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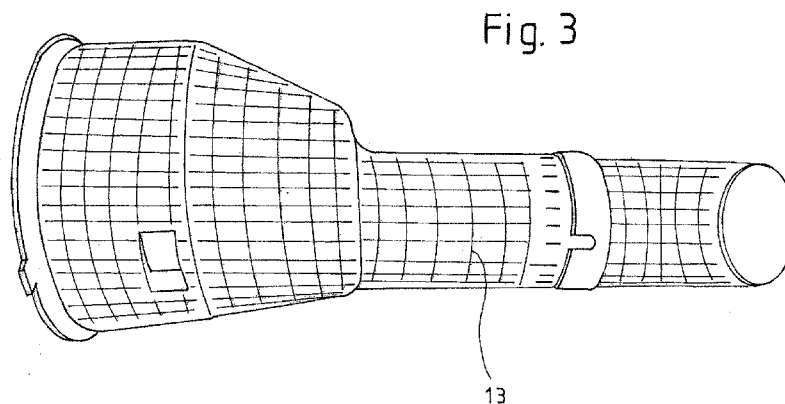
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(54) Title: METHOD OF PRODUCING A DEFLECTOR DEVICE FOR FUEL-REFILLING SYSTEMS AND CONSTRUCTION KIT WITH PREFABRICATED COMPONENTS FOR PRODUCING A DEFLECTOR DEVICE PROTOTYPE



(57) Abstract: The invention relates to a method (1) of producing a deflector devices for fuel tank systems comprising the following steps: production (2) of a deflector device prototype (14) from prefabricated components (10, 11, 12) of a construction kit (9), performance (3) of fuel-refilling tests using the deflector device prototype (14), possible modification (4) of the deflector device prototype (14), creation (5) of a construction model for the deflector device prototype (14), production (6) of a deflector device according to the construction model, optional performance (7) of fuel-refilling tests with the deflector device produced according to the construction model and preferably series production (8) of the deflector device according to the construction model. The invention further relates to a construction kit (9) with prefabricated components (10, 11, 12) for producing a prototype (14) of a deflector device for fuel tank systems.

Method of producing a deflector device for fuel-
refilling systems and construction kit with
prefabricated components for producing a deflector
device prototype

5

The invention relates to a method of producing
deflector devices for fuel-refilling systems. The
invention further relates to a construction kit with
prefabricated components for producing a deflector
10 device prototype for fuel-refilling systems.

Deflector devices integrated in fuel tank systems are
used to position the nozzle reliably in the filler neck
and to prevent the fuel from expanding and foaming back
15 when filling up, which can lead to the fuel-refilling
process being ended prematurely. The deflector devices
in this case are individually developed, constructed
and tested for each newly constructed fuel tank system.

20 With the method of producing deflector devices for fuel
tank systems known in the art, a prototype was produced
at a first stage using deflector sections from pre-
produced fuel tank systems, wherein deflector sections
from the pre-produced fuel tank systems were bonded
25 together. The prototype produced was then used to
perform fuel-refilling tests and was modified until the
fuel-refilling result met all the requirements. The
prototype thereby created was scanned and recorded by
means of a 3D scanner. The point cloud resulting from
30 the 3D scan was used to produce a construction model,
for example a CAD model. This construction model was
used to produce a prototype by means of a laser
sintering process, wherein this prototype was usually
produced by an external supplier. For different
35 reasons, such as limitations within the production
process, for example, the prototype produced according
to the construction model did not correspond to the
original prototype, which was produced using deflector
sections from pre-produced fuel tank systems. The

prototype produced according to the construction model therefore had to be checked using further fuel-refilling tests. The prototype produced according to the construction model had to be recalibrated following
5 modification, in order to produce a new construction model and to produce a prototype on the basis thereof. This process was repeated until the prototype produced according to the construction model met all the requirements. A mould was then produced in order to
10 manufacture the deflector device in series by injection moulding. At a final stage, the deflector devices created by means of the mould were tested with further fuel-filling tests.

15 In the case of the method known in the art for the production of deflector devices for fuel tank systems, a plurality of prototypes normally had to be produced by laser sintering, as the combination of different deflector sections from different pre-produced fuel
20 tank systems could result in a form that was not producible by injection moulding. Consequently, the newly constructed part did not correspond to the tested part. The production of a plurality of prototypes, the calibration and construction thereof and also the
25 production thereof by laser sintering resulted in a long, high-cost development process.

The invention therefore addresses the problem of simplifying methods of producing deflector devices for
30 fuel tank systems and shortening the development time for the deflector device for fuel tank systems.

The problem is solved by a method of producing deflector devices for fuel tank systems comprising the
35 following steps:
production of a deflector device prototype from prefabricated components of a construction kit,

performance of fuel-refilling tests using the deflector device prototype,
possible modification of the deflector device prototype,
5 creation of a construction model for the deflector device prototype,
production of a deflector device according to the construction model,
optional performance of fuel-refilling tests with the
10 deflector device produced according to the construction model
and
preferably series production of the deflector device according to the construction model.

15 The method according to the invention is based on the deflector device prototype being composed of prefabricated components of a construction kit. This particularly simplifies the creation of the
20 construction model for the deflector device prototype, as only prefabricated components of a construction kit are used. Consequently, the deflector device subsequently produced according to the construction model corresponds precisely to the deflector device
25 prototype made up of prefabricated components from the construction kit. Fuel-refilling tests may be optionally conducted to check again that the deflector device produced according to the construction model meets all the requirements for deflector devices. The
30 construction model created is preferably used subsequently for series production of the deflector device, for example by means of injection moulding. Series production of the deflector device may also be undertaken by an outside supplier. The development time
35 is considerably reduced by the method of producing deflector devices for fuel tank systems according to the invention, as there is no need for a plurality of prototypes to be produced by laser sintering.

According to a variant of the method according to the invention, the construction kit for producing the deflector device prototype exhibits prefabricated deflector base bodies, prefabricated inserts for the deflector base bodies for receiving a filler neck and prefabricated bends with different radii and/or lengths. The base bodies exhibit an expanded area in which the inserts can be used. The internal geometry of the expanded area is preferably standardized.

Furthermore, the base body exhibits a cylindrical area, wherein the length and the setting angle differ between the different base body designs. The prefabricated components of the construction kit are preferably designed such that they can be produced subsequently by injection moulding, so that there are no differences between the prototypes made up of prefabricated components from the construction kit and the deflector devices produced according to the construction model.

In a variant of the method according to the invention, the prefabricated components of the construction kit are made of plastic, metal, casting compound such as epoxy resin, for example, or glass.

In a further variant of the method according to the invention, the prefabricated components of the construction kit are produced by a rapid prototyping method, such as stereolithography, injection moulding, milling, turning, vacuum blowing and/or laser sintering, wherein the production method used depends for example on the material of the prefabricated component from the construction kit.

In a preferred variant of the invention, the construction models for the prefabricated components of the construction kit are stored on a computer facility, wherein the construction model of the deflector device prototype is created by means of the construction

models of the prefabricated components of the construction kit, which were used to produce the deflector device prototype. Since a construction model was stored on the computer facility for each of the individual prefabricated components of the construction kit, the construction model for the deflector device prototype can easily be created by combining the construction models for the prefabricated components of the construction kit. In particular, scanning of the deflector device prototype is thereby avoided.

In accordance with a further variant of the invention, the prefabricated components of the construction kit are provided with grid lines. By means of these grid lines, modifications to the prefabricated components of the construction kit can easily be recorded during production of the deflector device prototype and integrated into the construction model.

Transferring the modification to the prefabricated components of the construction kit to the construction model for the deflector device prototype by means of the grid lines thereby enables the prefabricated components of the construction kit to be adapted according to the invention without the deflector device prototype created having to be scanned by means of a 3D scanner to create the construction model.

In a further variant of the method according to the invention, the position of the prefabricated components of the construction kit used to produce the deflector device prototype relative to one another is determined by means of a scale applied to a prefabricated component, such as the deflector base body, for example, and a marking applied to a component connected thereto, such as a bend, for example. Alternatively, a marking is applied to the deflector body, for example, and the component connected thereto, such as a bend,

exhibits a scale. The deflector base body advantageously displays a scale, for example, in the area in which a bend is attached to the deflector base body and the bend attached to the deflector base body
5 exhibits a marking in the area of the connection with the deflector base body. By determining the position of the marking on the scale, the position of the components of the construction kit relative to one another can thereby be easily determined and
10 transferred to the construction model.

In an advantageous variant, the prefabricated components used to produce the prototype are detachably connected to one another, using the tongue-and-groove
15 principle, for example. The deflector device prototype can thereby be easily produced from prefabricated components of the construction kit. The prototype can easily be adapted by exchanging the prefabricated components of the construction kit due to the
20 detachable connection of the components of the construction kit to one another, until the fuel-refilling tests meet all the requirements for the deflector device.

25 The invention further relates to a construction kit with prefabricated components for the production of a prototype of a deflector device for fuel tank systems comprising:

at least two prefabricated deflector base bodies;
30 at least two prefabricated inserts for the deflector base bodies, designed to receive a filler neck;
at least two prefabricated bends with different radii and/or lengths.

35 By means of a construction kit of this kind according to the invention with prefabricated components, a prototype of a deflector device for fuel tank systems can be produced for the method according to the

invention for producing deflector devices for fuel tank systems. Using the construction kit according to the invention with prefabricated components has the advantage that a construction model of the deflector
5 device prototype can then easily be produced and said prototype is producible by injection moulding, for example.

In a variant of the construction kit according to the
10 invention, the prefabricated components of the construction kit are made of plastic, metal, a casting resin such as epoxy resin, for example, or glass and are produced by a rapid prototyping method, such as stereolithography, injection moulding, milling,
15 turning, vacuum blowing and/or laser sintering, for example. The prototype can therefore be produced subsequently according to one of the aforementioned methods from one of the aforementioned materials.

20 In a preferred variant of the construction kit according to the invention, the components of the construction kit exhibit grid lines on their surface, at least in part. By means of these grid lines, modifications to the components of the construction kit
25 can be transferred to the construction model of the prototype, without the prototype having to be scanned by means of a 3D scanner.

According to a further preferred variant of the
30 construction kit according to the invention, the components of the construction kit exhibit a scale or a marking at least in part, wherein the marking of the one fitted component is disposed following assembly with a further component in close proximity to the
35 scale of said further component. The position of the components of the construction kit can thereby be determined relative to one another following creation

of the deflector device prototype and transferred to the construction model.

5 In an advantageous variant of the construction kit according to the invention, a prefabricated deflector base body of the construction kit exhibits a scale at the end which is connected to a bend, and the bend exhibits a marking at the end which is connected to the deflector base body. The scale and marking therefore
10 lie in close proximity to one another and the position of the deflector base body and the bend attached thereto relative to one another can be determined easily and precisely.

15 According to a further variant of the construction kit according to the invention, the construction kit components are detachably connected to one another by means of a tongue-and-groove system, for example. This makes it easier for a prototype to be produced until it
20 meets all the requirements for the deflector device being produced in fuel-refilling tests, wherein the components used from the construction kit can easily be exchanged to produce the prototype.

25 In accordance with a further variant of the construction kit according to the invention, attachment points are provided within the deflector base body and/or the insert, in order to arrange an element between two internal faces of the deflector base body
30 and/or of the insert. For example, the attachment points are in the form of recesses in the wall of the deflector base body or of the insert and the element is a web that can be clamped into said recesses. By means of the element disposed within the deflector base body
35 and/or the insert, a filler neck introduced therein can be at least partly fixed and/or the penetration depth of the filler neck can be limited. For improved fixing, the inserted element may be additionally bonded or

welded to the inner wall of the deflector base body or of the insert. The inserted element may exhibit a plurality of forms, although it is preferably configured as a web.

5

The invention is explained in greater detail below with the help of the exemplary embodiments shown in the figures.

10 In the figures:

Figure 1 shows a flow diagram of a method according to the invention,

15
20
Figures 2a to 2c show prefabricated components of a construction kit according to the invention and20
Figure 3 shows a prototype of a deflector device made up of prefabricated components from a construction kit.25
30
35
Figure 1 shows the flow of a method 1 according to the invention for producing a deflector device for fuel tank systems. At a first stage 2 a prototype 14 of a deflector device is produced from prefabricated components 10, 11, 12 from a construction kit 9. Fuel-refilling tests 3 are then conducted using the prototypes 14 of the deflector device. If the prototype 14 of the deflector device should fail to meet all the requirements for the deflector device, said prototype 14 of the deflector device is adapted 4 until it meets all the requirements for the deflector device in the tank-refilling tests 3 performed. For prototypes 14 of the deflector device, which satisfy all requirements for the deflector device, a construction model 5 is created. Using the construction model, a deflector device is produced 6 which is optionally rechecked by

conducting further fuel-refilling tests 7, to see whether all requirements for deflector devices have been fulfilled.

- 5 With the help of the construction model created, series production 8 of the deflector device according to the construction model may preferably take place.

10 The advantageous feature of the method 1 according to the invention is that the prototype 14 of the deflector device is made 2 of prefabricated components 10, 11, 12 from a construction kit 9. The prefabricated components 10, 11, 12 from the construction kit 9 are configured such that the prototype 14 produced therefrom is
15 producible in production terms by means of injection moulding, for example. It is thereby achieved that the deflector device produced according to the construction model for the prototype 14 of the deflector device corresponds to the prototype and does not require
20 modification on account of production requirements. This results in a significant reduction in development time for the deflector device for fuel tank systems.

The construction kit 9 for production 2 of the
25 prototype 14 of the deflector device exhibits prefabricated deflector base bodies 10, prefabricated inserts 11 for the deflector base body 10 for receiving a filler neck and prefabricated bends 12 with different radii and/or lengths.

30 The prefabricated components 10, 11, 12 of the construction kit 9 are produced from plastic, metal or casting compound such as epoxy resin, for example, or glass, according to a rapid prototyping method, for
35 example, such as stereolithography, injection moulding, milling, turning, vacuum blowing and/or laser sintering.

Construction models for the prefabricated components 10, 11, 12 of the construction kit 9 are preferably stored in a computer facility, wherein the construction model for the prototype 14 of the deflector device is
5 created by means of the construction models of the prefabricated components 10, 11, 12 from the construction kit 9, which were used for production 2 of the prototype 14 of the deflector device. Since a construction model is stored in the computer facility
10 for each prefabricated component 10, 11, 12 of the construction kit 9, the construction model for the prototype 14 of the deflector device can easily be created by combining the construction models for the prefabricated components 10, 11, 12 from the
15 construction kit 9, which were used in the production 2 of the prototype 14 of the deflector device.

The prefabricated components 10, 11, 12 of the construction kit 9 are provided with grid lines 13, at
20 least in part. By means of these grid lines 13, modifications to the prefabricated components 10, 11, 12 of the construction kit 9 can be transferred to the construction model for the prototype. Modifications of this kind to the prefabricated components 10, 11, 12 of
25 the construction kit 9 may, for example, be openings in the peripheral walls.

The position of the prefabricated components 10, 11, 12 of the construction kit 9 relative to one another,
30 which were used to produce 2 the prototype 14 of the deflector device, is determined by means of a scale 15 applied to a prefabricated component 10, 11, 12, such as the deflector base body 10, for example, and a marking applied to a component 10, 11, 12 connected
35 thereto, such as a bend 12, for example. This alignment of the prefabricated components 10, 11, 12 from the construction kit 9, which were used to produce 2 the prototype 14 of the deflector device, may be

transferred into the construction model for the prototype 14.

5 The prefabricated components 10, 11, 12 from the construction kit used to produce 2 the prototype 14 are detachably connected to one another using the tongue-and-groove principle, for example. The prototype 14 of the deflector device can thereby be easily adapted 4.

10 Illustrated in Figures 2a to 2c is a construction kit 9 according to the invention with prefabricated components 10, 11, 12 for the production of a prototype 14 of a deflector device for fuel tank systems. The prototype 14 of the deflector device for fuel tank
15 systems is preferably produced according to the method described above in this case. The construction kit 9 comprises at least two prefabricated deflector base bodies 10, wherein an exemplary prefabricated deflector base body 10 is illustrated in Figure 2a. The deflector
20 base body 10 exhibits an upper expanded area in which an insert 11 can be used. The deflector base body 10 subsequently exhibits a conical area and a lower cylindrical area.

25 The construction kit 9 according to the invention further comprises at least two prefabricated inserts 11 for the deflector base body 10 configured to receive a filler neck. An exemplary insert 11 for the deflector base body 10 is depicted in Figure 2b.

30 The internal geometry of the deflector base body 10 and the external geometry of the inserts 11 are preferably coordinated with one another in this case, such that all prefabricated inserts 11 can be used in all
35 prefabricated deflector base bodies 10.

The construction kit 9 according to the invention further comprises at least two prefabricated bends 12

with different radii and/or lengths. Exemplary prefabricated bends 12 are depicted in Figure 2c.

By means of the construction kit 9 according to the invention with prefabricated components 10, 11, 12, shown in Figures 2a to 2c, a prototype 14 of a deflector device for fuel tank systems can be created, as with the implementation of the previously described method according to the invention.

10

The prefabricated components 10, 11, 12 of the construction kit 9 may be made of plastic, metal, a casting compound such as epoxy resin, for example, or glass and depending on the material used are produced by a rapid prototyping method such as stereolithography, injection moulding, milling, turning, vacuum blowing and/or laser sintering, for example.

Figure 3 shows a prototype 14 of a deflector device for fuel tank systems. The prototype 14 is made up of a prefabricated deflector base body 10, a prefabricated insert 11 and a prefabricated bend 12 from the construction kit 9 according to the invention.

25

As shown in Figure 3, the components 10, 11, 12 of the construction kit 9 comprise grid lines on their surface, at least in part. By means of the grid lines 13 on the surface of the prefabricated components 10, 11, 12 of the construction kit 9, modifications to the prefabricated components 10, 11, 12 of the construction kit 9 can be transferred to the construction model for the prototype 14 of the deflector device.

The components 10, 11, 12 of the construction kit 9 exhibit at least in part a scale 15 or a marking 16, wherein the marking 16 of the one component 12 is disposed following assembly with a further component 10

in close proximity to the scale 15 of said further component 10. As shown in Figure 3, the deflector base body 10 exhibits a scale 15 on the end, which is connected to a bend 12 and the bend 12 exhibits a marking 16 on the end, which is connected to the deflector base body 10. The position of the deflector base body 10 in relation to the bend 12 can therefore be determined using the scale 15 and the marking and transferred to the construction model for the prototype 14.

The components 10, 11, 12 of the construction kit 9 according to the invention are configured such that they can be detachably connected to one another, for example by means of a tongue-and-groove system. Consequently, a prototype created by means of components 10, 11, 12 from the construction kit 9 according to the invention, as shown in Figure 3, for example, can be adapted by exchanging individual components 10, 11, 12 of the construction kit 9.

Reference number list

1. Method
2. Production of a prototype
- 5 3. Fuel-refilling tests
4. Possible modification of the prototype
5. Creation of a construction model
6. Production of a deflector device
7. Optional fuel-refilling tests
- 10 8. Series production
9. Construction kit with prefabricated components
10. Deflector base body
11. Insert for deflector base body
12. Bend
- 15 13. Grid lines
14. Prototype
15. Scale
16. Marking

Claims

1. Method (1) of producing a deflector device for fuel tank systems comprising the following steps:
5 production (2) of a deflector device prototype (14) from prefabricated components (10, 11, 12) of a construction kit (9),
performance (3) of fuel-refilling tests using the deflector device prototype (14),
10 possible modification (4) of the deflector device prototype (14),
creation (5) of a construction model for the deflector device prototype (14),
production (6) of a deflector device according to the construction model,
15 optional performance (7) of fuel-refilling tests with the deflector device produced according to the construction model and
preferably series production (8) of the deflector device according to the construction model.
20
2. Method (1) according to Claim 1, characterized in that
the construction kit (9) for producing (2) the
25 deflector device prototype (14) exhibits prefabricated deflector base bodies (10), prefabricated inserts (11) for the deflector base bodies (10) for receiving a filler neck and prefabricated bends (12) with different radii
30 and/or lengths.
3. Method (1) according to Claim 1 or 2, characterized in that
the prefabricated components (10, 11, 12) of the
35 construction kit (9) are made of plastic, metal, casting compound such as epoxy resin, for example, or glass.

4. Method (1) according to one of Claims 1 to 3,
characterized in that
the prefabricated components (10, 11, 12) of the
construction kit (9) are produced by one of the
5 present methods: stereolithography, injection
moulding, milling, turning, vacuum blowing and/or
laser sintering.
- 10 5. Method (1) according to one of Claims 1 to 4,
characterized in that
construction models for the prefabricated
components (10, 11, 12) of the construction kit
(9) are stored on a computer facility, wherein the
construction model of the deflector device
15 prototype (14) is created by means of the
construction models of the prefabricated
components (10, 11, 12) of the construction kit
(9), which were used to produce (2) the deflector
device prototype (14).
20
6. Method (1) according to one of Claims 1 to 5,
characterized in that
the prefabricated components (10, 11, 12) of the
construction kit (9) are provided at least in part
25 with grid lines (13).
7. Method (1) according to Claim 6,
characterized in that
modifications to the prefabricated components (10,
30 11, 12) of the construction kit (9) can be
transferred to the construction model for the
deflector device prototype (14) by means of the
grid lines (13).
- 35 8. Method (1) according to one of Claims 1 to 7,
characterized in that
the position of the prefabricated components (10,
11, 12) of the construction kit (9) used to

- produce (2) the deflector device prototype (14) relative to one another is determined by means of a scale (15) applied to a prefabricated component (10, 11, 12), such as the deflector base body (10), for example, and a marking (16) applied to a component (10, 11, 12) connected thereto, such as a bend (12), for example.
- 5
9. Method (1) according to one of Claims 1 - 8, characterized in that
- 10 the prefabricated components (10, 11, 12) of the construction kit (9) used to produce (2) the prototype (14) are detachably connected to one another using the tongue-and-groove principle, for example.
- 15
10. Construction kit (9) with prefabricated components (10, 11, 12) for the production of a prototype (14) of a deflector device for fuel tank systems comprising:
- 20 at least two prefabricated deflector base bodies (10);
- at least two prefabricated inserts (11) for the deflector base bodies (10), designed to receive a filler neck and
- 25 at least two prefabricated bends (12) with different radii and/or lengths.
11. Construction kit (9) according to Claim 10 characterized in that
- 30 the prefabricated components (10, 11, 12) of the construction kit (9) are made of plastic, metal, a casting resin such as epoxy resin, for example, or glass and are produced by stereolithography, injection moulding, milling, turning, vacuum blowing and/or laser sintering.
- 35

12. Construction kit (9) according to one of Claims 10 and 11,
characterized in that
the components (10, 11, 12) of the construction
kit (9) exhibit grid lines (13) on their surface,
at least in part.
13. Construction kit (9) according to one of Claims 10 to 12,
characterized in that
the components (10, 11, 12) of the construction
kit (9) exhibit a scale (15) or a marking (16) at
least in part, wherein the marking (16) of the one
fitted component (12) is disposed following
assembly with a further component (10) in close
proximity to the scale (15) of said further
component (10).
14. Construction kit (9) according to Claim 13,
characterized in that
the deflector base bodies (10) of the construction
kit (9) exhibit a scale (15) at the end which is
connected to a bend (12), and the bend (12)
exhibits a marking at the end which is connected
to the deflector base body (10).
15. Construction kit (9) according to one of Claims 10 to 14,
characterized in that
the components (10, 11, 12) of the construction
kit (9) are detachably connected to one another by
means of a tongue-and-groove system, for example.
16. Construction kit (9) according to one of Claims 10 to 15,
characterized in that
attachment points are provided within the
deflector base body (10) and/or the insert (11),

- 20 -

in order to arrange an element between two
internal faces of the deflector base body (10)
and/or of the insert (11).

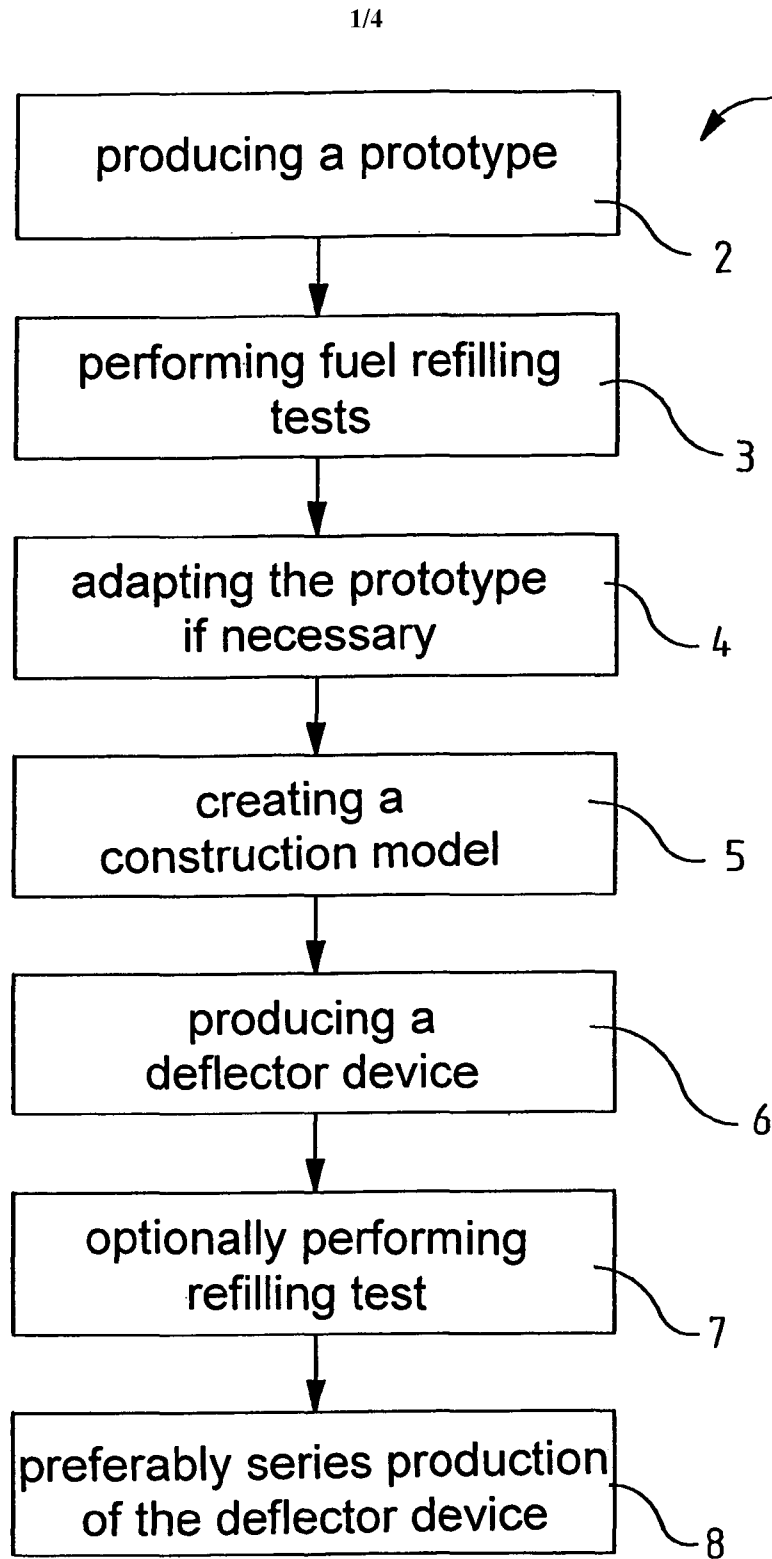


Fig. 1

Fig. 2a

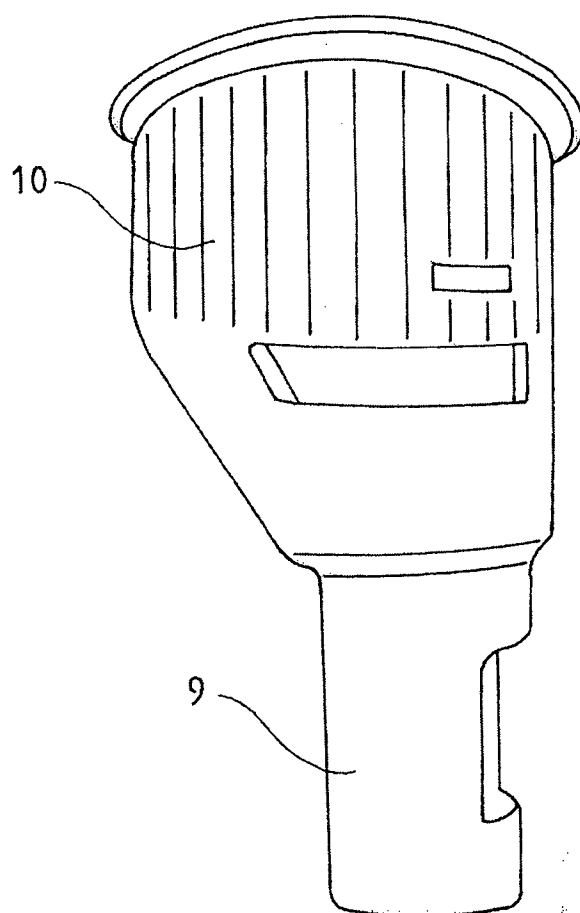


Fig. 2b

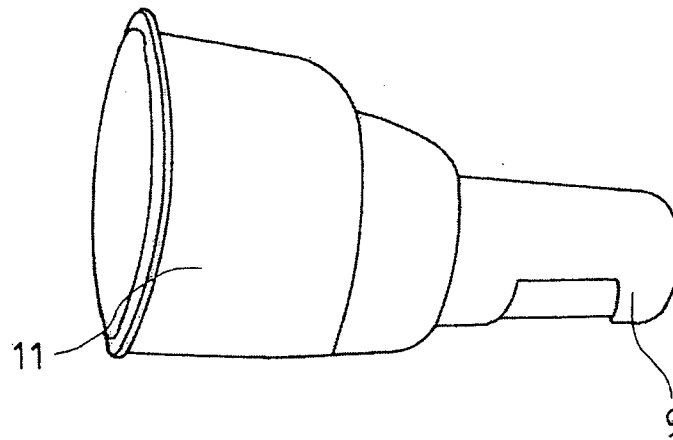


Fig. 2c

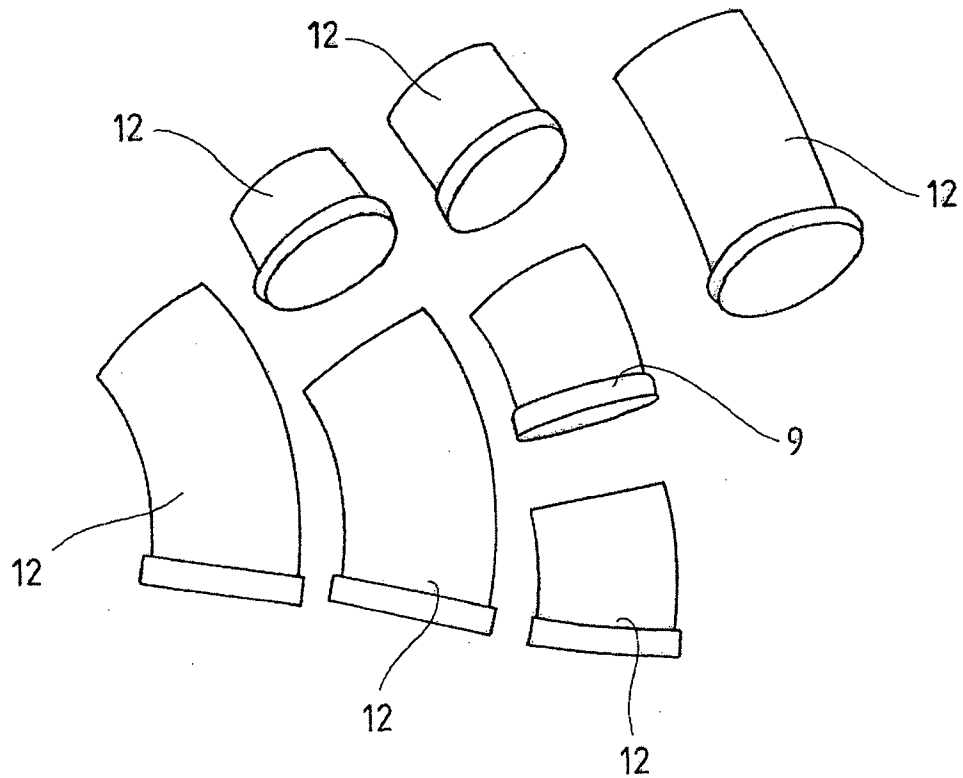
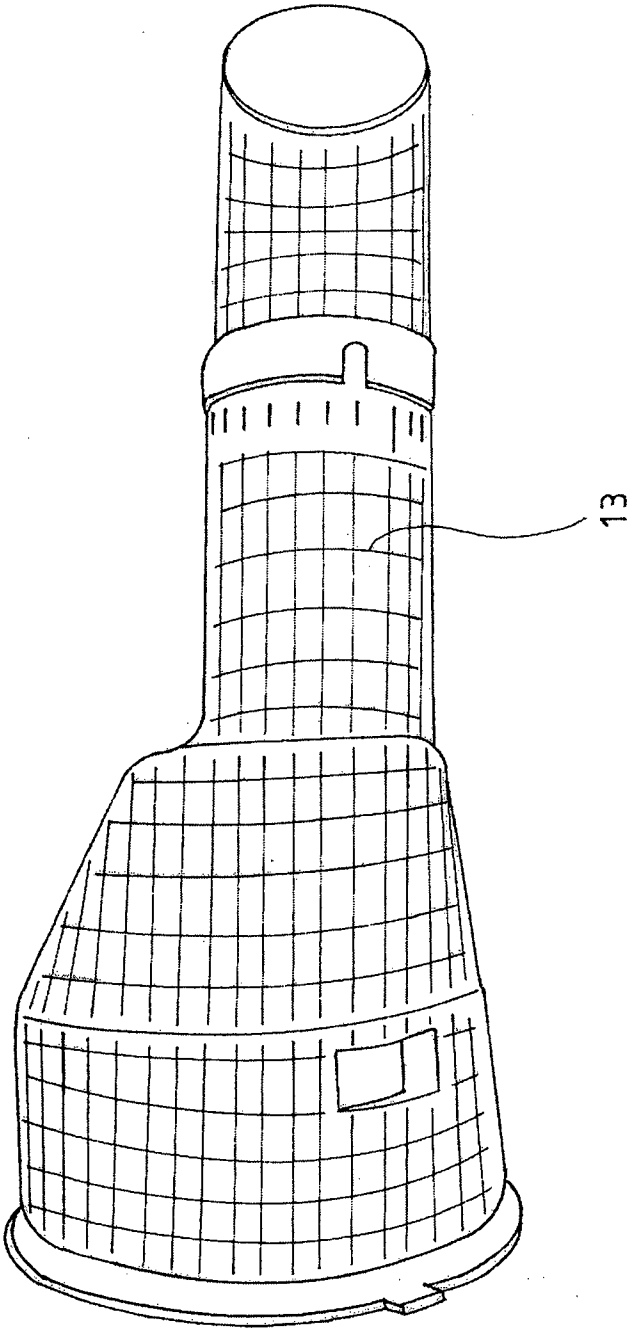


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2012/004431

A. CLASSIFICATION OF SUBJECT MATTER

INV. B62D65/00 G06T17/10
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)

B62D G06T

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 216 785 A2 (ALSTOM POWER NV [NL] ALSTOM SWITZERLAND LTD [CH] ALSTOM TECHNOLOGY LTD) 26 June 2002 (2002-06-26) the whole document	1-9
X	DE 43 40 646 A1 (MEC GMBH [DE]) 1 June 1995 (1995-06-01) the whole document	1-9
A	US 5 003 498 A (OTA YOSHIMI [JP] ET AL) 26 March 1991 (1991-03-26) figures 2a-2b	1-9



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

18 January 2013

Date of mailing of the international search report

28/01/2013

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/004431

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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			US 5819388 A 13-10-1998
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