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(54) **Device and method for protecting a catalyst and/or a vehicular particulate trap from theft, in particular for industrial vehicles**

(57) Device for protecting (1) a catalyst and/or a vehicular particulate trap (23) from theft, in particular for

industrial vehicles comprising at least a box-shaped body (10, 16, 17, 18, 19) and fixing means (14, 15) for fixing the box-shaped body to fixed parts (21) of a vehicle.

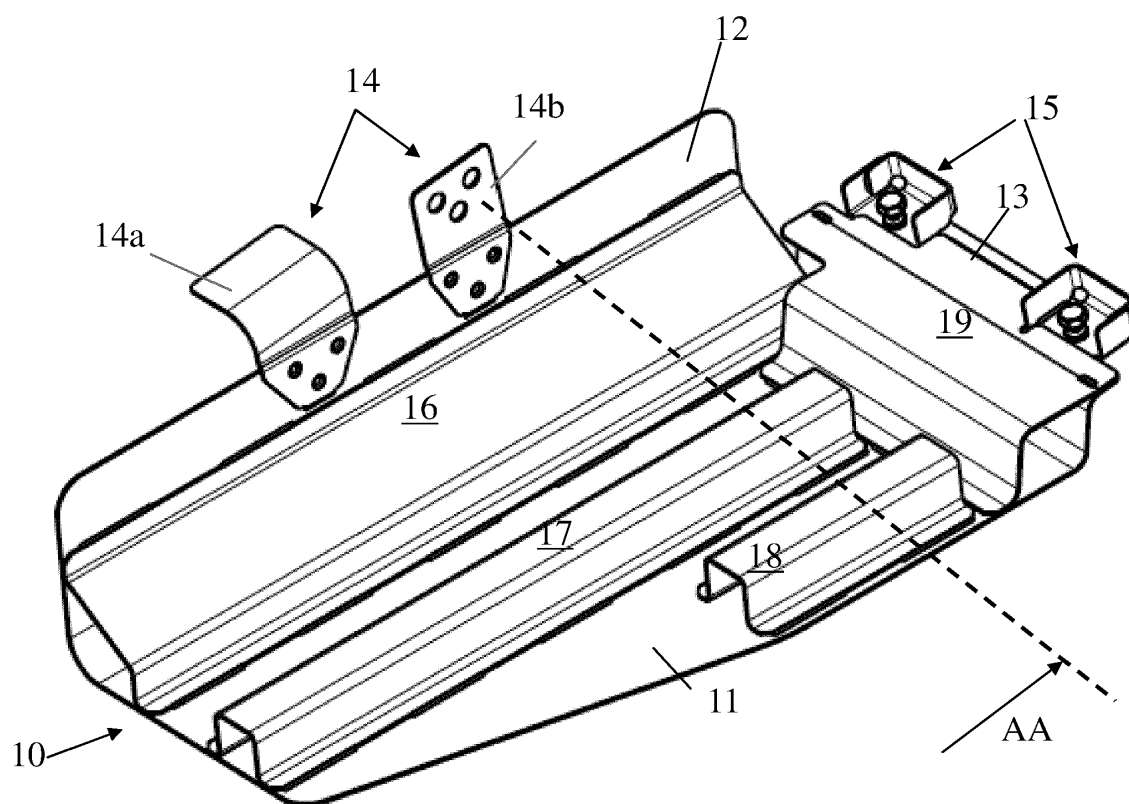


Fig. 1

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Description

Application field of the invention

[0001] The present invention refers to the field of devices and methods for protecting a catalysts and/or a vehicular particulate traps from theft, in particular for industrial vehicles.

Description of the prior art

[0002] In the field of motor vehicles, especially industrial vehicles or those vehicles which have a significant height from the ground, providing devices for preventing the theft of the catalyst and/or of the particulate trap is a priority. The theft of such components can usually be performed in the space of a few minutes when the vehicle is unattended and vulnerable.

[0003] Thieves usually slip under the vehicle and disconnect the catalyst and/or the trap from the manifold and from the muffler or from the catalyst, downstream, depending of what they intend to steal.

[0004] In some cases, in order to speed up the operation, they use cordless grinders, so that they can cut the manifold and/or other support elements of the catalyst and/or of the trap. The devices known in the art are inadequate to resist to the use of cordless grinders, which are able to cut even alloy steel in a short time.

Summary of the invention

[0005] It is thus the object of the present invention to overcome all the drawbacks mentioned above and to provide a device for protecting a catalyst and/or a vehicular particulate trap from theft, in particular for industrial vehicles.

[0006] More in particular, the aim is to make the stealing operations long and complex, in order to discourage the ill-intentioned persons.

[0007] It is thus object of the present invention a device for protecting a catalyst and/or a vehicular particulate trap from theft, in particular for industrial vehicles, according to claim 1.

[0008] Another aim of the present invention is to provide a method for protecting a catalyst and/or a vehicular particulate trap from theft, in particular for industrial vehicles, which allows to prevent the theft of such valuable components, at least during short stops, namely lasting less than thirty minutes with the vehicle resting on the ground.

[0009] A further aim of the present invention is to provide a vehicle equipped with a protection device as described above, comprising, possibly, further construction details which contribute to reach the aforementioned aim.

[0010] The claims are an integral part of the present description.

Brief description of the Figures

[0011] Further purposes and advantages of the present invention will become clear from the following detailed description of a preferred embodiment (and its alternative embodiments) and the drawings that are attached hereto, which are merely illustrative and non-limitative, in which:

- 10 figure 1 shows a perspective view of a possible embodiment of the device according to the present invention;
- figure 2 shows a part of the device according to figure 1;
- 15 figure 3 shows a section view according to the section AA of figure 1;
- figure 4 shows a bottom view, in a plan, of a vehicle equipped with the device according to the previous figures;
- 20 figure 5 shows a side view of the same vehicle.

[0012] In the figures the same reference numbers and letters identify the same elements or components.

Detailed description of preferred embodiments of the invention

[0013] A possible embodiment of the device 1 according to the present invention is shown in the figures from 1 to 3. Figure 1 shows a perspective view of the device, which, according to the present invention, is box-shaped.

[0014] In particular it comprises an outer part 10, intended to face towards the outside, for example downwards, and at least an inner part 16 - 19 intended to face towards the catalyst or trap 23 to be protected, so that hooking components of the catalyst or trap are protected from the bottom of the vehicle, which is usually the only way to reach such components. Said outer part 10 of the device 1 is shown in figure 4.

[0015] In the example shown in figures from 1 to 3, such outer part 10 is obtained by a flat plate 11 having the shape of a right-angled trapezoid, with two folded edges such that they can be fixed to the vehicle.

[0016] The shape of the plate may vary according to the position of the catalyst or trap 23 in relation to the fixed parts of the vehicle, such as, for example, the side members 21.

[0017] With particular reference to figures 1 and 2, the edges 12 and 13 are folded preferably at 90° with respect to the plane of the plate 11.

[0018] Such edges comprise respective fixing means 14 and 15 to the vehicle.

[0019] The outer part 10, together with at least one of the inner elements from 16 to 19, defines at least a box-shaped body.

[0020] Such internal elements carry out several functions related to the strengthening of the device, in particular they avoid the outer part 10 to be deformed during

a cutting attempt by means of a grinder, by preventing the disc to reach the hooking components of the catalyst or trap 23. They also carry out a function of mechanical redundancy with respect to the outer part 10, in case the latter was damaged.

[0021] With particular reference to figure 3, it can be noted that a transversal space or distance W1 - W3 is defined between the outer part 10 and the inner elements 16 - 19. Such distance is preferably larger than the cutting length of the disc of a cordless grinder. It has to be noted that the diameter of such discs is standard. This implies, as it will be explained below, that numerous cuts have to be made on the device 1 in order to neutralize it.

[0022] According to another aspect of the present invention, the device is preferably connected to a side member of the vehicle by means of at least one of said edges 12, 13, so that it is protected by such component which is known to be extremely thick and robust.

[0023] In the embodiment shown herein, the device 1 comprises U-shaped inner elements 16 and 19 which form the same number of box-shaped profiles in correspondence of the folded edges 12 and 13 respectively.

[0024] The other inner elements 17 and 18 are preferably omega-shaped, defining, with the outer part 10, the same number of box-shaped elements. They are appropriately distanced between each other and with respect to the aforementioned elements 16 e 19.

[0025] According to a preferred alternative embodiment of the device, the folded edge 13 of the outer part 10 is shaped in order to be mounted next to a cross member 24 of the vehicle frame and comprises fixing means 15 preferably suitable to fix the device 1 to the vehicle floor. Such fixing means 15 may be, for example, a pair of seats for the same number of screws. Such fixing means, being adjacent to the cross member 24 and sunken between the cross member 24 and the plate 11, are barely accessible. Furthermore, the screws preferably need uncommon tools, such as a torx wrench, a socket wrench, etc....

[0026] The distance between the device 1 and the cross member 24 should be such to prevent the disc of a cordless grinder to cut the folded edge 13 in a point outside the box-shaped body defined with the inner element 19. In other words, it should not be possible to bypass the redundancy defined by the box-shaped body.

[0027] The folded edge 12 is shaped in order to be adherent to the side member 21 when mounted and comprises preferably a hinge 14b suitable to be fixed directly to the side member 21 of the vehicle. According to such preferred alternative embodiment, such folded edge comprises also a hook 14a which can stretch out in order to be hooked to the side member 21, when the device 1 is fixed to the vehicle. Thus, even when an ill-intentioned person cuts the hinge 14b, the hook 14a, being substantially hanging from the side member, does not allow the removal of the device 1, which would free the access to the catalyst or to the trap 23.

[0028] According to a predictable theft attempt, the ill-

intentioned person lies down under the vehicle and, being in front of the device 1, the first thing he/she does is to locate the hinge 14b. After that, he/she cuts it by means of a cordless grinder, but he/she discovers that it is fixed to the vehicle in a higher point that cannot be reached by the disc of the grinder, due to the interference of the side member 21. At this point, the ill-intentioned person detects the presence of the fixing means 15, but, since he/she does not have the necessary wrenches, he/she tries to make a cut parallel to the folded edge 13. Such cut does not have any relevant effect, since the internal element 19 connects the fixing means 15 to the plate 11, bypassing the interconnection between the parts. At this point the ill-intentioned person may make further cuts, but, since he/she does not know and cannot see from the outside the fixing points of the inner elements 16 - 19, he/she should proceed by trial and error, which implies a further waste of time, until he/she gets discouraged and goes away before the driver or the owner of the vehicle comes back.

[0029] According to another aspect of the invention, the outer part 10 is preferably at a height of 30 cm from the ground, when the device is mounted on a vehicle and the latter is in running order.

[0030] In such circumstance, an ill-intentioned person cannot put his/her elbows to the ground in order to push the grinder against the device 1. He/she is thus forced to work with his arms out straight and projecting from the body. Such position is very uncomfortable and does not allow the ill-intentioned person to exert enough force to cut and destroy the device 1 in a reasonable short time.

[0031] During the routine maintenance of the vehicle, in order to remove the device 1, the fixing means 15 are loosened, so that the device 1, hinged to the side member 21 by means of the hinge 14b may be tilted in order to free the access to the catalyst or trap 23.

[0032] When the device is tilted, the hook 14a is disengaged from the side member, thus a full removal of the device may be obtained by disconnecting the hinge 14b.

[0033] According to the present invention, it is possible to reach an effective protection of a catalyst and/or trap 23 by means of a device 1 having at least a box-shaped body. Furthermore the latter is preferably shaped in order to be adherent and/or adjacent to fixed parts of the vehicle such as side members or cross members, making sure that the fixing points are appropriately protected by such side members or cross members of the vehicle itself. In particular, the fixing points should preferably be sunken so that a possible cutting point is inside at least a box-shaped body. Furthermore, the connection screws preferably need the use of uncommon tools whose availability on the market is scarce.

[0034] From the description set forth above it will be possible for the person skilled in the art to embody the invention with no need of describing further construction details. The elements and the characteristics described in the different preferred embodiments may be combined

without departing from the scope of the present application.

Claims

1. Device for protecting (1) a catalyst and/or a vehicular particulate trap (23) from theft, in particular for industrial vehicles, the catalyst and/or the trap comprising connection means to the vehicle, the device (1) comprising at least a box-shaped body (10, 16, 17, 18, 19) and fixing means (14, 15) of the box-shaped body to fixed parts (21) of the vehicle for protecting said connection means.

2. Device according to claim 1, comprising an inner part (10) and at least an inner element (16 - 19) and wherein a transversal width (w1, w2, w3, ...) between said outer part (10) and said at least an inner element is larger than the cutting length of a disc of a cordless grinder.

3. Device according to one of the previous claims 1 - 2, wherein said outer part (10) comprises a flat plate (11) having at least a folded edge (12, 13) in correspondence of which a respective U-shaped inner element (16, 19) is associated in order to define a corresponding box-shaped body.

4. Device according to one of the previous claims 1 - 3, wherein said flat plate has at least a respective omega-shaped inner element (17, 18) in order to define a corresponding box-shaped body.

5. Device according to claims 3 and 4, wherein said box-shaped bodies are distanced between each other.

6. Device according to one of the previous claims from 3 to 5, wherein said folded edge comprises fixing means (14, 15) to a fixed part of a vehicle.

7. Device according to claim 6, wherein said vehicle comprises a side member or a cross member and said fixing means (14) comprise

- a hook (14a) shaped in order to be hooked to a side member (21) or to a cross member (24) of the vehicle and/or

- a fixing hinge suitable to be fixed to a side member (21) or to a cross member (24) and/or

- a hook (14a) shaped in order to be hooked to a side member (21) or to a cross member (24) of the vehicle and a fixing hinge suitable to be fixed to said side member (21) or to said cross member (24).

8. Device according to claim 6, wherein said vehicle

comprising a floor and said fixing means (15) comprise at least a seat for a screw shaped to be fixed to the vehicle floor.

9. Vehicle comprising a system device to one of the previous claims from 1 to 8.

10. Vehicle according to claim 9, comprising a side member (21) or a cross member (24) and wherein the device (1) is adherent to said side member or cross member or it is adjacent to said side member or cross member so that said fixing means (15) are sunken with respect to the plate (11) and to the side member or cross member and so that any possible cut by means of a cordless grinder is within said at least a box-shaped body (10, 16, 17, 18, 19).

11. Vehicle according to one of the claims from 9 to 10, wherein said external part (10), when the vehicle is in running order, is at a height lower than 30 cm from the ground.

12. Method for protecting a catalyst or a vehicular particulate trap from theft, in particular for industrial vehicles, comprising a step of arranging a protection device (1) having at least a box-shaped body (10, 16, 17, 18, 19).

13. Method according to claim 12, further comprising a step of shaping said device (1) in order to make it adherent and/or adjacent to fixed parts of the vehicle such as side members or cross members, so that the fixing points are appropriately protected by said side members or cross members.

14. Method according to claim 13, wherein said shaping step provides at least one sunken fixing point of the device (1), so that a possible cut is within said at least one box-shaped body.

15. Method according to one of the claims from 12 to 14, comprising a step of using connection screws which need the use of uncommon tools whose availability on the market is scarce.

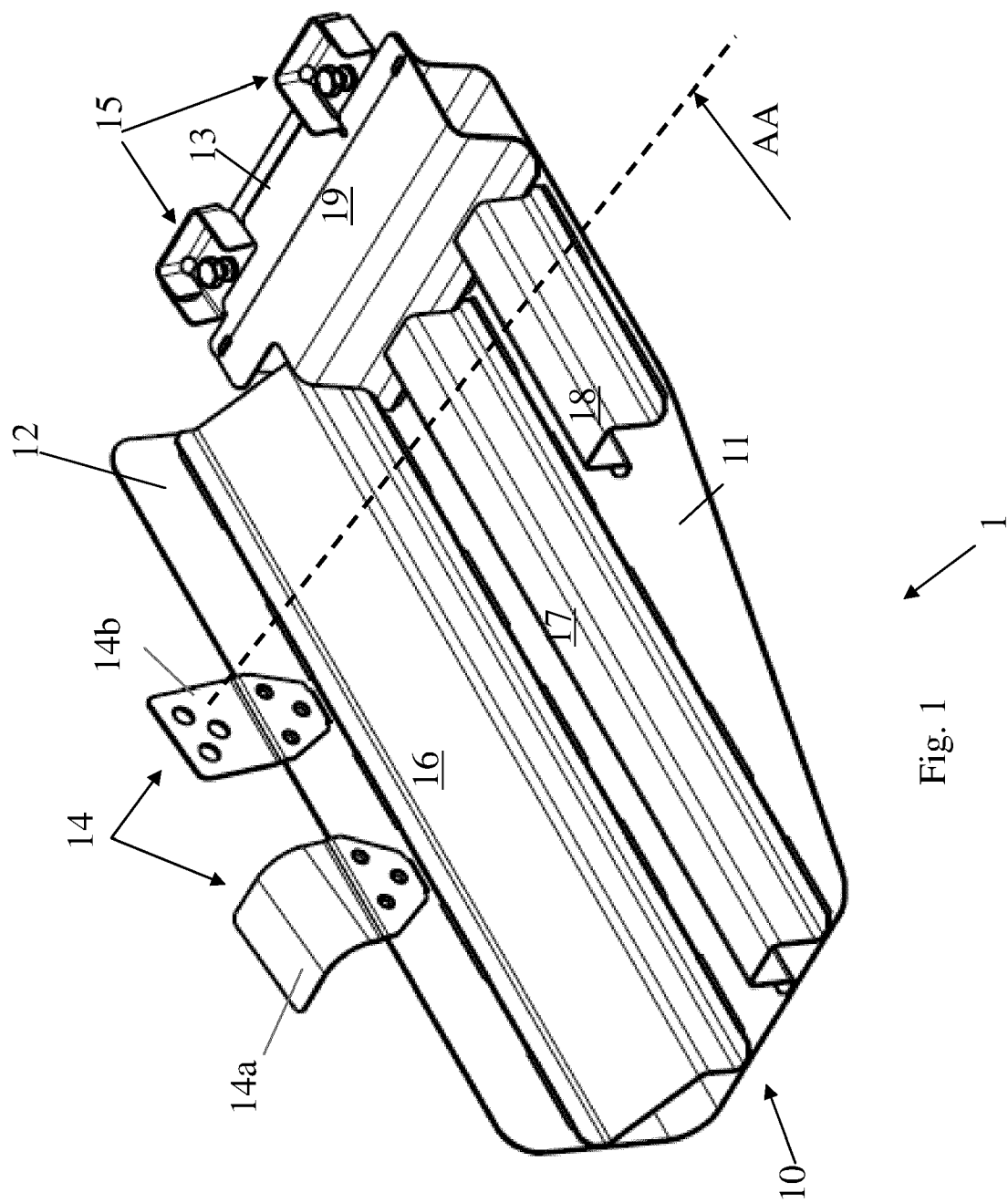


Fig. 1

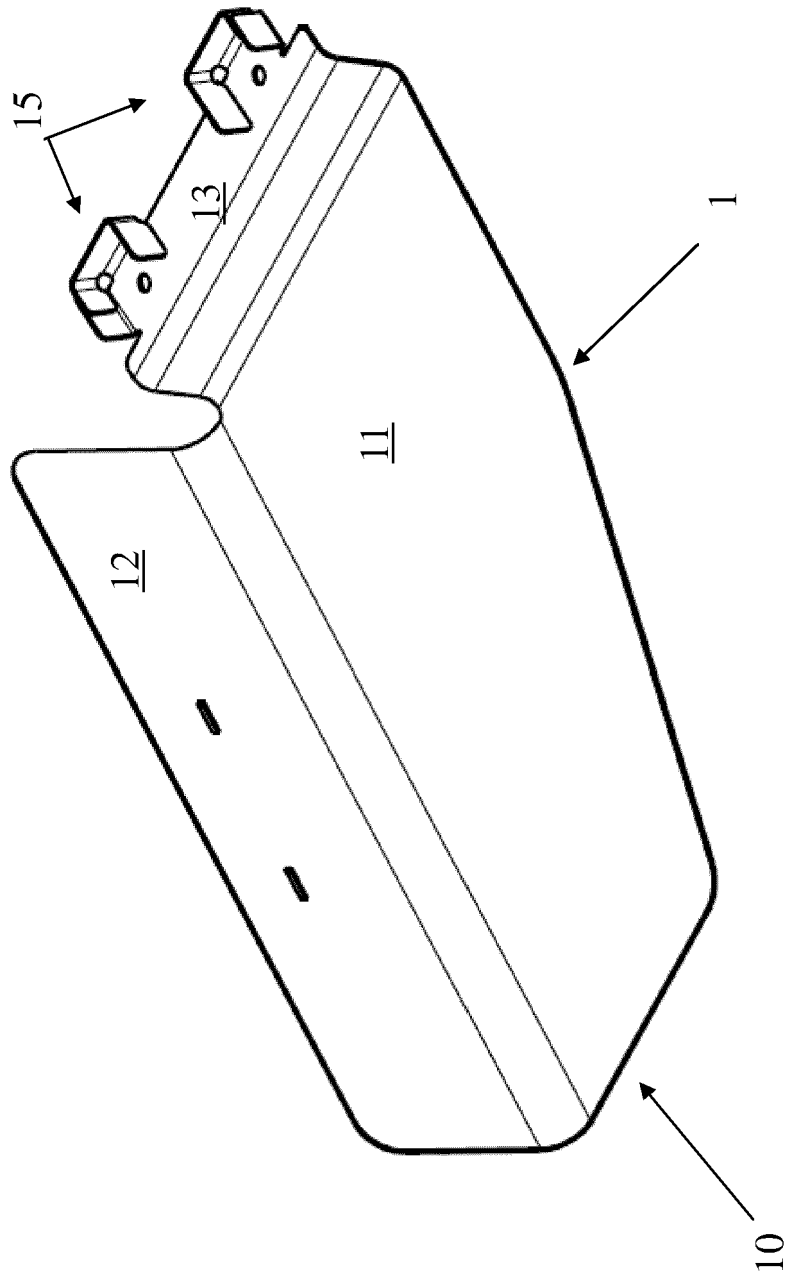


Fig. 2

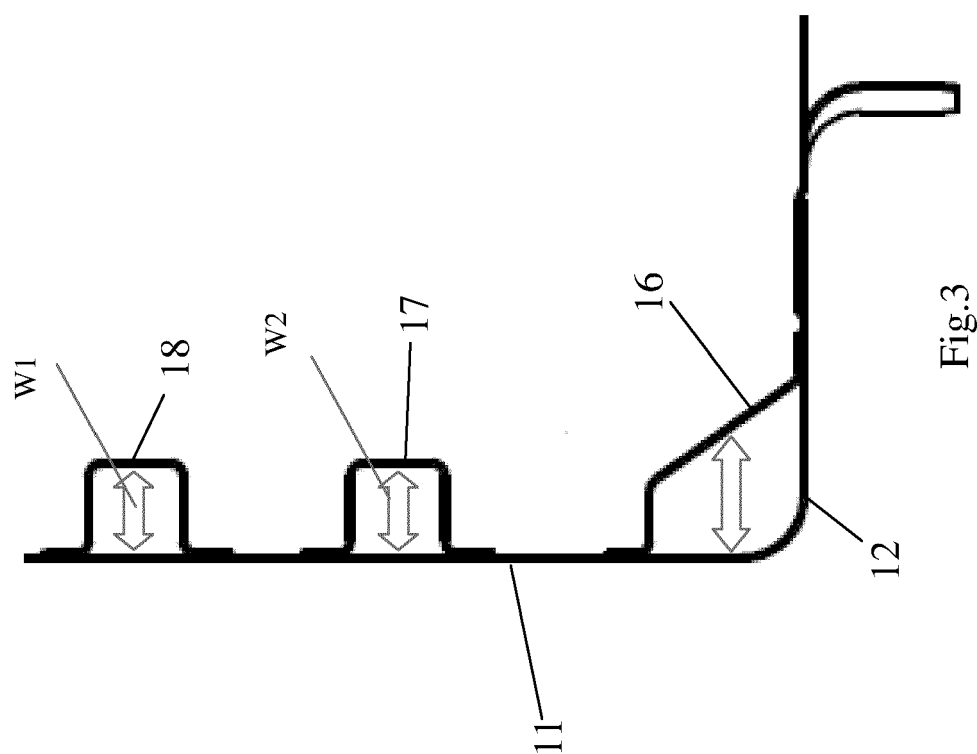


Fig.3

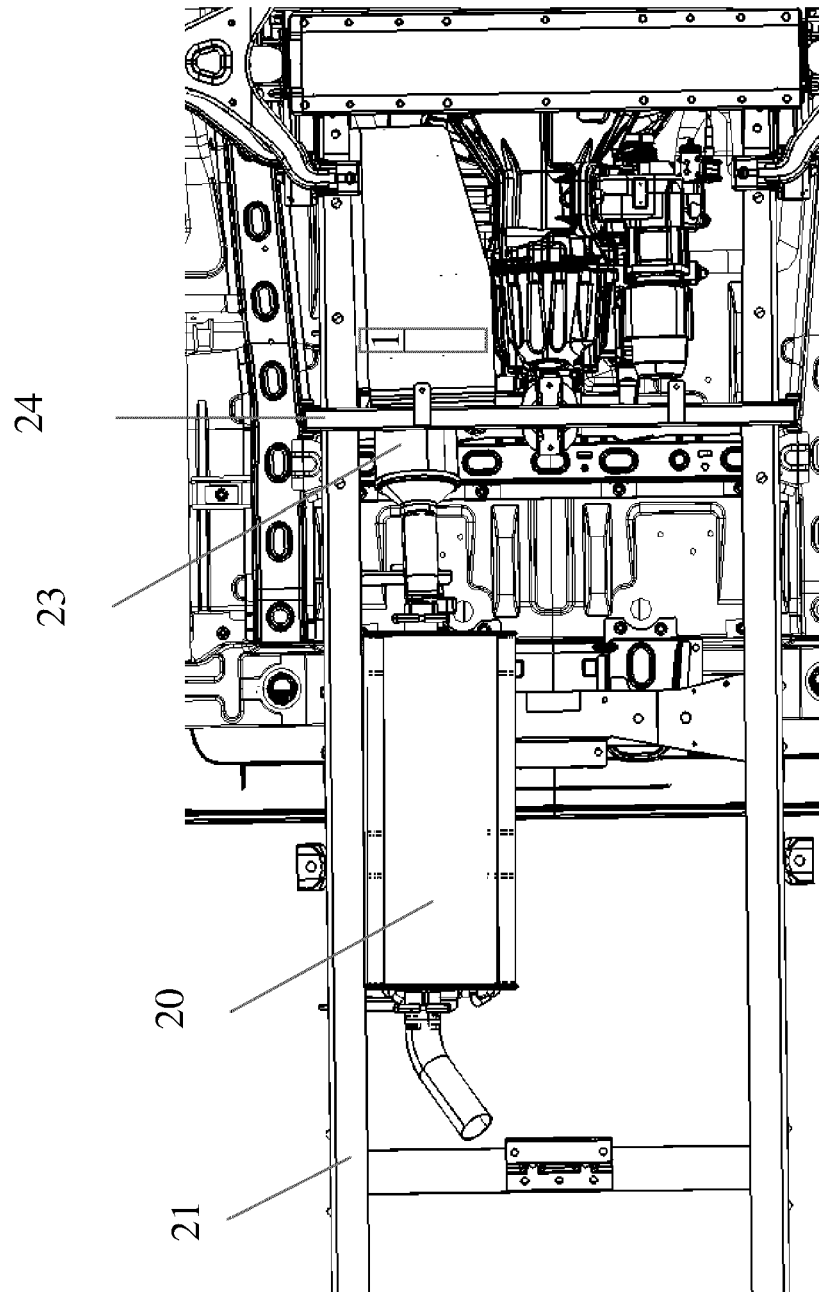


Fig. 4

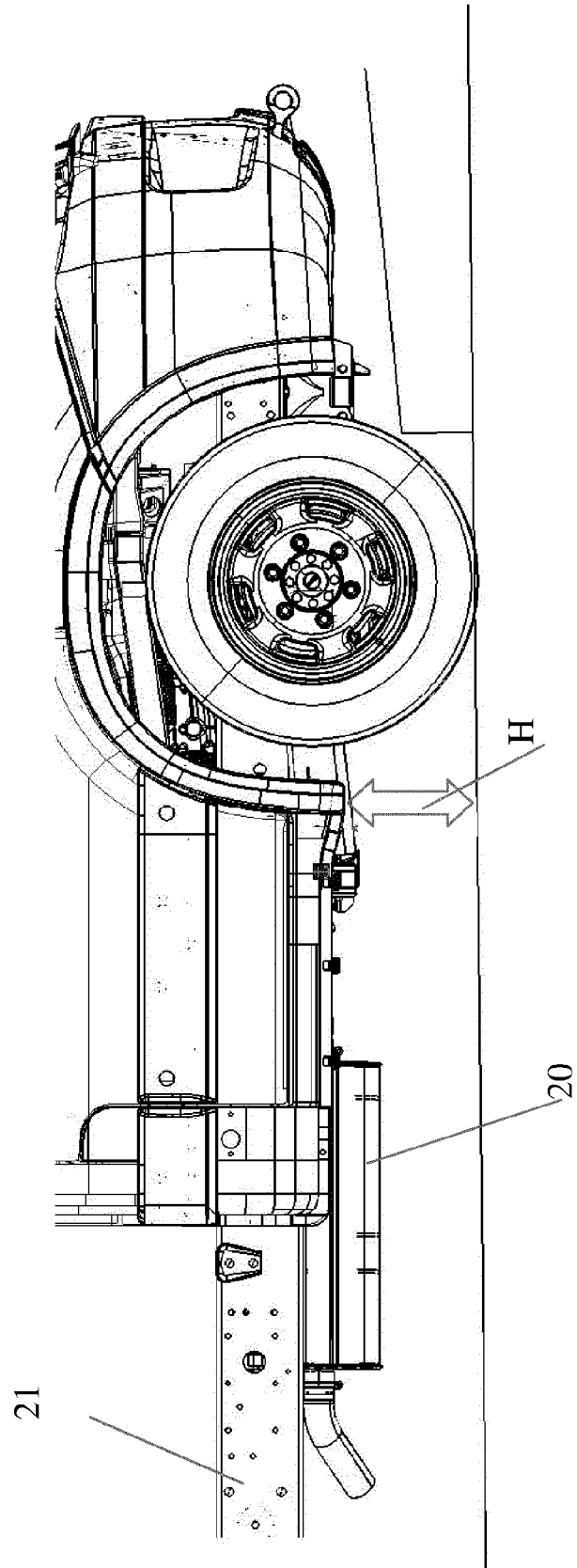


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 12 15 6513

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	US 2010/258703 A1 (MEISLAHN STEVEN [US]) 14 October 2010 (2010-10-14) * paragraph [0041] - paragraph [0043]; figure 1 *	1,2,9, 11-13,15 3,6	INV. F01N13/18
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			TECHNICAL FIELDS SEARCHED (IPC)
			F01N
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		17 July 2012	Zebst, Marc
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p> <p>& : member of the same patent family, corresponding document</p>			

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

EP 12 15 6513

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The members are as contained in the European Patent Office EDP file on
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17-07-2012

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US 2010258703	A1	14-10-2010	NONE
GB 2481574	A	04-01-2012	NONE

EPO FORM P0459

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