which passes through the film 11 thanks to the tears produced in the insulating layer 19, collects before flowing into the labyrinth structure 9.

[0062] The mixing chambers 18 thus have the function of increasing the period of time between the moment when the beverage passes into the lower chamber and the moment when the beverage reaches the labyrinth structure 9 and then comes out through the beverage spout 4, thus improving the mixing and homogenisation of the beverage, encouraging the formation of the crema if the beverage is coffee obtained from ground coffee and of a better extraction of the flavours if the beverage is obtained using a soluble product.

[0063] This effect is further improved by the presence of the wings 13 that create turbulence in the flow of the

beverage inside the intermediate gaps 16 encouraging their mixture.

[0064] The wings 13 also define, between them and the ribs 12, radial channels that favour the conveying of the beverage into the labyrinth structure 9, wherein the beverage is slowed down before reaching the beverage outlet 8.

[0065] According to what is illustrated in Figure 5, once this period of time has passed, the filter layer 20 and any additional filter layer/s give way under the thrust of the pressure and tear at the ribs 12.

[0066] Advantageously, in the embodiment in Figure 5, the fact that the beverage outlet 8 is higher than the labyrinth structure 9 ensures that the film 11 never completely flattens against the annular crests 10 inside the beverage outlet 8, thus encouraging the flow of the beverage towards the beverage outlet 8.

Claims

1. Beverage preparation capsule (1) comprising a cup-shaped body (6) internally defining a cavity (3) designed to contain an amount of a soluble or brewable product, and a lid (7) arranged to fluid-tightly seal the cup-shaped body (6) and intended to be perforated to allow a fluid to be injected into the cavity (3); the cup-shaped body (6) comprises, at a bottom portion thereof, a beverage outlet (8) and a labyrinth structure (9) surrounding the beverage outlet (8); the beverage preparation capsule (1) further comprises a film (11) fixed to an annular relief (14) of the cup-shaped body (6) to cover the beverage outlet (8) and the labyrinth structure (9) and subdivide the cavity (3) into an upper chamber intended to contain the soluble or brewable product and to receive the fluid, and a lower chamber intended to house the labyrinth structure (9) and the beverage outlet (8);

characterised in that it further comprises a film supporting structure (15) arranged in the lower chamber, between the annular relief (14) and the labyrinth structure (9), and comprising a plurality of ribs (12) mutually spaced apart to define intermediate gaps (16) around the labyrinth structure (9) and projecting upwards beyond the labyrinth structure (9);

the film (11) is arranged to extend above, and spaced apart from, the labyrinth structure (9) and is designed to torn at the ribs (12) under the effect of the increase in the fluid pressure inside the capsule (1).

2. The beverage preparation capsule (1) of claim 1, wherein the film (11) comprises at least one gas/-moisture barrier layer (19) and at least one filter layer (20) having a break strength greater than that of the gas/moisture barrier layer (19) to torn after the gas/-

moisture barrier layer (19).

3. The beverage preparation capsule (1) of claim 1 or 2, wherein the film (11) is unconstrained to the film supporting structure (15). 5
4. The beverage preparation capsule (1) of any one of the preceding claims, wherein the ribs (12) are plate-shaped radial ribs lying on respective radial planes with respect to a longitudinal axis (A) of the capsule (1) and bounded, at the top thereof, by respective coplanar plane upper surfaces lying on a plane (P2) perpendicular to the longitudinal axis (A). 10
5. The beverage preparation capsule (1) of claim 4, wherein the labyrinth structure (9) comprises a plurality of concentric annular ridges (10) surrounding the beverage outlet (8) and coaxial to the longitudinal axis (A); the annular relief (14) extends upwards beyond the labyrinth structure (9) and the ribs (12) extend upwards beyond the annular relief (14). 15 20
6. The beverage preparation capsule (1) of any one of the preceding claims, wherein a top of the beverage outlet (8) extends upwards beyond the labyrinth structure (9). 25
7. The beverage preparation capsule (1) of any one of the preceding claims, wherein the film supporting structure (15) is spaced apart from the annular relief (14) to define therewith an annular gap (17) surrounding the film supporting structure (15) and communicating with the intermediate gaps (16); the intermediate gaps (16) and the annular gap (17) define, when the film (11) is pressed against or towards the film supporting structure (15) under the effect of the increase in fluid pressure inside the capsule (1), mixing chambers (18) where the beverage is collected before flowing into the labyrinth structure (9) and into the beverage outlet (8). 30 35 40
8. The beverage preparation capsule (1) of any one of claims 4 to 7, wherein the film supporting structure (15) further comprises a plurality of radial wings (13) arranged between the ribs (12), within the intermediate gaps (16) and so sized as not to protrude beyond the ribs (12). 45
9. The beverage preparation capsule (1) of claim 8, wherein the wings (13) have a lower height than the ribs (12). 50
10. The beverage preparation capsule (1) of any one of the preceding claims, wherein the cup-shaped body (6), the lid (7) and the film (11) are made of a biodegradable and/or compostable material. 55

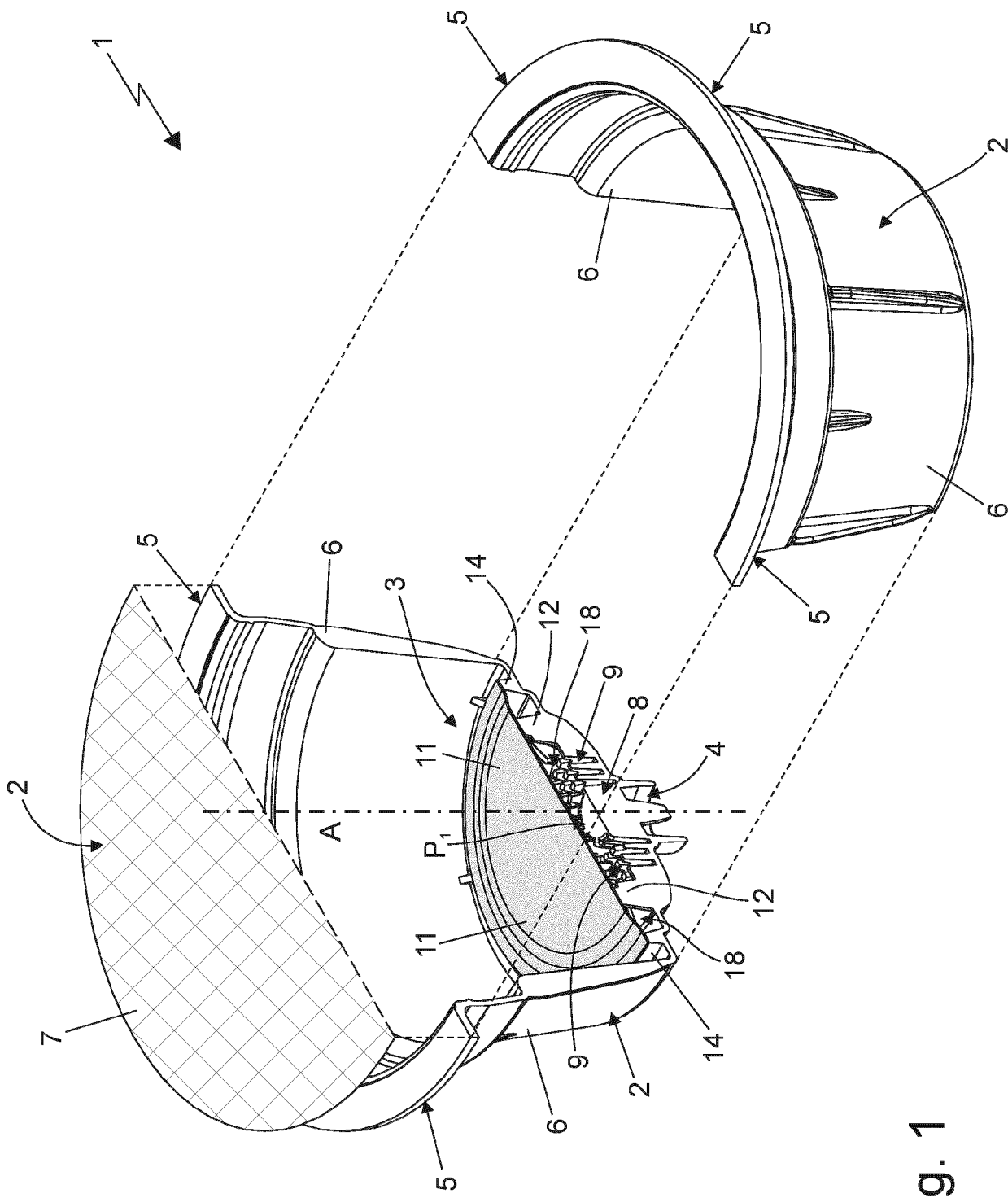


Fig. 2

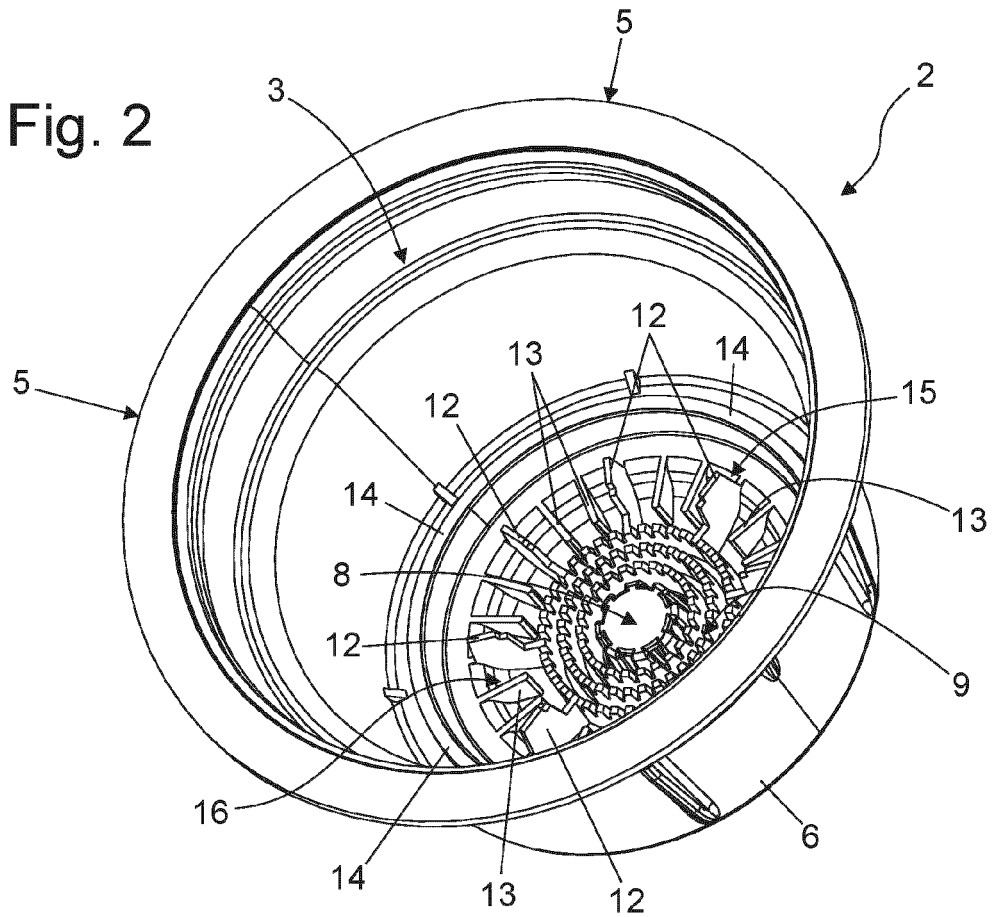
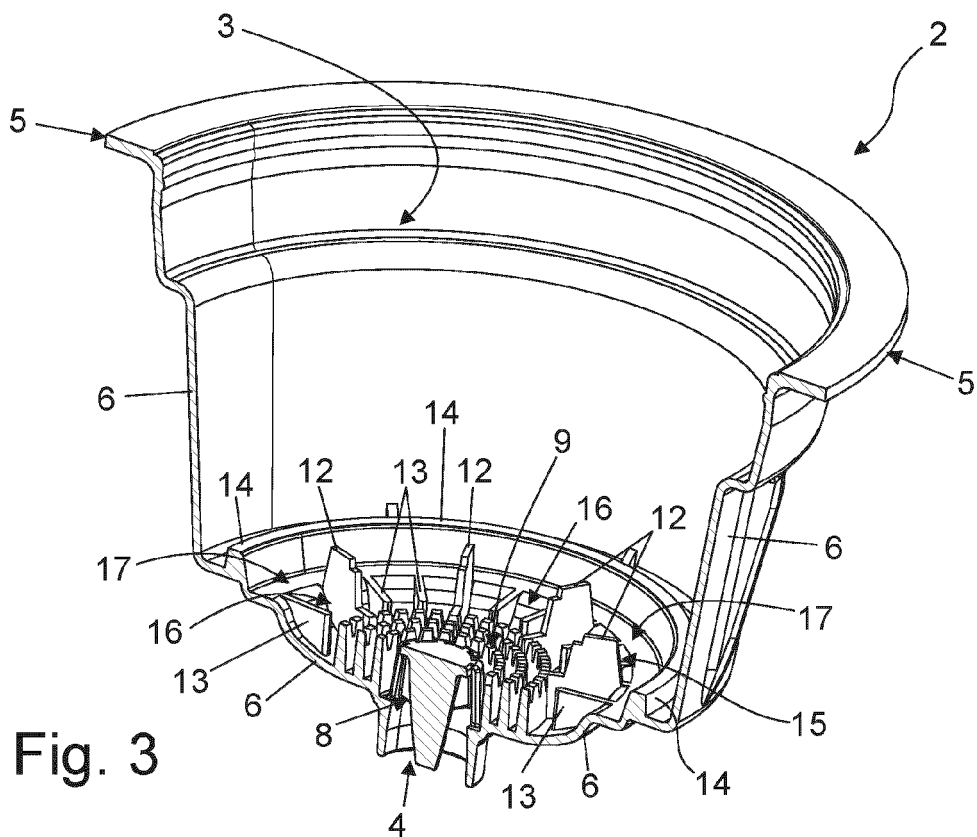


Fig. 3



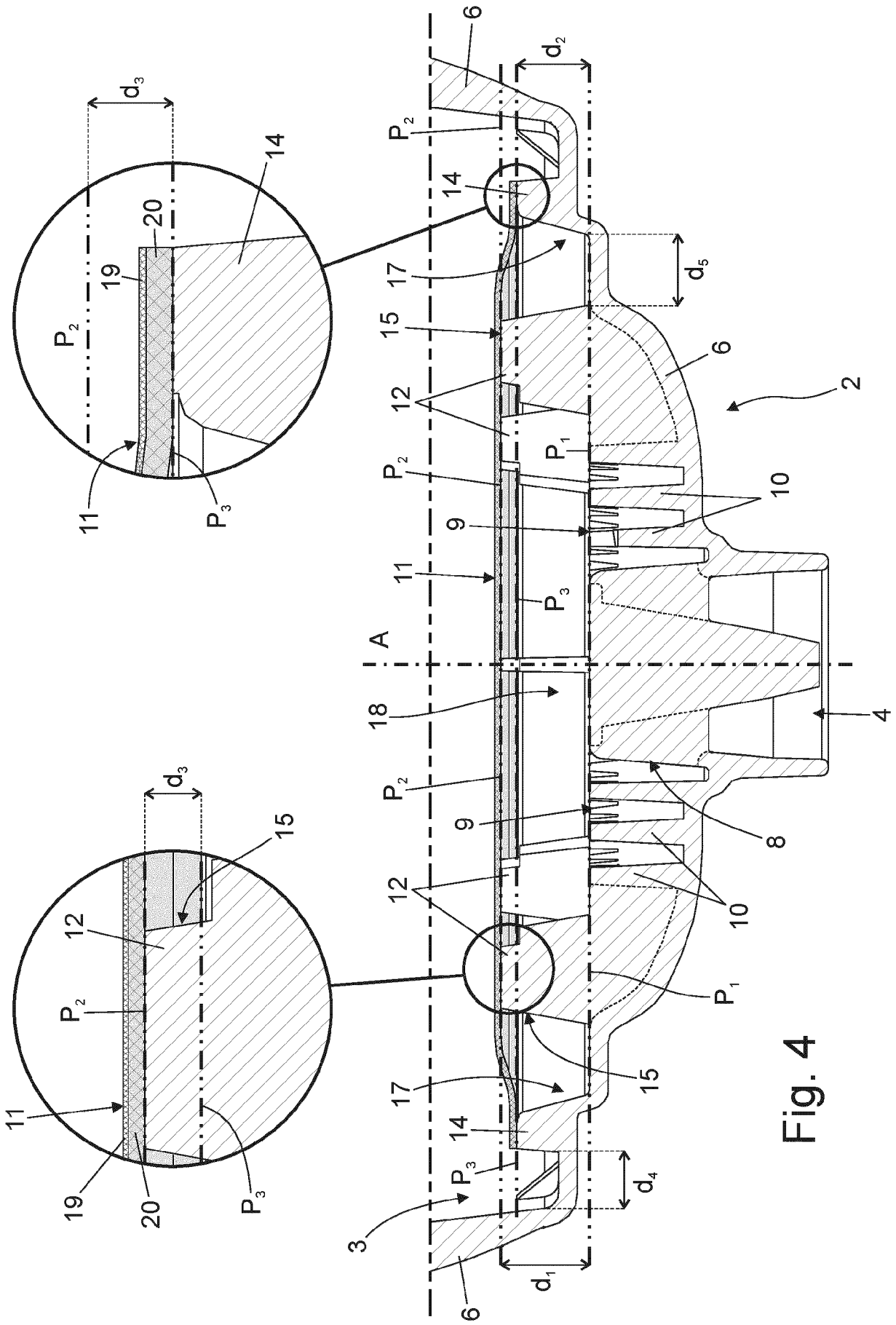


Fig. 4

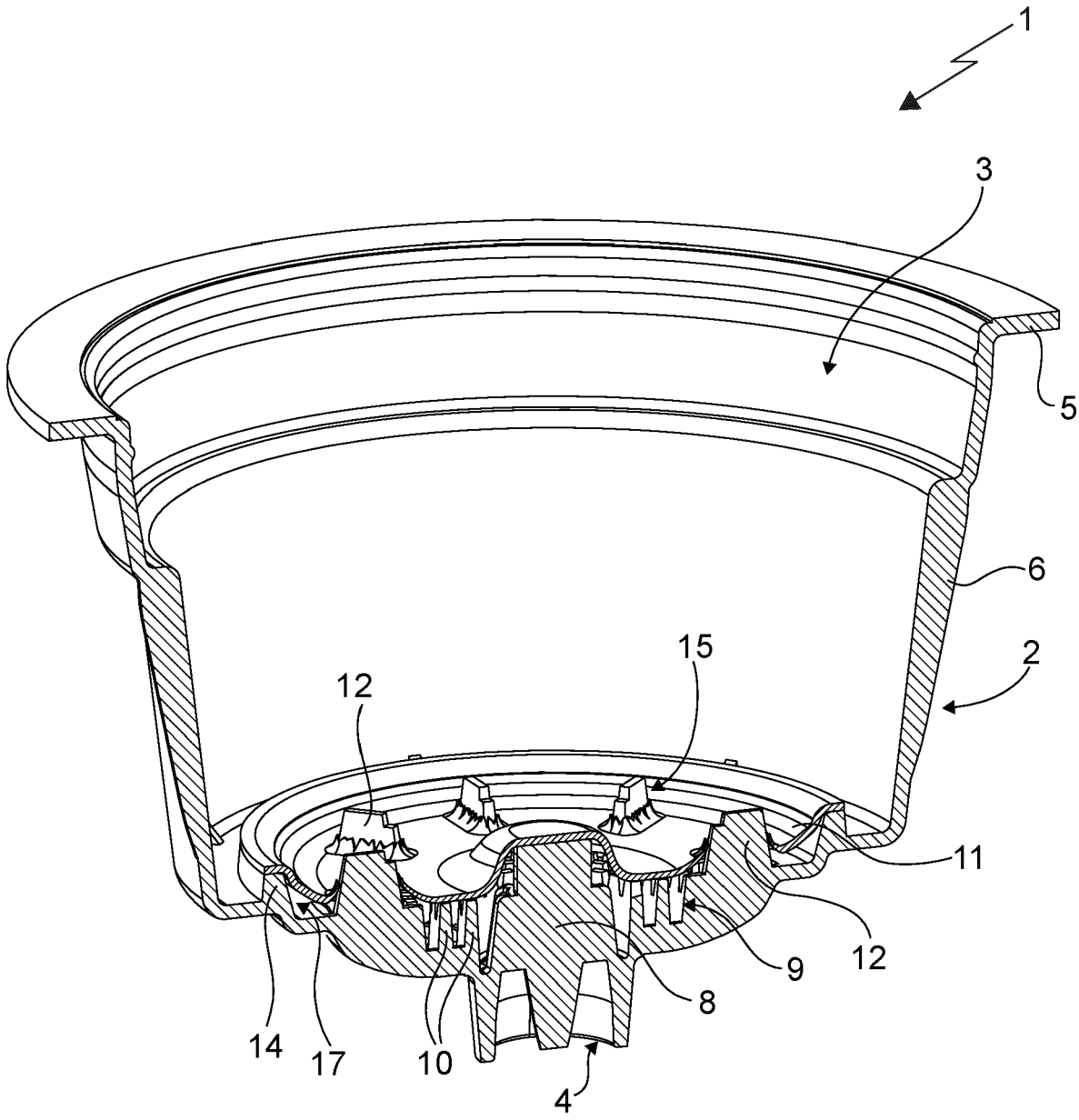


Fig. 5



EUROPEAN SEARCH REPORT

Application Number

EP 24 20 6036

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, P	US 2024/017912 A1 (SCHENONE MATTEO [IT]) 18 January 2024 (2024-01-18) * claims 16-29; figures 1,7,8 *	1-10	INV. B65D85/804
X	US 2022/227575 A1 (BISIO LUIGI [IT]) 21 July 2022 (2022-07-21) * claims 1-14; figures 1,2a,2b *	1-10	
X	IT 2021 0000 9392 A1 (BISIO PROGETTI SPA [IT]) 14 October 2022 (2022-10-14) * claims 1-14; figures 1,2a,2b,5 *	1-10	
X	US 2020/223623 A1 (SCHENONE MATTEO [IT]) 16 July 2020 (2020-07-16) * claims 1-12; figures 1-4 *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		18 December 2024	Brochado Garganta, M
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 24 20 6036

5

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
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2024017912 A1	18-01-2024	CN 116547219 A	04-08-2023
		EP 4259542 A1	18-10-2023
		US 2024017912 A1	18-01-2024
		WO 2022123478 A1	16-06-2022

US 2022227575 A1	21-07-2022	BR 112021024249 A2	18-01-2022
		CN 114096472 A	25-02-2022
		EP 3980352 A1	13-04-2022
		ES 2946708 T3	24-07-2023
		US 2022227575 A1	21-07-2022
		WO 2020245685 A1	10-12-2020

IT 202100009392 A1	14-10-2022	BR 112023016511 A2	24-10-2023
		CN 116981631 A	31-10-2023
		EP 4323289 A1	21-02-2024
		WO 2022219436 A1	20-10-2022

US 2020223623 A1	16-07-2020	BR 112020006293 A2	13-10-2020
		CN 111372870 A	03-07-2020
		EP 3687924 A1	05-08-2020
		ES 2908277 T3	28-04-2022
		US 2020223623 A1	16-07-2020
		WO 2019064096 A1	04-04-2019

EPO FORM P0459

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 23203275 [0001]
- IT 102024000003652 [0001]
- EP 2238050 A [0008]