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(71) Applicant: **Laborex**  
**2250 Olen (BE)**

(72) Inventor: **Kuysters, Wim**  
**2250 Olen (BE)**

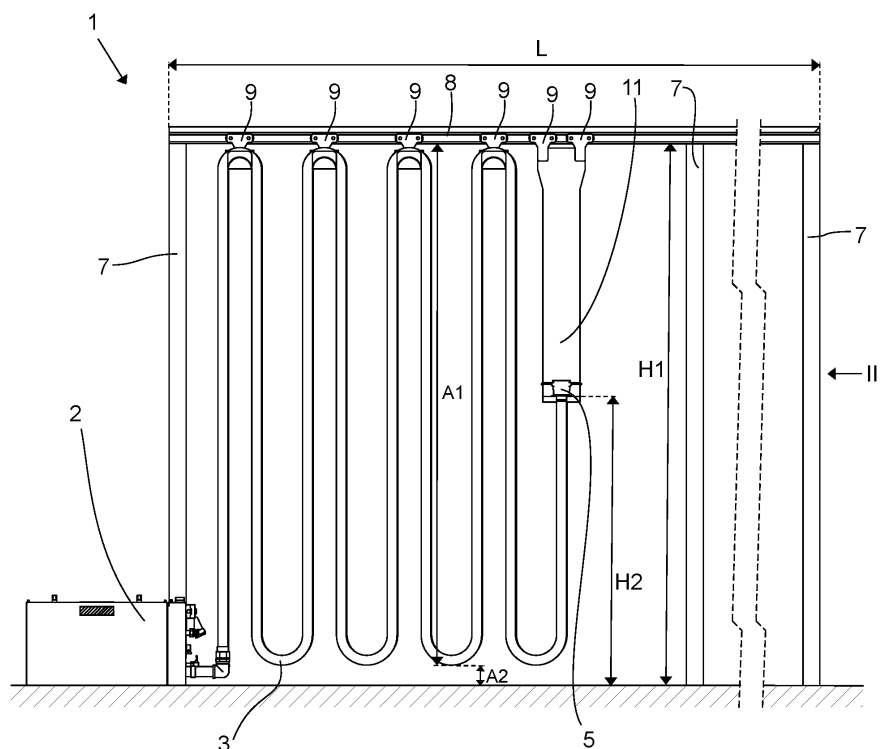
(74) Representative: **Kamphuis, Albertus Johannes**  
**Patenthuis**  
**Slachthuisstraat 120 bus 3**  
**2300 Turnhout (BE)**

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(54) **DEVICE AND METHOD FOR EMPTYING A COLLECTION TANK OF A TOILET IN A RAILWAY CARRIAGE**

(57) Device (1) for emptying a collection tank of a toilet of a railway carriage, wherein the device (1) comprises a suction device (2), wherein the device (1) comprises a suction hose (3) connected to the suction device (2), wherein the suction hose (3) is provided with a first coupling (5) for coupling the suction hose (3) to an outlet of the collection tank, wherein the device (1) is provided

with a rail (8) extending in a direction, the device (1) being provided with one or more wheel sets (9), arranged to be attached to the rail (8) and to move along the rail (8) in said direction, wherein the suction hose (3) is suspended from the one or more wheel sets (9) at one or more first positions between the suction device (2) and the first coupling (5).

**Fig. 1****EP 4 549 283 A1**

## Description

**[0001]** The invention concerns device and a method for emptying a collection tank of a toilet in a railway carriage.

**[0002]** Modern passenger trains comprise collection tanks to collect urine, faeces and toilet flush water. These collection tanks must be emptied regularly, usually daily.

**[0003]** To enable such, the collection tanks are provided with connections, in particular a connection for coupling a suction hose to be able to empty the collection tank, and a connection for coupling a supply hose for rinsing water to be able to rinse the tank.

**[0004]** In order to empty the collection tanks, facilities are present at train depots that are provided with a so-called suction post, to which said suction hose and said supply hose for rinsing water are connected. The suction posts are arranged to be able to execute a simple program that substantially consists of alternating between suction, rinsing for a certain time, and suction again. The suction hose and the supply hose are located on the ground, both during use and when not in use.

**[0005]** A device for emptying a collection tank of a toilet of a railway carriage is described in CN203063962U.

**[0006]** The known devices for emptying the collection tanks of railway car toilets have a number of disadvantages, as explained below.

**[0007]** Because the suction hose and the supply hose, and their couplings, lie on the ground, they pose a risk to the persons whose task it is to empty the collection tanks. In particular, they may step on the hoses and couplings and fall or injure their ankles. This risk is all the greater because this work is carried out when it is dark, and because the hoses may have a considerable diameter and their couplings may therefore be of considerable size.

**[0008]** Also, if the end of the suction hose is laid down, a quantity of liquid originating from the collection tank can easily flow back out of the coupling and/or the suction hose, and thereby contaminate the workplace, which is undesirable for the persons working there due to the possible presence of pathogenic micro-organisms in the collection tank.

**[0009]** There is also a risk that couplings for fresh water supply hoses, such as those used for flushing toilets and for supplying hand washing taps in the train, will become contaminated with said micro-organisms, because they are located in the same workplace and can therefore come into contact with spilled contents of the collection tank. This may also contaminate the fresh water tanks in the train carriage. Although this fresh water is explicitly advertised in the train carriages as being unsuitable as drinking water, such contamination is nevertheless undesirable.

**[0010]** Also, moving the suction hose, and to a lesser extent the supply hose, is hard work, and the hose length is limited, such that a relatively large number of devices for emptying the collection tanks are needed to empty the collection tanks of an entire train. The known devices are

therefore typically positioned with a relatively short distance between them of 13 to 15 meters.

**[0011]** In order to prevent or reduce the above-mentioned disadvantages, the invention relates to a device for emptying a collection tank of a toilet of a railway carriage, wherein the device comprises a suction device, wherein the device comprises a suction hose connected to the suction device, wherein the suction hose is provided with a first coupling for coupling the suction hose to an outlet of the collection tank, wherein the device is provided with a rail extending in a direction, the device being provided with one or more wheel sets, arranged to be attached to the rail and to move along the rail in said direction, wherein the suction hose is suspended from the one or more wheel sets at one or more first positions between the suction device and the first coupling.

**[0012]** This allows the suction hose to be used and stored in a suspended position, such that the risk of accidents is reduced.

**[0013]** In a preferred embodiment, said direction is a horizontal direction or a direction deviating less than 5° from horizontal.

**[0014]** In a preferred embodiment, the rail is located at a height of 100 cm or more, and more preferably 180 cm or more.

**[0015]** In a preferred embodiment, the rail is located at a height of 500 cm or less, and more preferably 400 cm or less.

**[0016]** In a preferred embodiment, the number of first positions is at least two, wherein the mutual distance between the first positions is at most: the height of the rail times two minus 0.20 m.

**[0017]** This allows to maximize the available height of the rail to be used to suspend the suction hose, without the suction hose touching the ground.

**[0018]** In a preferred embodiment, the mutual distance between the first positions is at least 1.5 m.

**[0019]** In a preferred embodiment, the number of first positions is at least two, wherein the mutual distance between the first positions is at least 4.0 m and at most 8.0 m.

**[0020]** In a preferred embodiment, the suction hose has a length which is at least 10.0 m and at most of 30.0 m, such that a large area, in particular the entire length of a train, can be spanned by means of two said suction hoses.

**[0021]** In a preferred embodiment, the number of said wheel sets is at least two. More preferably, the number of said wheel sets is three or four or five.

**[0022]** In a preferred embodiment, the rail has a length which is at least 7.0 m, preferably which is at least 8.0 m and more preferably which is at least 10.0 m.

**[0023]** In a preferred embodiment, the rail has a length which is at most 16.0 m and more preferably which is at most 14.0 m.

**[0024]** In a preferred embodiment, the device is provided with a holder for the first coupling, wherein the holder is arranged to suspend the first coupling there-

from.

**[0025]** This has the advantage that the first coupling does not lie on the ground and does not pose a tripping hazard. It also prevents or makes it more difficult for the contents of the suction hose to flow back out of the first coupling, such that the above-mentioned disadvantages are avoided.

**[0026]** In a preferred embodiment, the holder is suspended from the rail and the holder is arranged to move along the rail in said direction.

**[0027]** In a preferred embodiment, the holder is arranged to suspend the first coupling therefrom, in that the holder is provided with means for receiving the first coupling, wherein the means for receiving the first coupling are located at a height which is 100 cm or more and which is 240 cm or less.

**[0028]** In a preferred embodiment, the device is provided with a supply hose for supplying flushing water, wherein the supply hose is connected to a source of flushing water, wherein the supply hose is provided with a second coupling for coupling the supply hose to an inlet of the collection tank, wherein the supply hose is suspended from the one or more wheel sets at one or more second positions between the source of flushing water and the second coupling.

**[0029]** This allows the supply hose for rinsing water and the suction hose to be suspended in a clear manner next to each other on the same rail.

**[0030]** In a preferred embodiment, the holder is arranged to also suspend the second coupling therefrom.

**[0031]** In a preferred embodiment, the number of first positions is equal to the number of second positions and the mutual distance between the first positions is equal to the mutual distance between the second positions.

**[0032]** The invention also relates to a method for emptying a collection tank of a toilet of a train carriage, wherein a device according to the invention is used, wherein the suction hose is connected to the collection tank by means of the first coupling and wherein the tank is at least partially emptied by means of the suction device.

**[0033]** In order to clarify the invention, a preferred embodiment of a device according to the invention and a method according to the invention are described below, with reference to the following figures, in which:

Figure 1 shows a first horizontal view of a device according to the invention;

Figure 2 shows a component of the device of Figure 1 on a larger scale;

Figure 3 shows a second horizontal view of the device of Figure 1, as indicated by arrow III;

Figures 4 and 5 show components of the device of Figure 3 on a larger scale.

**[0034]** The device 1, shown in Figures 1 to 5, substantially consists of a suction device 2, two hoses 3,4, connected to the suction device 2, and a guide system to which the hoses 3,4 are attached in a manner that will be

explained below. Such a suction device 2 is also known in the state of the art under the name suction post. The device 1 is shown in Figures 1 to 5 in a state in which it is not in use and in which the hoses 3,4 are stored.

**[0035]** More specifically, the two hoses are a suction hose 3 for emptying a collection tank of a toilet of a train carriage and a supply hose 4 for flushing water. The suction hose 3 is provided with a first coupling 5 which is arranged to be coupled to a complementary outlet coupling of the collection tank. The supply hose 4 is provided with a second coupling 6 which is arranged to be coupled to a complementary inlet coupling of the collection tank. The suction hose 3 and the supply hose 4 both have a length of approximately 27 m.

**[0036]** The suction device 2 is connected to a source of flushing water and to a drain for contaminated water and is arranged to execute a simple program wherein two periods of suction via the suction hose 3 alternate with a period of supplying flushing water via the supply hose 4.

**[0037]** The guidance system substantially consists of two posts 7 and a rail 8 extending horizontally between the upper ends of the posts 7. The rail 8 is located at a height H1 of 320 cm and has a length L of 11 m. Six wheel sets 9 are attached to the rail 8, which are provided with wheels 10 that are complementary to the rail 8 such that the wheel sets 9 are able to move along the rail 8.

**[0038]** To two of the wheel sets 9, in particular the two wheel sets 9 that are located furthest from the suction device 2, a holder 11 is attached for the first coupling 5 and the second coupling 6. For this purpose, the holder 11 is provided with hooks 12 to hook in the first coupling 5 and the second coupling 6. The hooks 12 are located at a height H2 of 180 cm.

**[0039]** The suction hose 3 and the supply hose 4 are each attached to one of the other four wheel sets 9 at four positions along their length, such that the suction hose 3 and the supply hose 4 are suspended from the rail 8 over a distance A1 of 300 cm and therefore have a distance A2 of approximately 20 cm from the ground. The four positions along the length of the suction hose 3 and the supply hose 4 have a mutual distance of approximately 6.5 m.

**[0040]** The use of the device 1 for emptying and cleaning a collection tank of a toilet of a railway carriage is simple and as follows.

**[0041]** The holder 11 is moved along the rail 8 in a direction away from the suction device 2 until the holder 11 is in the vicinity of the outlet coupling and inlet coupling of the collection tank of the train carriage. As a result, one or more of the wheel sets 9 to which the suction hose 3 and the supply hose 4 are attached also move along the rail 8. Subsequently, the first coupling 5 and second coupling 6 are removed from the holder 11 and connected to the outlet coupling and inlet coupling of the collection tank. For the sake of completeness, it should be noted that, due to the limited length of the section of the suction hose 3 and the supply hose 4 between the suction device 2 and the nearest wheel set 9, this nearest wheel set 9 cannot move or can move only slightly. This nearest

wheel set 9 is nevertheless present to facilitate installation or removal or relocation of the suction hose 3 and the supply hose 4.

[0042] Subsequently, the above-mentioned program is carried out by the suction device 2 to empty and rinse the collection tank.

[0043] The first coupling 5 and second coupling 6 are then released and resuspended on the hooks 12 of the holder 11. Due to the height H2 of the hooks 12, the first coupling 5 and second coupling 6 can be removed from the holder 11 and resuspended at an ergonomic height.

[0044] Since the first coupling 5 and second coupling 6 are suspended with their distal end pointing upwards, no liquid can flow back from these couplings, such that the working space around the device 1 is not contaminated.

[0045] Subsequently, the holder 11 is moved back along the rail 8 until the storage position of Figure 1 is reached again. During this entire process, only a small portion of the suction hose 3 and the supply hose 4, in particular the part near the first and second couplings 5, 6, possibly may be on the ground. The remaining part of the suction hose 3 and the supply hose 4 are suspended, not in contact with the ground, on the wheel sets 9.

## Claims

1. Device (1) for emptying a collection tank of a toilet of a railway carriage, wherein the device (1) comprises a suction device (2), wherein the device (1) comprises a suction hose (3) connected to the suction device (2), wherein the suction hose (3) is provided with a first coupling (5) for coupling the suction hose (3) to an outlet of the collection tank, **characterised in that** the device (1) is provided with a rail (8) extending in a direction, the device (1) being provided with one or more wheel sets (9), arranged to be attached to the rail (8) and to move along the rail (8) in said direction, wherein the suction hose (3) is suspended from the one or more wheel sets (9) at one or more first positions between the suction device (2) and the first coupling (5).
2. Device (1) according to any one of the preceding claims, **characterised in that** said direction is a horizontal direction or a direction deviating less than 5° from horizontal.
3. Device (1) according to any one of the preceding claims, **characterised in that** the rail (8) is located at a height (H1) of 100 cm or more.
4. Device (1) according to claim 3, **characterised in that** the number of first positions is at least two, wherein the mutual distance between the first positions is at most: the height of the rail (8) times two minus 0.20 m, wherein the mutual distance between the first positions is at least 1.5 m.

5. Device (1) according to any one of the preceding claims, **characterised in that** the number of first positions is at least two, wherein the mutual distance between the first positions is at least 4.0 m and at most 8.0 m.
6. Device (1) according to any one of the preceding claims, **characterised in that** the suction hose (3) has a length which is at least 10.0 m.
7. Device (1) according to any one of the preceding claims, **characterised in that** the number of said wheel sets (9) is at least two.
8. Device (1) according to any one of the preceding claims, **characterised in that** the rail (8) has a length which is at least 7.0 m.
9. Device (1) according to any one of the preceding claims, **characterised in that** the device (1) is provided with a holder (11) for the first coupling (5), wherein the holder (11) is arranged to suspend the first coupling (5) therefrom.
10. Device (1) according to claim 9, **characterised in that** the holder (11) is suspended from the rail (8) and is arranged to move along the rail (8) in said direction.
11. Device (1) according to claim 9 or 10, **characterised in that** the holder (11) is arranged to suspend the first coupling (5) therefrom, **in that** the holder (11) is provided with means (12) for receiving the first coupling (5), wherein the means (12) for receiving the first coupling (5) are located at a height (H2) which is 100 cm or more and which is 240 cm or less.
12. Device (1) according to any one of the preceding claims, **characterised in that** the device (1) is provided with a supply hose (4) for supplying flushing water, wherein the supply hose (4) is connected to a source of flushing water, wherein the supply hose (4) is provided with a second coupling (6) for coupling the supply hose (4) to an inlet of the collection tank, wherein the supply hose (4) is suspended from the one or more wheel sets (9) at one or more second positions between the source of flushing water and the second coupling (6).
13. Device (1) according to claim 12 and any one of claims 9 to 11, **characterised in that** the holder (11) is arranged to suspend the second coupling (6) therefrom.
14. Device (1) according to claim 12 or 13, **characterised in that** the number of first positions is equal to the number of second positions and that the mutual distance between the first positions is equal to the mutual distance between the second positions.

tions.

- 15.** Method for emptying a collection tank of a toilet of a train carriage, wherein a device (1) according to any one of the preceding claims is used, wherein the suction hose (3) is connected to the collection tank by means of the first coupling (5) and wherein the tank is at least partially emptied by means of the suction device (2).

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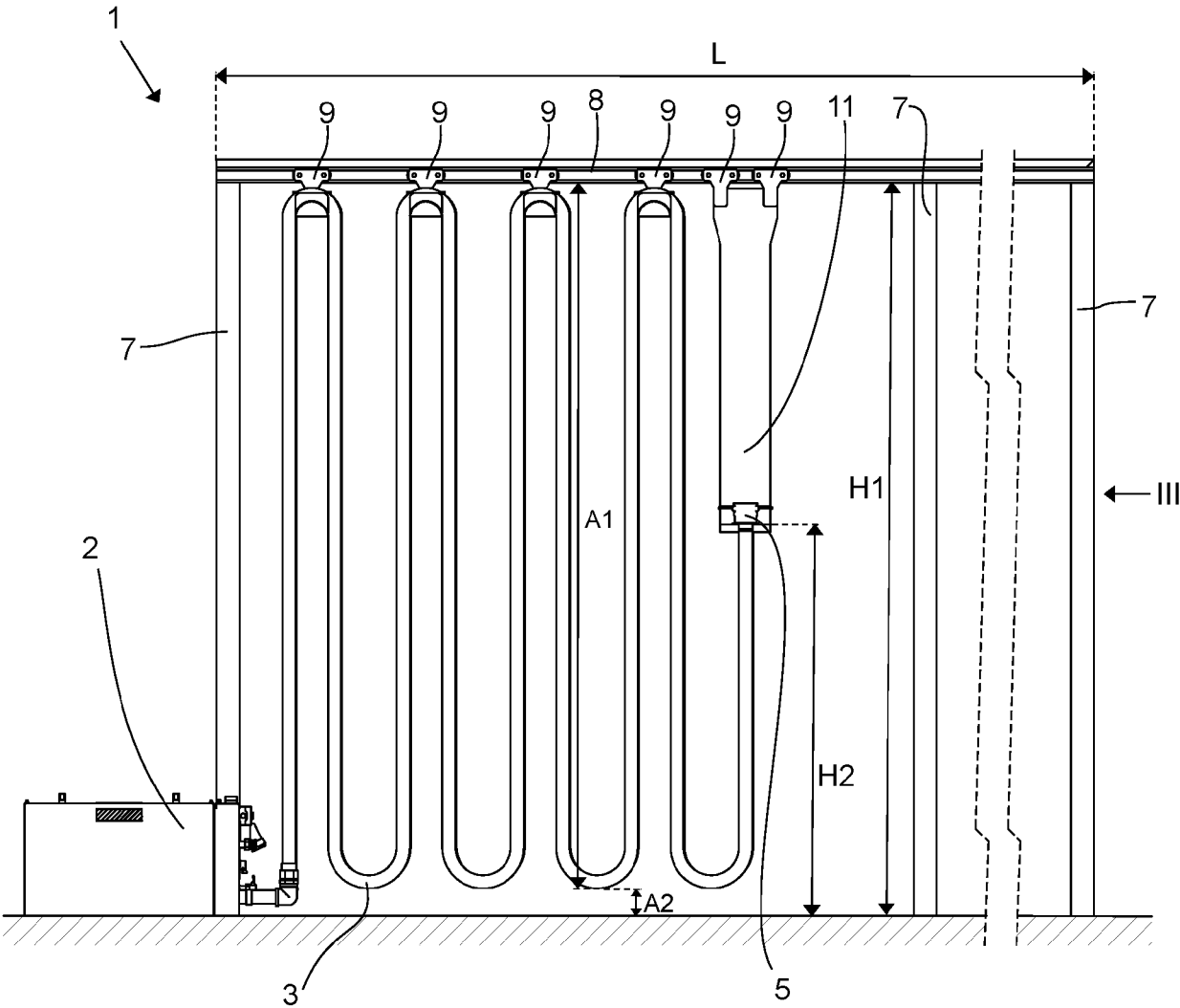


Fig. 1

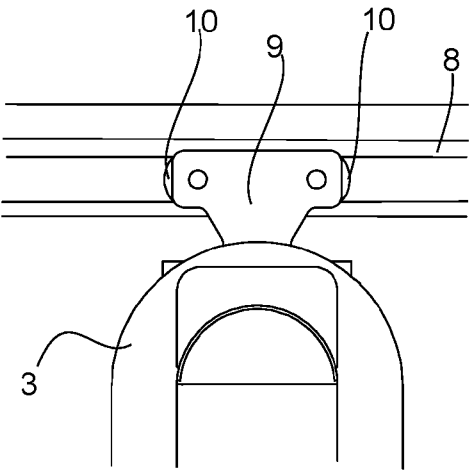


Fig. 2

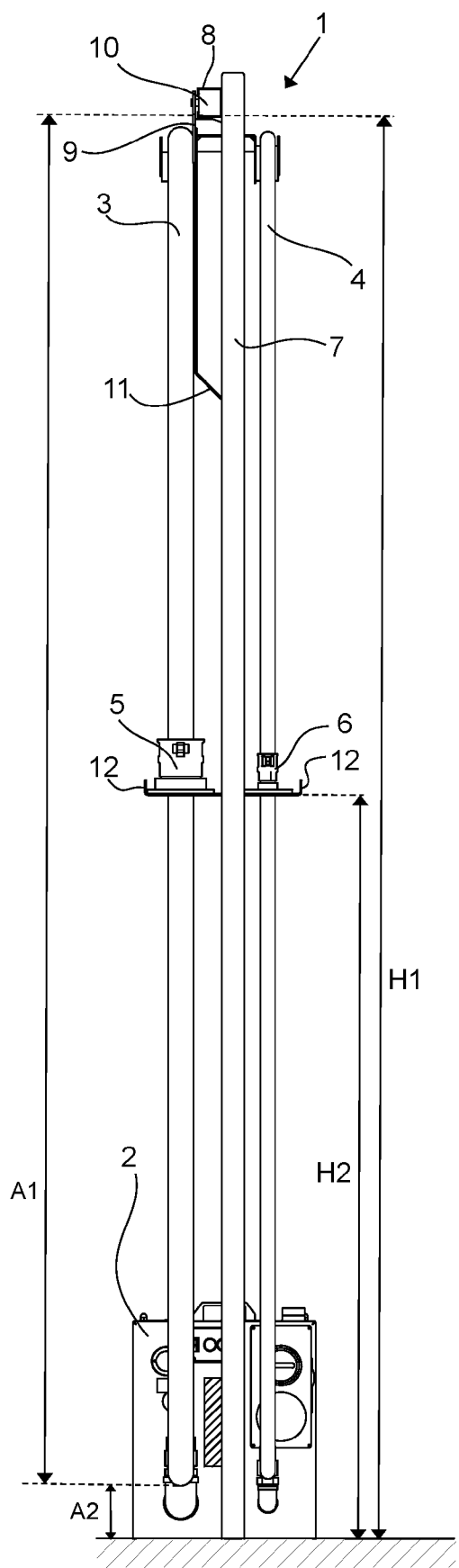


Fig. 3

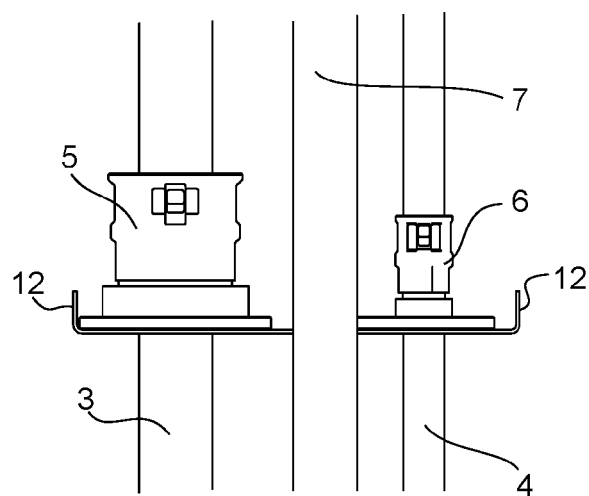


Fig. 4

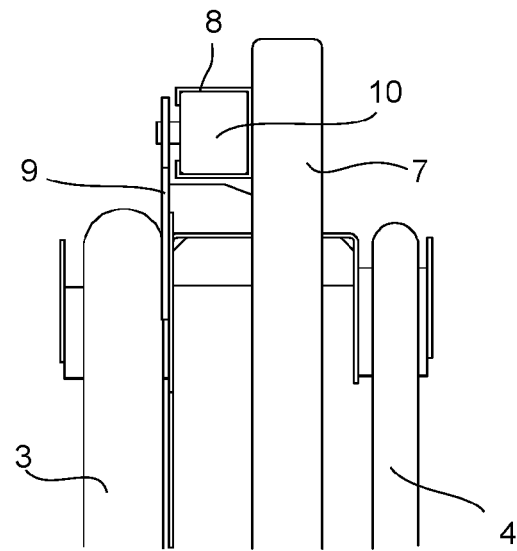


Fig. 5



## EUROPEAN SEARCH REPORT

Application Number

EP 24 20 5763

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category                                                                                                                                                                                                                                                                     | Citation of document with indication, where appropriate, of relevant passages                                        | Relevant to claim                | CLASSIFICATION OF THE APPLICATION (IPC)    |
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|                                                                                                                                                                                                                                                                              |                                                                                                                      |                                  | B61K<br>B61D<br>B60S                       |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                   |                                                                                                                      |                                  |                                            |
| Place of search                                                                                                                                                                                                                                                              |                                                                                                                      | Date of completion of the search | Examiner                                   |
| Munich                                                                                                                                                                                                                                                                       |                                                                                                                      | 6 March 2025                     | Crama, Yves                                |
| CATEGORY OF CITED DOCUMENTS                                                                                                                                                                                                                                                  |                                                                                                                      |                                  |                                            |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document                                                      |                                                                                                                      |                                  |                                            |
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**REFERENCES CITED IN THE DESCRIPTION**

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