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(54) **HERMETIC CLOSURE SYSTEM FOR A CONTAINER AND CONTAINER INCLUDING SUCH A CLOSURE SYSTEM**

(57) The invention relates to a closure system (1) and a container (30) forming a hermetic and/or sealed closure system for conditions in which pressure reductions or over-pressures occur inside or outside the container (30), which tend to cause the release of liquids or solids housed inside the container (30) or inside other containers located therein. The invention comprises: a system including a plurality of fixed flanges, projections or tabs (26) provided on the longer sides (22) of a body (8) of a container having a polygonal cross-section (30), optionally arranged in a structural manner, with first spaces (27) being provided alternately therebetween; a device made from metal or another rigid material (14), comprising a plurality of fixed flanges, projections or tabs (17) which are folded back, spaced apart from one another and designed to be form-fitted to the plurality of fixed flanges, projections or tabs (26) provided on the longer sides (22) of the body (8) of the container (30); and a polygonal lid (2) having a cross-section matching that of the body (8) of the container (30), said lid being provided with a seal (19) that can be inserted in the lower part (3) thereof and openings (41) in which bolts or screws (16) are inserted through a channel or groove (15) in the above-mentioned device (14) which is moved along the first two locking sides (9) thereof, which are the opposite longer sides.

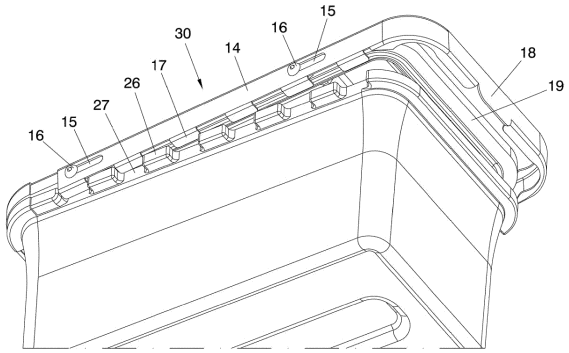

FIG. 4

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Description

OBJECT OF THE INVENTION

[0001] The present invention relates to a new closure system which combines the benefits of bayonet closure systems, spring lever closure systems, friction closure systems and hinge closures. One of the technical fields wherein this is included is in container manufacturer.

[0002] The object of the invention relates to a closure assembly for a receptacle, as well as the receptacle itself adapted to being closed with said closure assembly.

BACKGROUND OF THE INVENTION

[0003] Closure systems applied to receptacles have made it possible, throughout history, to protect the content of the receptacle from its environment, protection against undesired elements, as well as protection of the content from spilling. Since ancient times, any type of container has required a lid, a closure or a combination of both. As an example of this, we can find from corncobs, used by the Latin American indigenous peoples to close bottles, to very thick olive oil that the ancient Romans used to seal their bottles, to the wood and pitch cap, etc.

[0004] The development of the food industry, now in the era of Mesopotamian civilizations, together with the production of surpluses in agriculture has provided the development of storage systems for food left over from self-consumption. Right from the start, one of the most important factors has been airtightness. Airtightness has been designated as the barrier between food and the environment to prevent the action of microorganisms and preserve food from adverse climatic conditions that favour oxidation.

[0005] Throughout our recent history, and in accordance with industrial development, that term of airtightness has been expanded not only to the preservation of food against the environment, but as a consequence of production and transport of hazardous products, it is the environment that must be preserved from the material produced or transported in that airtight container. Therefore, the requirements of that initial airtightness, preservation of food, have been easily surpassed by the requirements of airtightness in the transport of hazardous goods.

[0006] About hermetic closures, it is known by the inventors that the main closures used in receptacles are: friction closures, wherein the lid can be removed with the pressure of a finger, by sliding or prying off. Twist off closures, wherein the receptacle has a twist off closure which may be of the type of screw closure, buttress thread, with plastisol, etc. Furthermore, the ring in these closures may be of type of short continuous cord, long continuous cord, twist off, pry off, lug amerseal, etc., as well as closures by double or permanent tongue-and-groove closure, and pressure tongue-and-groove, or the closures of the atmospheric type used in aerosols.

[0007] In addition to the above, furthermore, bayonet closure systems are known, named in utility models and patents such as Spanish utility model U0277708 "Bayonet-type pressure cooker", and the Spanish patent E94103580 "Pressure cooker with bayonet closure". Another closure system to be highlighted is that named in the European patent application 00103090.7 "Closure system". Among them we can highlight the existence of bayonet-type receptacle closures and the typical use of spring levers in the locks.

[0008] The main problem of the type of closures mentioned, and not mentioned in this document, is that the airtightness, defined as the property generated by a receptacle as a whole so that it does not let the air or other fluids pass through, is easily achievable in closures for receptacles of circular type or in other receptacles through sealing systems. Of the latter, we underline that they do not allow hermetic closure after their opening. A consequence of this is that the airtightness, and/or watertightness, required for receptacles designed to be a barrier to fluids at high pressure such as fluids in air transport, fluids in a pressure cooker and others are relegated to being transported in circular-section receptacles.

[0009] From that described, we can conclude that airtightness and/or watertightness, at high internal or external pressures, of a receptacle with non- circular section is a very difficult task to achieve with current closure systems or methods. The airtightness and/or watertightness achieved with the closure object of the present invention, in the receptacles wherein it is coupled, is an airtightness and/or watertightness at internal pressures that considerably exceed those required by the transport of hazardous goods, not to mention the fact that achieving a closure for these types of receptacles, having non-circular section, and maintaining the advantages inherent to the logistics of a receptacle or container having non-circular section, makes the task much more complicated.

[0010] The inventors have developed the current closure system, which combines the advantages of friction, sliding, bayonet closures, hinge closures and the spring-lever operating system in locks.

[0011] All of this has given rise to the present closure assembly for a receptacle, as well as the receptacle itself adapted to be closed with said closure assembly, which is capable of maintaining an airtightness and/or watertightness at high pressures, maintaining the polygonal section necessary for the correct workflow, in the sectors the invention is designed for. Among said sectors, and not limited to, there is the transport of hazardous goods, more specifically, the transport of infectious material, as well as that wherein it is necessary to maintain fluid confined in a receptacle with high airtightness and/or watertightness requirements.

DESCRIPTION OF THE INVENTION

[0012] The present invention resolves the closure of receptacles with polygonal section wherein it is neces-

sary to maintain airtightness and/or watertightness conditions in extreme conditions, such as high internal or external pressures reached in the transport of goods in liquid or solid form in the hold of aeroplanes and for all use wherein extreme airtightness is necessary. The problem in the holds of aeroplanes arises since, due to the altitude, the pressure conditions that can be found during the flight in extreme conditions may be in the order of 0.68 kPa (0.68 bar, 10 lb/in^2). As receptacles or packages are normally filled at normal atmospheric pressure of approximately 100 kPa (1 bar, 14.7 lb/in^2), the aforementioned pressure reductions tend to cause the discharge of the liquid content from the receptacles, even making them explode during the flight. This does not occur when the current closure is adapted to the receptacles designed for the transport of goods, more particularly and not limited to, hazardous goods in tubes, vessels, racks, etc. placed inside a receptacle with this closure system.

[0013] The configuration and properties of the closure and the receptacle of this invention are described below.

[0014] The hermetic closure system is designed for a receptacle having polygonal section, (comprising body and lid), which must be closed hermetically, said closure comprising:

- a first system of fixed tabs (similar to the spring levers of locks) coupled (either structurally or not) to the body of the receptacle to close,
- a metal device, similar to a strip, perimetric, similar to the section of the receptacle which is going to be closed, said metal device having one of its shorter sides open, said metal device having a plurality of second tabs disposed towards the inside of its section,
- a seal in accordance with the upper base of the system of first tabs,
- a system with hinge and bolt, the hinge whereof constitutes a fixed part disposed in the closure system of the body or directly on the body of the receptacle, whilst the bolt constitutes the moving part and is positioned in the receptacle lid.

[0015] Below, the closure system structurally coupled in a receptacle of rectangular section is described.

[0016] The closure system comprises a lower part situated in the upper open part of the body of a widened receptacle. Said lower part comprises a flat base wherein a system of first tabs is disposed separated in the longer two sides of the expansion of the receptacle and with a single tab which covers the front part of the receptacle, which is slightly introduced in the side of the flat base, and the fixed part of a hinge system.

[0017] A rigid strip (preferably of metal material), located perimetrically in the open upper part of the body of the widened receptacle. Said strip is composed of a form marked by the form of the closure system located in the open upper part of the body of the widened receptacle. The form described will correspond to the perimetric form having one of its sides, being that of the lower side which has the hinge system, free. The strip has a section in alternate U-shape section with an L-section. The variation in the sections corresponds to the fact that the section, in the areas where there is a first tab, is U-shaped, and where there is the free space between the first two consecutive tabs, it is L-shaped.

[0018] The first tabs are located in the lower parts of the long sides of the strip, having in the remaining side a U-section altered in its middle part by a long L which acts a handle. The strip also has in its long sides two openings on each side, which perform the function, with the aid of the corresponding bolts, of a guide for the strip in its longitudinal displacement.

[0019] The receptacle lid has a section and shape in accordance with the open upper part of the body of the widened receptacle, and has a channel for the perfect coupling of the metal device or strip. This channel is in the two longest sides of the lid and on the side opposite that of the housing of the moving part of the hinge composed of the lid and the body. Furthermore, the lid has two cavities, with or without metal insert, and on each side for the disposal of (preferably) four bolts for the fastening and guide of the strip to the lid.

[0020] It should be underlined that the strip is disposed on the lid through the bolts, which through the aforementioned side openings of the strip, shall perform the closed and open positions of the assembly. In the open position, the strip displaces by sliding or friction through the lid guides with the aid marked by the bolts, this final position coincides with the displacement of the strip towards the opposite side of the hinge. In its final, or open, path, the strip has the first tabs in the free space left by the tabs of the open upper part of the body of the widened receptacle. In this way, it allows the pivoting and the opening of the hinge closure formed by the body and the lid. In its final, or closed, path, the closure is disposed in the closest part to the hinge, wherein that the tabs of the strip, and the tabs of the open upper part of the body of the widened receptacle are one on the other. This prevents the opening of the closure by the pivoting or the operation of the hinge. In addition to this, the lid has a seal throughout its perimeter. This seal has a bilabial or torus of revolution section and a hardness so that it allows the sliding of the strip and also maintains the airtightness and/or watertightness of the assembly. The contact of the closure seal with the receptacle body is performed in the portion of material left in the tray, which is the open upper part of the body of the widened receptacle, and the internal cavity of the receptacle, which is the base of the tabs.

[0021] The disposition of the assembly enables that when the receptacles are filled at normal atmospheric pressure of approximately 100 kPa, the reductions in pressure or the overpressures, which tend to cause the discharge of the liquid contents of the receptacles, or even make them explode, do not occur.

DESCRIPTION OF THE DRAWINGS

[0022] To complement the description being made and in order to aid towards a better understanding of the characteristics of the invention, in accordance with a preferred example of practical embodiment thereof, a set of drawings is attached as an integral part of said description wherein, with illustrative and non-limiting character, the following has been represented:

Figure 1.- Shows a perspective view of the closure assembly in accordance with the invention, in open position, comprising the first fixed tabs and the strip.
Figure 2-a-. Shows a perspective view of a lid with the seal and the hinge system, prepared to receive the strip.
Figure 2-b.- Shows a perspective view of the seal.
Figure 2-c.- Shows a perspective view and section of a segment sectioned from the strip.
Figure 3.- Shows a perspective view of the part of the closure system incorporated in the body of a receptacle according to the invention.
Figure 4.- Shows an exploded view of the receptacle according to one of the preferred embodiments of the invention, together with a test-tube stand with primary containers of blood sample tube-type, designed to be contained in the receptacle.
Figure 5.- Shows an interior perspective in section of one of the preferred embodiments of the invention, with the closed position of the system, according to the invention.
Figure 6.- Shows a top view of a receptacle in accordance with one of the preferred embodiments of the invention containing urine sample vessels.

PREFERRED EMBODIMENT OF THE INVENTION

[0023] Below, a preferred embodiment of the invention is described, with the aid of figures 1 to 6, which relates to a hermetic closure system (1) for a receptacle and to a receptacle (30) equipped with said closure system (1).

[0024] In accordance with figures 1 to 3, the hermetic closure system (1), comprises an assembly of fixed tabs (26) disposed alternately in the longer sides of a body (8) of a receptacle and structurally integrated.

[0025] The closure system (1) further comprises a metal strip (14) equipped, in turn, with a plurality of second tabs (17), designed to fit into first spaces defined between each two consecutive first tabs (26), during the displacement of the strip (14), a hinge system (7) being disposed in a lid (2) and in the body (8), as will be explained below.

[0026] The strip (14) is situated perimetrically in the open upper part of the body (8). The form described will correspond to the perimetric form, being one of its sides, that of the lower side which has the hinge system, free. The strip has a U-shaped section alternated with an L-section. The variation in the sections correspond to the fact that the section in the areas where there is a first tab is U-shaped, and where there is a free space between the first two consecutive tabs, it is L-shaped.

[0027] The hinge closure (7) comprises articulation devices (25), disposed in the second pivoting side (21), separated by a space (24) in a body (8), and articulation devices (11) separated by a space (12) in a lid (2) disposed in the first pivoting side (6). Both parts of the receptacle, body (8) and lid (2), are joined by a hinge (7) through the articulation devices (25) and (11), interconnected through the spaces (24) and (12) by means of a bolt or rod (13). This closure system further comprises a seal (19) disposed in a lid (2) with a bilabial or torus of revolution section, which performs the function of airtightness with the horizontal displacement, or friction, of the strip (14) from the open position, according to figure 1, to the closed position, figure 5, and the hinge closure (7). The horizontal displacement of the strip (14) is performed by the longer sides of the receptacle (22) and (9) applying a horizontal force in the grip or handle (18) which transfers to the strip (14) from an open position, according to figure 1, wherein the tabs or spring levers (27) of the strip (14) coincide in the first free spaces (27) of the body (8) which allow the opening in book form through the hinges (7) to access the interior of the receptacle (8). The horizontal movement of the strip (14) perimetrically closes the first free side of the lid (10) with the second free sides (23) of the body (8) and also closes the first closure sides, the longest, (9) of a lid (2) with the second closure sides (22) of a body (8). This displacement is guided through the assembly formed by grooves (15) in the strip (14) and stops or bolts (16) disposed in orifices (41) in a lid (2), which may go directly or with metal insert.

[0028] We will now describe the preferred embodiment of the invention and the application of the hermetic and/or airtight closure for conditions wherein reductions in pressure or overpressures occur, whether internal or external to the receptacle (30), which tend to cause the discharge of the liquid or solid contents, from inside the receptacle (30) or from the receptacles inside it, towards the environment.

[0029] The receptacle (30) is formed by a lid (2) equipped with a flat base (3) in its lower zone and a first upper portion (4) having a dome form, to be able to house cooling means (not shown), and equipped with gripping means (5) to grip said lid (2) from the exterior, as well as to perform the opening with hinge system (7) of the lid (2). The base (3) has a substantially polygonal form, on one of the sides whereof, called first pivoting side (6), are disposed articulation means (7) adapted for their articulated joining with a body (8), of a receptacle (30), as will be explained below. The base (3) further comprises first closure sides (9) adjacent to the first pivoting side (6), and first free side (10) opposite the first pivoting side (6).

[0030] The strip or closure device (14) is disposed substantially throughout the first closure sides (9). The closure element (14) has a profile that can externally fit in said first closure sides (9), wherein it is displaceably fixed. The closure element (14) comprises a groove (15) along

which it will displace with respect to its corresponding first closure side (9). Two stops or bolts (16), fixed to each one of the first closure sides (9), determine the end points of the displacement and keep the first closure sides (9) connected to the closure element or strip (14). The closure element or strip (14) comprises in the lower part a plurality of fixed tabs, spring levers or flanges (17) folded and separated from one another, adapted to perform a form closure with the body (8), of the receptacle (30), as shall be explained later.

[0031] The closure device or strip (14) has a grip or handle (18) in its end farthest from the first pivoting side (6), surrounding the first free side (10).

[0032] The lid (2), of the receptacle (30) incorporates a seal (19) which can be inserted in the lower part of the base (3), which has an open or bilabial profile, with the opening directed towards the fixed tabs, spring levers or flanges (17).

[0033] The receptacle (30) further comprises a body (8) which has a parallelepipedic form, of widened receptacle, and comprises a second upper portion (20) in quadrangular form with the base (3) of the lid (2). In particular, the second upper portion or tray (20) comprises, similar to the lid (2), a second pivoting side (21), two second closure sides (22) adjacent to the second pivoting side (21), and a second free side (23) opposite the second pivoting side (21).

[0034] As observed in figures 4 and 5, the second closure sides (22) are equipped with fixed tabs, spring levers or flanges (26) projecting outwards, and separated by first spaces (27). In a first end position of the closure element (14), the fixed tabs, spring levers or flanges (17) are housed in said first spaces (27). In that case, the lid (2) can pivot around the rod (13) with respect to the body (8) of the receptacle (30) and open or close said receptacle (30). With the receptacle (30) closed, the closure element (14) can displace towards a second end position, wherein its fixed tabs, spring levers or flanges (17) have slid under the fixed tabs, spring levers or flanges (26) of the body (8), establishing a form closure between the fixed tabs, spring levers or flanges (17) of the strip (14) and the fixed tabs, spring levers or flanges (27) of the body (8) which prevents the pivoting between the lid (2) and the body (8) of the receptacle (30) keeping said receptacle (30) closed in secure manner and maintaining the airtightness and/or watertightness for the stipulated requirements.

[0035] The articulation means (7) comprises a plurality of second teeth (11) separated by second spaces (12) and disposed along the pivoting side (6) and protruding from the base (3). The second teeth (11) are bored according to the direction of the first pivoting side (6) to enable the passage of a connecting rod (13).

[0036] The second pivoting side (21) longitudinally comprises a plurality of third spaces (24) that define third teeth (25) separated by said third spaces (24) and which are bored in longitudinal direction, corresponding to the second spaces (12) and second teeth (11), to house the rod (13) which allows a pivoting joint between the lid (2) and the body (8), of the receptacle.

[0037] The body (8) of the receptacle (30) comprises an insert (28) to house, in a lateral face, a valve (29) with tared pressure to remove gases from inside the receptacle (30).

[0038] As shown in figures 4 and 5, the receptacle (30) is designed for, but not limited to, the health area, to transport primary containers (31, 32) with samples, for example, tubes (31) with blood samples, as well as vessels (32) with urine or stool samples. With this object, the lid (2) is equipped in its upper portion (4) with ribs (33) which protrude towards the body (8), to serve as support for the cooling means for the primary containers (31, 32) transported, improving the biological stability of the sample during transport. Additionally, means of adjustment (not shown) can be incorporated in the bottom of the receptacle (8), wherein the primary containers (31, 32) are disposed, to adjust the height of said primary containers (31, 32), so that they can make contact with the ribs (33).

[0039] The receptacle (30) can incorporate within the body (8) a test-tube stand (35) to be able to arrange the primary containers (31, 32) inside in orderly fashion. Said test-tube stand (35) comprises a first rack (36) with first orifices (37) to house the primary containers (31) and a second rack (38) disposed on the first rack (36), also with second orifices (39), to house the tubes (31) through said orifices (37, 39). The first (36) and second (38) racks can be interconnected at a certain distance by means of pillars (40) which are disposed through respective grooves (not shown) existing in the racks (36, 38). At least one of the pillars (40) comprises second gripping means (42) to facilitate the introduction and extraction of the test-tube stand (35) in the receptacle (8). Furthermore, the pillars (40) may be flat and contain spaces (42) to lighten the weight.

[0040] Likewise, the secondary container has space to hold, in accordance with the legislation, absorbent material, for example, polypropylene sheets, to absorb the entire content in the case of breakage of the primary containers.

[0041] The preferred capacity is fifty tubes (31) of blood sample or, alternately, eight vessels (32) of urine sample.

Claims

1. Hermetic closure system (1) for receptacle, designed to be used in a receptacle equipped with a body (8) having a polygonal section, **characterized in that** it comprises:

   - a plurality of first fixed tabs (26) disposed alternately in the longer sides (22) of the body (8), wherebetween are alternately defined first spaces (27);
   - a strip (14) of rigid material, comprising a plurality of second fixed tabs (17) disposed folded

and separated from one another, adapted to perform a form closure together with the plurality of first fixed tabs (26); and
- a polygonal lid (2) having a section in accordance with the body (8) of the receptacle (30), and equipped with:

- a seal (19) which can be inserted in the lid's lower part (3), and
- orifices (41) wherein bolts (16) are disposed through a channel or groove (15) in the strip (14),

wherein said strip (14) is displaceable through two first closure sides (9), of the lid (2).

2. Closure system (1) according to claim 1, **characterized in that** the strip (14) comprises at least one groove (15) to be displaced horizontally through the two first closure sides (9) and second closure sides (22) of the body (8), so as to be guided through a system formed by the groove (15) and the bolt (16).

3. Closure system (1) according to claim 1, **characterized in that** the strip (14) has horizontal slide-lock means.

4. Closure system (1) according to claim 1, wherein the lid (2) and the body (8) have a hinge system (7).

5. Receptacle (30) **characterized in that** it incorporates the hermetic closure system (1) described in any of claims 1 to 4.

6. Receptacle (30) according to claim 5, **characterized in that** it is designed to contain food.

7. Receptacle (30) according to claim 5, **characterized in that** it is designed to contain hazardous goods.

8. Receptacle (30) according to claim 5, **characterized in that** it is designed to contain biological products.

9. Receptacle (30) according to any of claims 5 to 8, **characterized in that** it comprises an insert (28) to house a valve (29) having a tared pressure to remove gases from inside the receptacle (8).

10. Use of the receptacle described in any of claims 5 to 9, for the airtight transport of products in conditions wherein reductions in pressure or overpressures occur, whether internal or external to the receptacle (30), which tend to cause the discharge of the liquid and/or solid content from inside the receptacle (30), or from containers inside said receptacle.

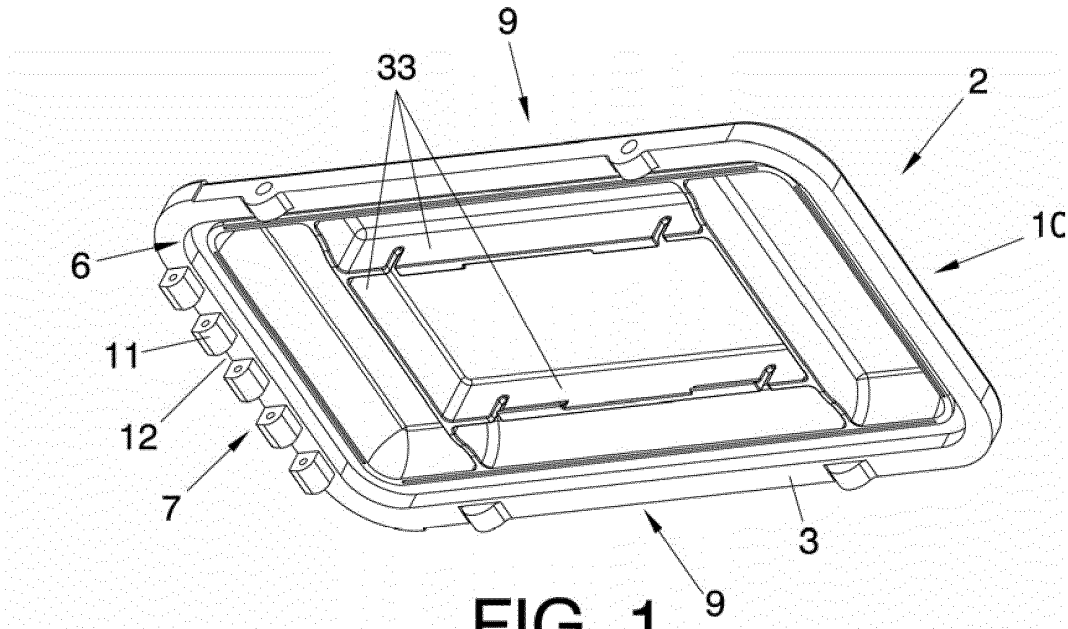

FIG. 1

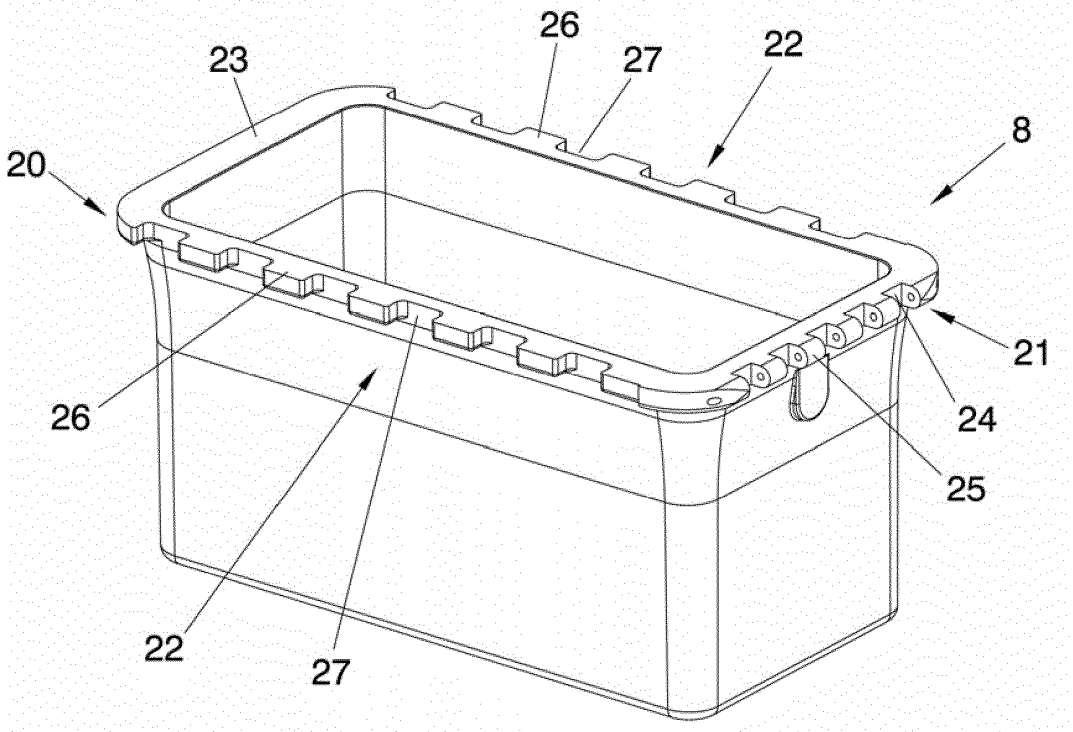

FIG. 2

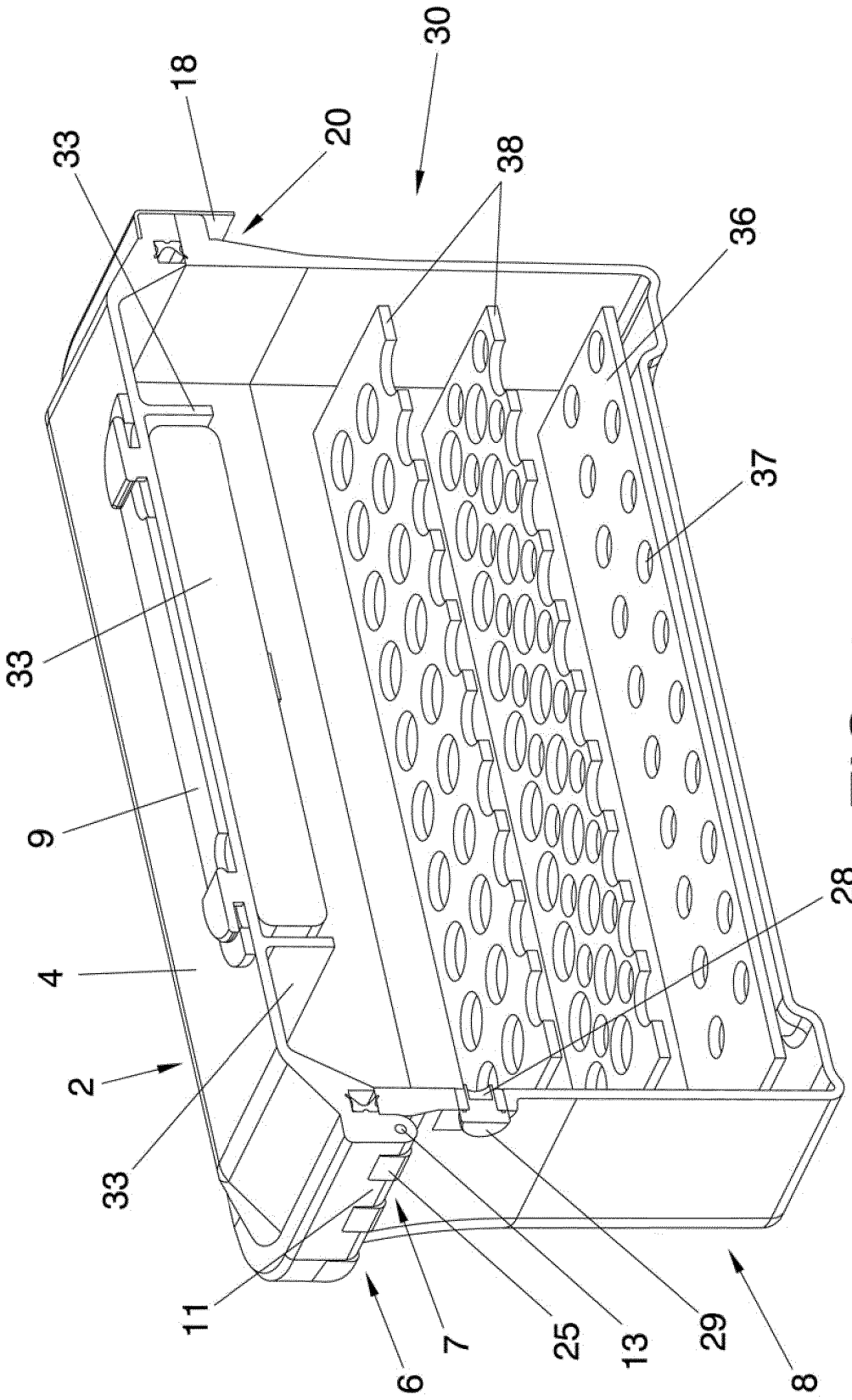

FIG. 3

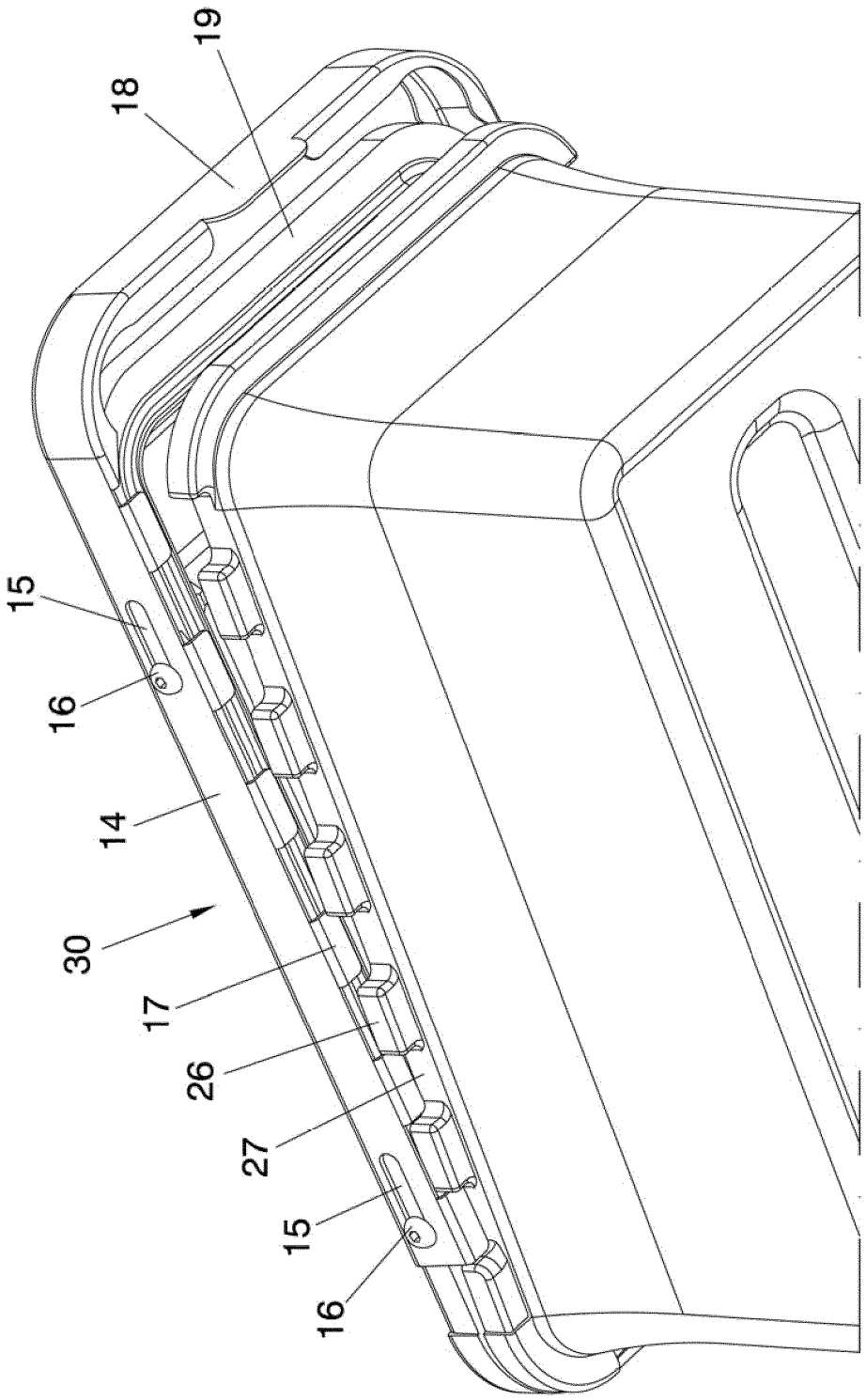

FIG. 4

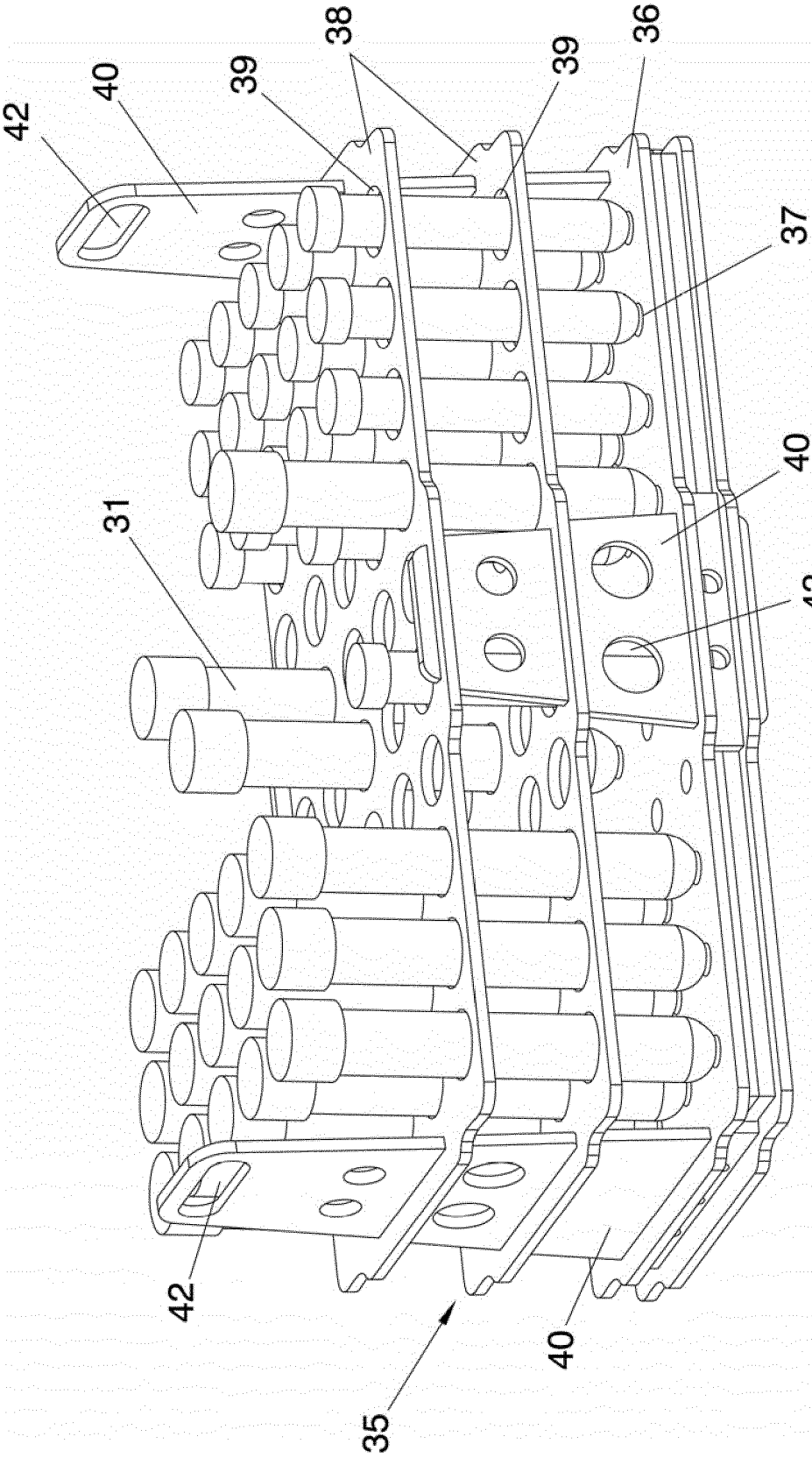

FIG. 5

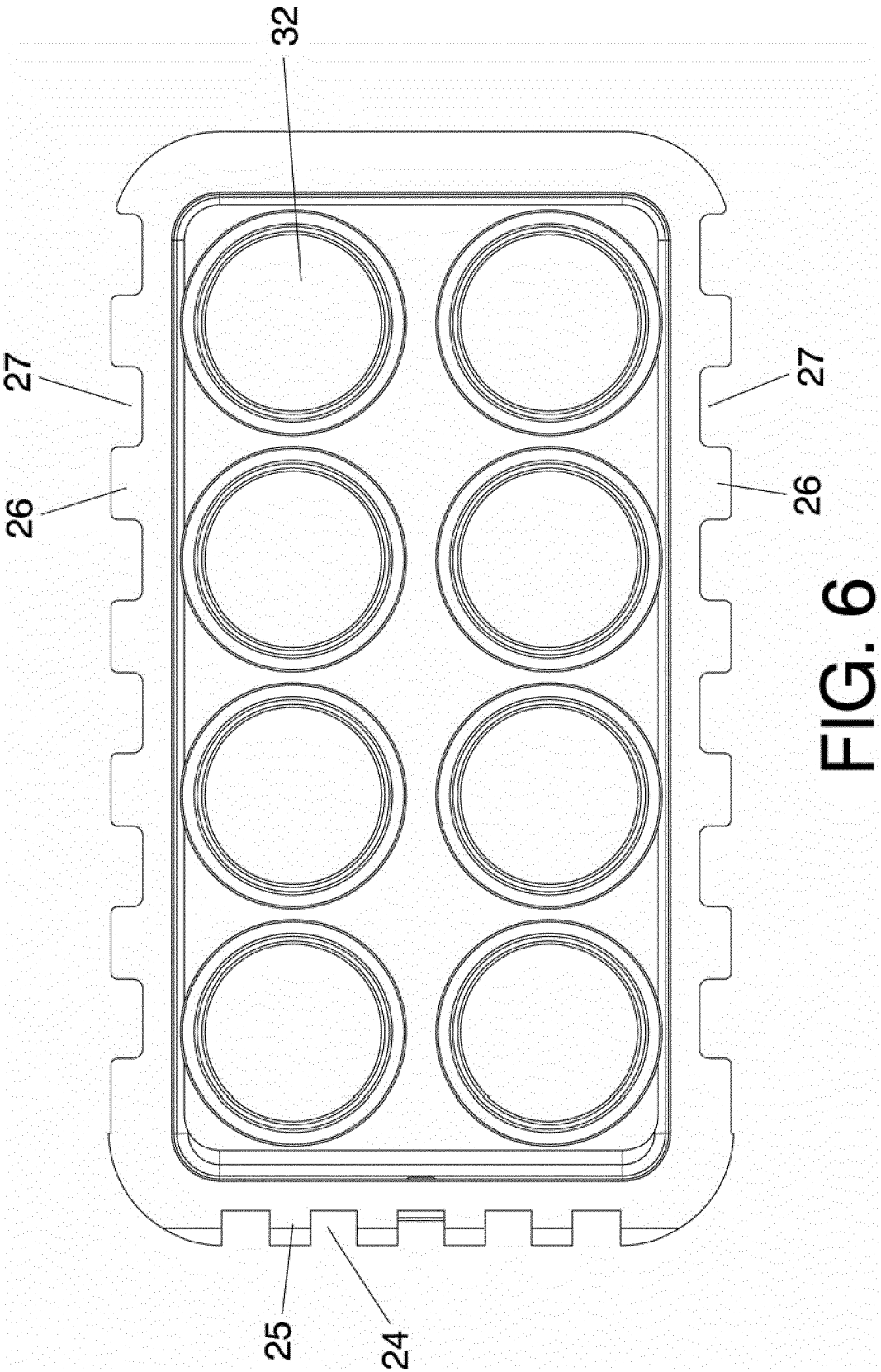

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/ES2012/070706

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D45/02
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65D F16B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2008/151368 A1 (JOINLOCK PTY LTD [AU]; CAMERON DEAN OSMAN [AU]) 18 December 2008 (2008-12-18) page 16, line 29 - page 17, line 18; figure 18 -----	1,10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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Date of the actual completion of the international search	Date of mailing of the international search report
1 February 2013	08/02/2013
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Bridault, Alain

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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REFERENCES CITED IN THE DESCRIPTION

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