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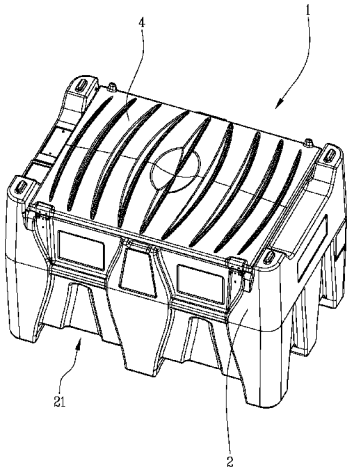
(54) Title: COMBINED TANK FOR FUEL TRANSPORT

Fig.1



(57) Abstract: The fuel transport tank (1) comprises at least a first container (2) and at least a second container (3), the first container (2) being provided with at least a seat (20) in which the second container (3) is inserted in a removable manner.

COMBINED TANK FOR FUEL TRANSPORT

Technical Field

The present invention relates to an improved transport tank.

In detail, the invention presented concerns a tank with a double container designed to transport diesel fuel and an aqueous solution of high-purity urea, generally known by the commercial name of AdBlue.

Background Art

Tanks are known for the transport of fuel, e.g., diesel fuel, consisting of a hollow container, on which is mounted a pump which is fluid-dynamically connected inside the container and to a dispensing nozzle.

The purpose of these transport tanks is to refuel agricultural vehicles or operating machines directly on the worksite, e.g., a field or a building site, etc.

In practice, the tanks of this type have been designed to be transported on the cargo bed of a truck or in the loading compartment of a van or the like.

Currently, in order to comply with recent legal provisions, both European and extra-European, which aim at reducing the emission into the environment of the nitrogen oxides comprised in the exhaust fumes, agricultural vehicles, commercial vehicles and various operating machines are equipped with an additional tank to the diesel fuel tank, designed to contain the above aqueous solution of urea or AdBlue.

In practice, these vehicles mount a known system for the injection of a pre-set quantity of AdBlue between the motor and the catalytic converter.

This way a consistent part of the nitrogen oxides are transformed into nitrogen and water and dispersed in this form in the environment.

Clearly, the AdBlue tank has to be periodically replenished.

For this reason, currently, the market makes available transport tanks for AdBlue similar to those for diesel fuel, together with which these are transported to worksites.

Consequently, in order to be able to fuel vehicles equipped with nitrogen oxide abatement systems on site, double the number of tanks has to be moved with respect to those needed to fuel traditional vehicles, and this proves both inconvenient and inefficient.

Description of the Invention

In this context, the technical aim at the bottom of the present invention is to propose a fuel transport tank which exceeds the limits of known tanks and which at the same time provides more effective use.

The indicated technical aim is achieved by a tank made according to claim 1.

Brief Description of the Drawings

Other characteristics and advantages of the present invention will become clearer from the indicative, yet non-limiting description of a preferred, but not exclusive embodiment of a transport tank, as illustrated in the accompanying drawings, wherein:

- Figure 1 is an axonometric view of the tank, with the lid closed;
- Figure 2 is the view of Figure 1, in which the lid is raised;
- Figure 3 is the view of the two previous figures, in which an AdBlue tank container is removed from a suitable seat formed in a diesel fuel container; and
- Figure 4 is an axonometric view of the AdBlue container, rotated with respect to its representation in Figure 3.

Embodiments of the Invention

With reference to the accompanying figures, reference numeral 1 globally indicates an innovative and improved fuel transport tank with respect to known tanks.

The proposed tank 1 comprises a first container 2 for transporting diesel fuel and a second container 3 for transporting an aqueous solution of urea, in particular AdBlue.

According to an important aspect of the invention, the first container 2 is provided with a seat 20 (clearly visible in Figure 3) in which the second container 3 is inserted in a removable manner.

In order to allow the second container 3 to be inserted in the first container 2 and transported by means of it, the first container 2 will be larger in size than the second container 3, as shown on the attached illustrations.

It should be considered that the first and the second containers 2, 3 are adapted to perform the function of “tanks” in themselves and that the proposed tank 1

can therefore be deemed a "compound tank"; this is therefore a complex product, made up of (at least) two main removable parts, which structurally and functionally operate in conjunction to obtain convenience and effectiveness of use which are not achieved by the prior art.

The containers 2, 3 have a generically prismatic or polyhedral shape, preferably having six main faces or sides and are provided with an internal volume which contains the relative fuel.

Each container 2, 3 of the invention has a respective filling opening which gives access to the internal volume, through which opening the contained fuel also flows out.

Both containers 2, 3 may be made in a single body piece, preferably polyethylene.

The first container 2 comprises a lower base side 21 on which it can be rested during transport and an opposite upper side 22, wherein the above seat 20 for the second container 3 is preferably formed.

The seat 20 therefore defines a sort of groove or cavity which extends from the upper side 22 towards the inside of the first container 2, to allow the second container 3 to be inserted and extracted from above.

Always from the upper side 22, the filling opening can be formed and a space 23 (e.g., a recess) can also be defined wherein a pump is mounted which is connected to a dispenser by means of a pipe, such dispenser consisting of a nozzle or similar devices.

The pump, not shown for reasons of legibility of the illustrations, is fluid-dynamically connectable, by means of at least a specific pipe, to the filling openings of the first container 2 and of the second container 3, to allow the dispensing of the fuel transported therein.

The invention can also comprise a lid 4, hinged to the first container 2, which lid 4, once closed, is adapted to cover the seat 20 and the second container 3 contained therein.

Means can also be provided for keeping the lid 4 in closed position, lockable and releasable by a user (think for example of a padlock or a lock or the like).

In detail, the lid 4 is substantially hinged at a corner of the upper side 22, so that, once closed, it covers and protects the second container 3 for the AdBlue, the pump, the dispensing nozzle and the fluid-dynamic connection pipes (compare Figures 1 and 2).

As has been said, the seat 20 for fitting the second container 3 is in practice defined by a recess which is shaped by the outer walls themselves of the first container 2; preferably, the seat 20 of the first container 2 has a substantially prismatic or polyhedral shape and is adapted to receive to size the second container 3.

In particular, both the second container 3 and the seat 20 can have a quadrangular profile, seen from a plan perspective or from above and, preferably, the seat 20 is configured to contain the second container 3 in a substantially complete manner.

In practice, once inserted in the seat 20, the second container 3 is completely closed in the first container 2, with an upper side or grip side 34 of the second container 3 remaining accessible to the user, when the lid 4 is raised; when the lid 4 is closed, the second container 3 is completely covered and is in practice isolated with respect to the outside environment.

As shown in the Figures 2 and 4, the upper side 34 of the second container 3 is preferably provided with a grip element 31, e.g., a handle, for the manual extraction of the second container 3 itself from the seat 20.

As shown in Figure 3, the seat 20 of the first container 2 is defined by a lower bottom 24 and by four side walls 25, substantially vertical, which rise up from the bottom 24 as far as the upper side 22 of the first container 2; preferably, the bottom 24 and the walls 25 of the seat 20 are sized in such a way as to touch respective sides 32, 33 of the second container 3, possibly leaving a certain amount of play to facilitate extraction.

To be precise, the second container 3 and the seat 20 have a substantially similar shape, to define a male/female coupling, with or without play.

In practice, the seat 20 is shaped in such a way as to allow the second container 3 inserted therein a single degree of freedom of movement in the direction of extraction and insertion.

Once the lid 4 has been closed, the second container 3 is also constrained with respect to the displacement in the direction of extraction and can therefore be transported together with the first container 2 to which it is therefore integrally coupled.

As can be seen in Figure 3, the seat 20 has a bottom 24 having a complementary shape with respect to a support side 33 of the second container 3, opposite the grip side 34.

Even more in detail, the support side 33 of the second container 3 can be provided with an outer cap 35 for closing its filling opening; in this case, the bottom 24 of the seat 20 shapes a housing 26 to receive to size the cap 35 of the second container 3.

Furthermore, the support side 33 of the second container 3 and the bottom 24 of the seat 20 can have respective curved contact surfaces, convex and concave respectively (as in the figures) or vice versa.

As can be appreciated in particular in the Figures 2 and 4, the second container 3 can shape a shaped recess 36 which defines a housing to receive a dispensing nozzle.

In detail, the housing for the nozzle is defined between the shaped recess 36 of the second container 3 and the side walls 25 of the seat 20, when the second container 3 is inserted in the seat 20.

The shaped recess 36 can be substantially obtained at at least one corner of the grip side 34 of the second container 3.

The operation of the proposed tank 1 is described below.

The first and the second container 2, 3 are filled with diesel fuel and AdBlue respectively.

Afterwards, the second container 3 is inserted “head down” in the seat 20 of the first container 2 and the lid 4 is closed.

At this point, the tank 1 full of both fuels is loaded on the transport vehicle, resting on the base of the first container 2.

Once it reaches its destination, e.g., a piece of land on which a tractor is working, the tank 1 is unloaded and moved close to the tractor itself.

The operator opens the lid 4 and, by means of the pump and the dispenser, fills the specific tank mounted on the tractor with diesel fuel.

Afterwards, the operator extracts the second container 3, by pulling the handle 31, overturns it and connects the pump to the opening so as to be able to fill the AdBlue tank with which the tractor is equipped.

The two diesel fuel and AdBlue dispensing phases can of course be reversed.

It can therefore be appreciated how the invention fully overcomes the drawbacks of known tanks, inasmuch as by using the proposed tank 1, only one article is moved, not only during transport on board the vehicle but also during the unloading and displacement of the tank 1 from the transport vehicle to the tractor or other vehicle to be refuelled.

CLAIMS

1) Fuel transport tank (1), comprising at least a first container (2) and at least a second container (3), said first container (2) being provided with at least a seat (20) in which said second container (3) is inserted in a removable manner.

2) Tank (1) according to the preceding claim, wherein the first container (2) is larger in size than the second container (3).

3) Tank (1) according to at least one of the preceding claims, wherein said seat (20) is defined by a recess which is shaped by the outer walls of the first container (2).

4) Tank (1) according to at least one of the preceding claims, wherein said second container (3) and the seat (20) of the first container (2) have a substantially polyhedral shape.

5) Tank (1) according to at least one of the preceding claims, wherein the second container (3) and the seat (20) have at least a quadrangular profile.

6) Tank (1) according to at least one of the preceding claims, wherein the seat (20) is adapted to contain the second container (3) in a substantially complete manner.

7) Tank (1) according to at least one of the preceding claims, wherein the seat (20) of the first container (2) is defined by a bottom (24) and by side walls (25), which are sized in such a way as to touch respective sides (32, 33) of the second container (3).

8) Tank (1) according to at least one of the preceding claims, wherein the tank (1) and the seat (20) have a substantially similar shape, to define a male/female coupling.

9) Tank (1) according to at least one of the preceding claims, wherein the seat (20) is shaped in such a way as to allow the second container (3) inserted therein a single degree of freedom of movement in the direction of extraction and insertion.

10) Tank (1) according to at least one of the preceding claims, wherein the first container (2) comprises a base side (21) on which it can be rested and an opposite upper side (22) wherein the seat (20) is formed.

11) Tank (1) according to the preceding claim, wherein said seat (20) is defined

by a cavity which extends from said upper side (22) towards the inside of the first container (2), to allow said second container (3) to be inserted from above.

12) Tank (1) according to at least one of the preceding claims, wherein the seat (20) has a bottom (24) having a complementary shape with respect to a support side (33) of the second container (3).

13) Tank (1) according to the preceding claim, wherein said support side (33) of the second container (3) can be provided with an outer cap (35) for closing a filling opening, said bottom (24) of the seat (20) shaping a housing (26) to receive said cap (35).

14) Tank (1) according to claim 12 or claim 13, wherein said support side (33) of the second container (3) and the bottom (24) of the seat (20) have respective curved contact surfaces.

15) Tank (1) according to at least one of the preceding claims, wherein one side of the second container (3) is provided with a grip element (31) for the extraction thereof from the seat (20).

16) Tank (1) according to at least one of the preceding claims, wherein the second container (3) shapes a shaped recess (36) to define a housing to receive a dispensing nozzle.

17) Tank (1) according to the preceding claim, wherein said shaped recess (36) is obtained at at least one corner of said second container (3).

18) Tank (1) according to at least one of the preceding claims, comprising a lid (4) hinged to the first container (2) which, once closed, is adapted to cover the seat (20) and the second container (3).

19) Tank (1) according to at least one of the preceding claims, wherein on the second container (3) a pump is mounted which is connected to a dispenser.

20) Tank (1) according to the preceding claim, wherein said pump is fluid-dynamically connectable to a filling opening of the first container (2) and/or to a filling opening of the second container (3).

21) Tank (1) according to at least one of the preceding claims, wherein the first and the second container (2, 3) are each made in a single body piece.

22) Tank (1) according to at least one of the preceding claims, wherein the first and the second container (2, 3) are made of polyethylene.

23) Tank (1) according to at least one of the preceding claims, wherein the first container (2) comprises diesel fuel and the second container (3) comprises an aqueous solution of urea.

Fig.1

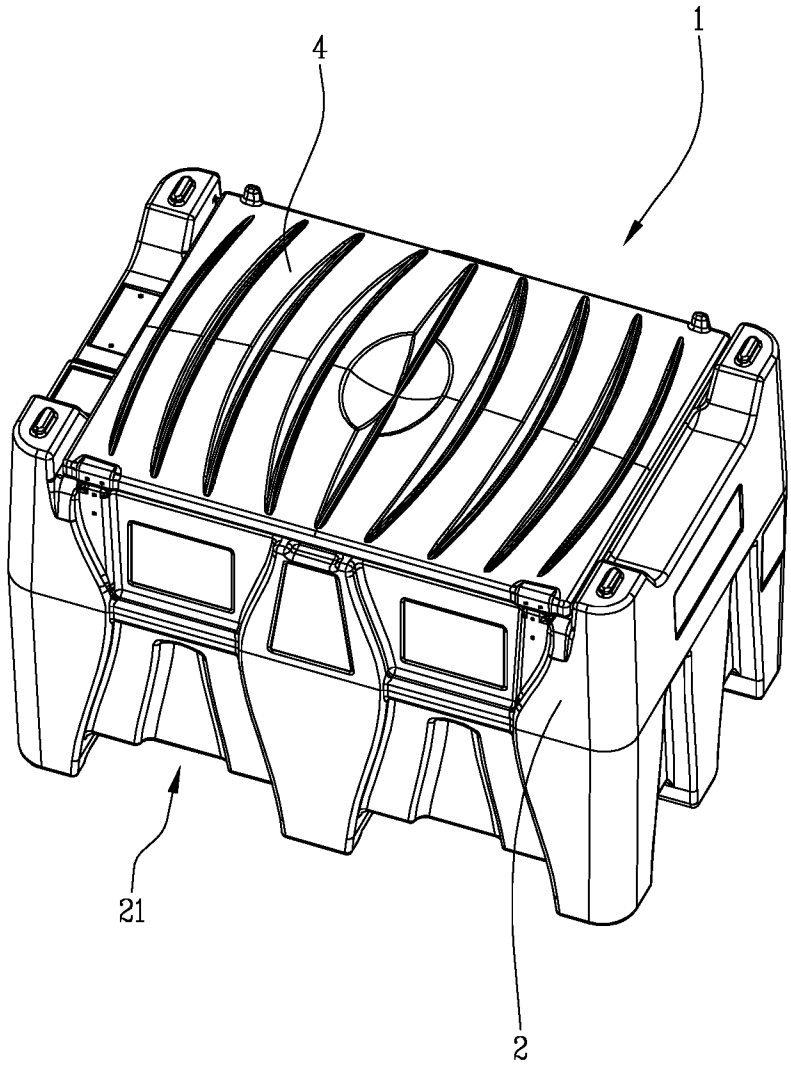


Fig.2

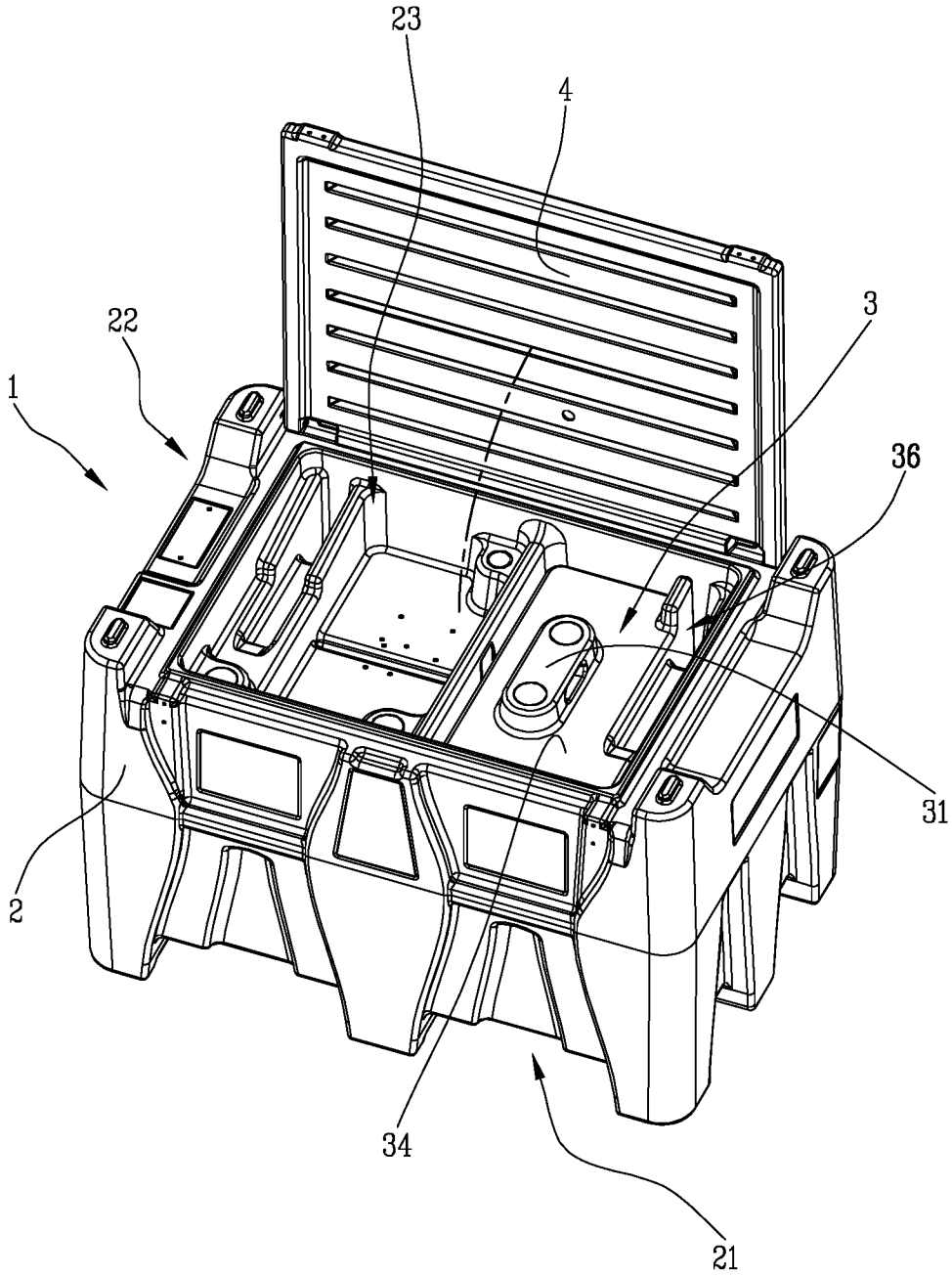
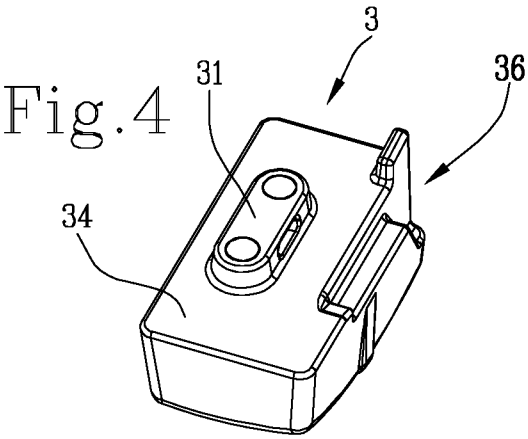


Fig.4



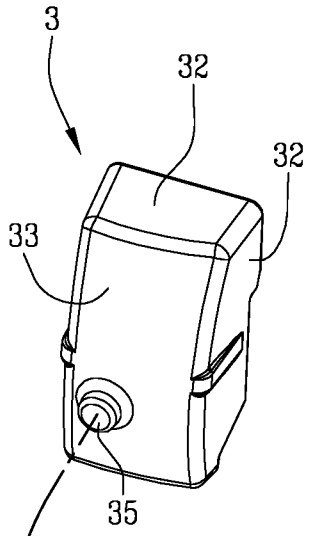
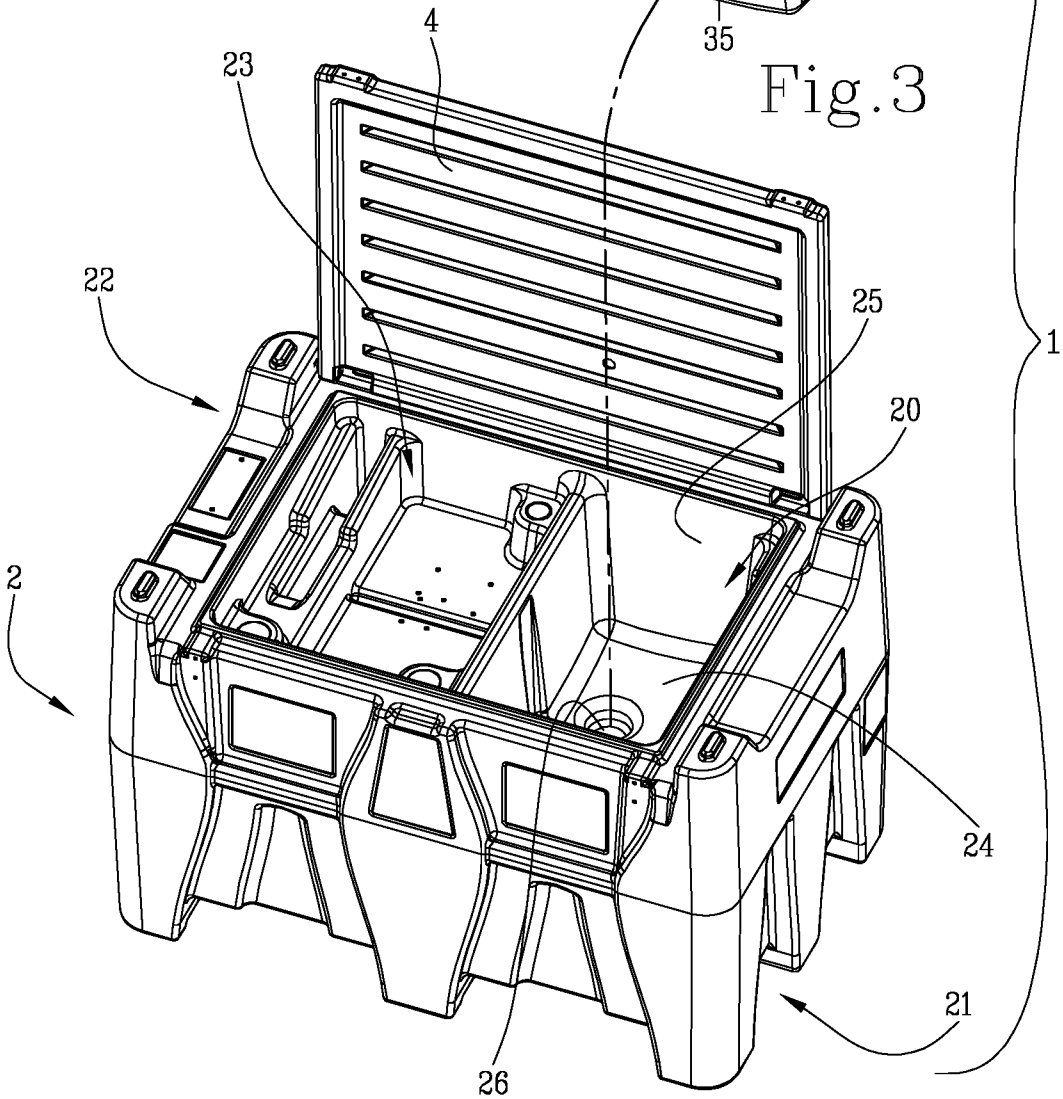


Fig.3



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2017/051917

A. CLASSIFICATION OF SUBJECT MATTER
INV. B67D7/84
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)
B67D B60K

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

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Y	DE 10 2013 002582 A1 (STIERMANN ERWIN [DE]) 14 August 2014 (2014-08-14) figures 5-10	1-12, 14-23
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A	US 2010/282758 A1 (GADEN DALE D [US] ET AL) 11 November 2010 (2010-11-11) figures 4a-4c	1-23

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☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
10 July 2017	19/07/2017

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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