



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
12.08.2020 Bulletin 2020/33

(51) Int Cl.:
F41A 23/42 ^(2006.01)
F41F 3/042 ^(2006.01) **F41F 3/04** ^(2006.01)

(21) Application number: **20153069.8**

(22) Date of filing: **22.01.2020**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(30) Priority: **05.02.2019 IT 201900001627**

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(54) **MISSILE LAUNCHING ASSEMBLY AND MISSILE LAUNCHER COMPRISING SAID LAUNCHING ASSEMBLY**

(57) The invention concerns a missile launching assembly (10) comprising:
- a support base (11) which extends between a front end (FE) and a rear end (RE) along a main extension direction (D), the support base (11) being orientable between a transport angular position and an launching angular position;
- at least one launching frame (20) secured to the support

base (11) to be rotationally integral therewith and adapted and configured to support at least one missile launching container; and
- at least one rear wheel assembly (16, 17) at the rear end (RE), the rear wheel assembly (16, 17) comprising at least one first rear wheel (16) with a first rear rotation axis which is substantially parallel to said support base (11).

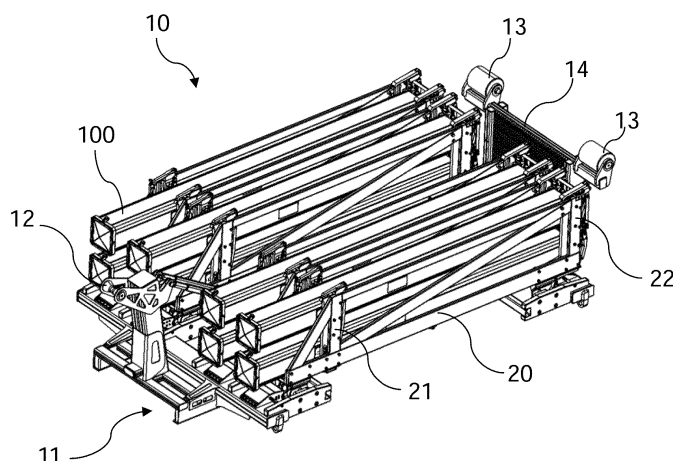


FIG. 5

Description**FIELD OF THE INVENTION**

[0001] The present invention refers to the technical field of missile or projectile launching systems and relates in particular to a missile launching assembly and a missile launcher comprising said launching assembly.

STATE OF THE ART

[0002] Missile launching assemblies comprising a plurality of launching containers, or canisters, wherein each launching container is adapted and configured to contain a respective missile for housing, transport and launching purposes, are already known.

[0003] A multiple launching assembly, i.e. having a plurality of canisters, is for example known from the US patent 7,207,254 and is in particular represented in Figure 2 of that patent and indicated with the Anglo-Saxon expression "vertical launch pack". This vertical launch pack comprises a plurality of canisters secured to each other and each housing a respective missile.

[0004] A further multiple launching assembly is disclosed by the European patent application EP1710530 A2. In such a multiple launching assembly, a plurality of canisters are stacked together and secured mechanically to form launch batteries. The launch batteries are in turn secured to a support base having an end portion hinged to a rear portion of a frame of a self-propelled transport vehicle to rotate along an axis orthogonal to a longitudinal axis of the vehicle, between a lowered transport position and a raised launch position under the thrust and control of a linear actuator.

[0005] Although the multiple launching assembly described in the patent application EP1710530 A2 is advantageous, there is now a need for a different missile launching assembly that may be reloaded in a particularly flexible and easy way.

[0006] The object of the present description is to provide a missile launching assembly that meets the aforesaid requirement.

[0007] This object is achieved by means of a missile launching assembly as defined in general in Claim 1. Preferred and advantageous embodiments of the aforesaid missile launching assembly are defined in the accompanying dependent claims.

[0008] The invention will be better understood from the following detailed description of a particular embodiment made by way of example and thus in no way limiting, with reference to the accompanying drawings briefly described in the subsequent paragraph.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

Figure 1 shows an axonometric view of an illustrative

and non-limiting embodiment of a missile launcher, comprising a missile launching assembly represented in the transport configuration.

Figure 2 shows a further axonometric view of the missile launcher in Figure 1, wherein the launching assembly is represented in the transport configuration.

Figure 3 shows an axonometric view of the missile launcher in Figures 1 and 2, wherein the launching assembly is represented in the launching configuration.

Figure 4 shows a further axonometric view of the missile launcher in Figures 1-3, wherein the launching assembly is represented in the launching configuration.

Figure 5 shows an axonometric view of the launching assembly, wherein a plurality of launching frames of that assembly are visible.

Figure 6 shows a further axonometric view of the launching assembly in Figure 5.

Figure 7 shows an axonometric view of one of the launching frames of the launching assembly in Figures 5 and 6.

Figure 8 shows a schematic side view of the launching frame of Figure 7 in an approach phase of a launching container in the launching frame.

Figure 9 shows a schematic side view of the launching frame of Figure 7, wherein two launching containers are inserted in the launching frame.

Figure 10 shows an axonometric view of a guide system comprised in the launching frame, wherein the guide system is in a first operative configuration.

Figure 11 shows an axonometric view of the guide system in Figure 10, wherein the guide system is in a second operative configuration.

Figure 12 shows an axonometric view of the launching assembly according to a further embodiment of the invention;

Figure 13 shows a detailed view of the front end of the launching assembly in Figure 12.

Figure 14 shows a detailed view of the rear end of the launching assembly in Figure 12.

DETAILED DESCRIPTION

[0010] In the accompanying Figures 1-4, a non-limiting embodiment of a missile launcher 1 is shown. In the example shown in Figures 1-4, the missile launcher 1 comprises, or is installed on, a land transport vehicle 5, which in the example is a military truck suitable for the transport and launching of missiles.

[0011] The missile launcher 1 comprises a missile launching assembly 10 which in Figures 1 and 2 is shown in the transport configuration and which in Figures 3 and 4 is shown in the launching configuration.

[0012] The missile launcher 1 comprises a mounting frame 2 to which the missile launching assembly 10 is pivotally coupled. For example, without thereby introducing any limitation, the missile launching assembly 10 is pivotally coupled to one end portion of the mounting frame 2 distal from the driver's cab of the transport vehicle 5.

[0013] The missile launching assembly 10 comprises an orientable support base 11, in particular pivotable, between a transport angular position, shown in Figures 1 and 2, and a launching angular position, shown in Figures 3 and 4. For this purpose, at least one controllable actuator 3 may be provided in the missile launcher 1 to orient the support base 11. For example, the aforesaid actuator 3 comprises a linear actuator, for example a hydraulic or hydro-pneumatic actuator, having an end portion pivotally connected, e.g. hinged, to the mounting frame 2 and having an opposite end portion pivotally connected, e.g. hinged, to the missile launching assembly 10 and in particular to the support base 11.

[0014] The support base 11 is in the transport angular position when the missile launching assembly 10 is in the transport configuration and assumes the launching angular position when the missile launching assembly 10 assumes the launching configuration.

[0015] In accordance with an advantageous embodiment, the mounting frame 2 of the missile launcher 1 comprises a plurality of support feet 4. Preferably these support feet 4 are adapted and configured to assume a retracted position in the transport configuration and an extended configuration in the launching configuration in order to act in the latter configuration as support elements for the mounting frame 2 in order to stabilize the mounting frame 2 in position before launching one or more missiles. Each of the support feet 4 is preferably actuated by a linear actuation system, e.g. a hydraulic actuation system.

[0016] Moreover, the support feet 4 allow the mounting frame 2 and the launching assembly 10 to be released from joint use with the transport vehicle 5. In other words, embodiments of the missile launcher 1 are possible wherein the transport vehicle 5 is not provided for in the missile launcher 1 and/or wherein the transport vehicle 5 may be detached from the remaining part of the missile launcher 1, whereby once the missile launcher 1 has been transported to the site, it may rest by means of

support feet 4 directly on a supporting surface of a launch field, for example on the ground, without the interposition of the transport vehicle 5, which may thus be used to load, transport and unload on the launch field other launching assemblies, each comprising a launching frame 2 and a launching assembly 10. Even in this configuration, the support feet 4 are advantageously adjustable to level the mounting frame 2 with respect to the support surface.

[0017] The missile launcher 1 is preferably a multiple missile launcher, i.e. it is suitable to transport and launch multiple missiles before reloading. In the particular example shown in the figures, without thereby introducing any limitations, the missile launcher 1 allows eight missiles to be transported and launched before reloading.

[0018] The support base 11, is for example, a flatrack platform or "flatrack support base".

[0019] In accordance with an advantageous embodiment, the support base 11 comprises at least one gripping element 12, such as a gripping arm, adapted to allow the lifting of the support base 11 by lifting means (for example a lifting arm) in order to unload the support base 11 from, or to load the support base 11 onto, the mounting frame 2 on a transport vehicle 5. This allows advantageously for a support base 11 to be loaded onto the mounting frame 2 or to unload it therefrom, for example so that it may be quickly replaced with an additional preloaded support base 11 to allow an en-bloc reloading of the missile launcher 1. The aforesaid lifting arm may advantageously be provided on board the missile launcher 1, in other words it may be a component integrated into the missile launcher itself. For example, the aforesaid lifting arm may be installed on the mounting frame 2.

[0020] In accordance with an advantageous embodiment, the support base 11 comprises a support foot 14, which is adapted and configured to act as a support element for the support base 11 on the ground during en-bloc loading or unloading of the support base 11 from the mounting frame 2. In accordance with a particularly preferred embodiment, the support foot 14 comprises at least one wheel 13, preferably a pair of wheels 13, pivotally hinged to the support foot 14.

[0021] In accordance with an advantageous embodiment, the support foot 14 is pivotally hinged to the support base 11 to be moved between a retracted angular position, shown in Figure 3, and an extended angular position, shown in Figure 4. For example, in the retracted angular position, the support foot 14 is transverse, for example perpendicular to the support base 11, while in the extended angular position the support foot 14 is parallel to the support base 11.

[0022] The missile launching assembly 10 comprises at least one launching frame 20 fixed to the support base 11 to be integral thereto in rotation. In accordance with an advantageous embodiment, the launching frame 20 is secured removably to the support base 11. In this way, it is advantageously possible to change the launching frame 20 by replacing it with another in order to easily

modify the launching assembly 10 so that it may be suitable to support and launch ammunition of different types. In accordance with an advantageous embodiment, the missile launching assembly 10 comprises a plurality of launching frames 20 secured to the support base 11. In the example shown in the figures, the missile launching assembly 10 comprises four launching frames 20 secured to the support base 11.

[0023] The launching frame 20 comprises at least one pair of uprights 21, 22. In the example shown in the figure, the launching frame 20 comprises a first pair of uprights 21 and a second pair of uprights 22. The pairs of uprights 21, 22 are spaced apart from each other.

[0024] The launching assembly 10 comprises a first launching container 100, or canister, containing a respective first missile. In an advantageous embodiment, the aforesaid launching container 100 is adapted and configured to allow an SVL (Soft Vertical Launch) of the missile contained therein and is, for example, made according to the teachings of the US patent 7,207,254 B2. In the particular example shown in the accompanying figures, the missile launching assembly 10 comprises eight launching containers 100, i.e. eight missiles. This number is not limitative but only illustrative.

[0025] The missile launching assembly 10 further comprises coupling elements S1, S2 through which the first launching container 100 is removably secured to the launching frame 20 between the pair of uprights 21, 22. In the particular example shown in the figures, each launching container 100 is removably secured to the launching frame 20 between a first pair of uprights 21 and a second pair of uprights 22. The pairs of uprights 21, 22 are spaced apart from each other along an axis of prevalent longitudinal extension of the launching container 100.

[0026] The coupling elements S1, S2 comprise a first guide system S1 adapted and configured to allow a guided sliding of the first launching container 100 between the uprights 21, 22 along a first stroke delimited between a first initial insertion position and a first final securing position. In this way, it is advantageously possible to also load a single launching container 100 into the launching frame 20 when the support base 11 is in the transport angular position, i.e. when the missile launching assembly 10 is in the transport configuration.

[0027] In accordance with a particularly advantageous embodiment:

- the first guide system S1 comprises a first pair of opposed tracks, each secured to or integrated in a respective upright of said pair of uprights 21, 22;
- the first launching container 100 comprises a pair of sliders 101, 102 which protrude from opposite outer side walls of the first launching container 100 to be slidably received in the first pair of opposed tracks.

[0028] Expediently, the aforesaid opposed tracks are

parallel to each other.

[0029] The aforesaid sliders 101, 102 for example are or comprise pins, for example cylindrical, which project from two opposed side walls of the launching container 100.

[0030] In accordance with a preferred embodiment, according to the example shown in the figures, the launching container 100 comprises a plurality of sliders, for example a first pair of opposed sliders 101 and two further pairs of opposed sliders 102. The first pair of sliders 101 is spaced from the two further pairs of sliders 102 along the axis of prevalent longitudinal extension of the launching container 100.

[0031] In accordance with an advantageous embodiment, the launching frame 20 comprises two pairs of uprights 21, 22 spaced apart from each other along a prevalent longitudinal extension direction of the first launching container 100 and the first guide system S1 is provided on both pairs of uprights 21, 22.

[0032] For example, with reference to Figure 7, in a launching frame 20 there are provided two pairs of opposed tracks on the two uprights 21, or front uprights 21, and two pairs of opposed tracks on the two uprights 22, or rear uprights 22, of the launching frame 20. The terms 'front' and 'rear' are defined here with respect to the launching direction of the missile or missiles. The aforesaid rails may be channels or openings defined in the thickness of the plate elements applied to the uprights 21, 22 or recesses made integrally in the thickness of the uprights 21, 22.

[0033] In accordance with a particularly advantageous embodiment, each track of the aforesaid pair of tracks comprises, from the initial insertion position to said final securing position, a first rectilinear segment and a second segment joined to the first rectilinear segment, the second segment being a segment inclined with respect to the first rectilinear segment or being a curvilinear segment. This expedient has several advantages. In effect, on the one hand, it makes it easier and more effective to stabilize the securing position of a launching container 100 during the rotation of the support base 11. Moreover, the aforesaid expedient makes it easier to load and secure two separate launching containers 100 in a same launching frame 20, preferably in an arrangement wherein said launching containers 100 are arranged at a distance from each other in a direction perpendicular to the prevalent longitudinal extension directions of the launching containers 100.

[0034] In accordance with an advantageous embodiment, the missile launching assembly 10 comprises a locking system 50 which may be actuated to be moved with respect to said pair of uprights 21, 22 between a locked and a released position. In the locked position, the locking system 50 prevents the launching container 100 from sliding, with respect to the launching frame 20, from the securing position. In the released position, the aforesaid locking system 50 allows the launching container 100 to slide with respect to the launching frame

20, both for the insertion of the launching container 100 into the launching frame 20 and for the extraction of the launching container 100 from the launching frame 20, for example in order to reload the launching frame 20 with a new launching container 100.

[0035] In accordance with an advantageous embodiment, the locking system 50 comprises a movable arm 51 to which at least one locking element 52 is attached, which in the locked position is such that it interferes in abutment against a slider 101, 102 of the launching container 100 to prevent the slider 101, 102 from sliding inside the guide system S1, S2. In the particular example shown in the figures, the aforesaid locking system 50 comprises for each upright 21, 22 a respective movable arm 51 to which two movable locking elements 52 are pivotally hinged in order to lock two launching containers 100 to the uprights 21, 22 simultaneously.

[0036] In accordance with an advantageous embodiment, the movable arm 51 may be moved by means of a manual actuating lever 53, preferably pivotally hinged to the upright 21, 22 to be rotated between a released position (Figure 10) and a locked position (Figure 11). This expedient also contributes to the quick loading and unloading of the launching container 100 from the launching frames 20.

[0037] In accordance with a particularly advantageous embodiment, the missile launching assembly 10 comprises a second launching container 100 containing a respective second missile, and the aforesaid coupling elements are such that the second launching container 100 is removably secured to the launching frame 20 between the pair of uprights 21, 22. The coupling elements comprise a second guide system S2 adapted and configured to allow a guided sliding of the second launching container 100 between said uprights 21, 22 along a second stroke delimited between a first initial insertion position and a second final securing position.

[0038] In accordance with a particularly advantageous embodiment, in the second final securing position, the second launching container 100 overhangs the first launching container 100 when the latter is in the first final securing position.

[0039] Advantageously, as may be seen in the figures, the aforesaid second stroke has a length shorter than the first stroke.

[0040] Advantageously, the second guide system S2 comprises a second pair of opposed tracks, each secured to or integrated in a respective upright of said pair of uprights 21, 22. The second launching container 100 comprises a pair of sliders 101, 102 which protrude from opposite side walls of the second launching container 100 to be slidingly received in the second pair of opposed tracks.

[0041] In accordance with a particularly advantageous embodiment, the missile launching assembly 10 comprises a vibration damping system operatively interposed between the launching frame 20 and the support base 11 of the missile launching assembly 10. In accordance

with a preferred embodiment, the launching frame 20 comprises a plurality of connection plates 25 mechanically coupled to the support base 11 and a plurality of dampers operatively interposed between the connection plates 25 and the support base 11. The dampers are or comprise, for example, plate-like elements made of e.g. a rubbery material to dampen vibrations. These elements are interposed and tightened between the connection plates 25 and the support base 11 and are, for example, mounted on the connection plates 25. The vibration damping system advantageously allows the ammunition to be protected against vibrations and shock induced during the logistical transport and during loading and/or unloading of the launching assembly 10.

[0042] In accordance with a particularly advantageous embodiment, the missile launching assembly 10 further comprises a controllable mechanical locking system to assume an activation and deactivation state, wherein in the activation state the mechanical locking system allows the launching frame 20 to be mechanically coupled to the support base 11 to cancel out the effects of the vibration damping system. For example, the aforesaid mechanical locking system makes it possible to bypass the aforesaid plurality of dampers, creating a rigid mechanical connection between the launching frame 20 and the support base 11. In other words, in the activated state, the aforesaid mechanical locking system is such that the launching frame 20 and the support base 11 are brought into a hard mounting-type mutual coupling configuration.

[0043] For example, the aforesaid mechanical locking system comprises at least one pin sliding between an extended and a retracted position, wherein the pin is for example provided on board the support base 11 and wherein, when the mechanical locking system is in the activated state, the pin is in the extended position and is operatively interposed between the support base 11 and the launching frame 20, for example to be at least partially received in a matching seat 26 provided on the launching frame 20, for example provided on the connection plates 25.

[0044] In accordance with an embodiment, the aforesaid mechanical locking system may be manually activated and deactivated.

[0045] As is evident from that which is described above, the proposed missile launching assembly 10 fully achieves its objects in terms of overcoming the drawbacks of the known art.

[0046] Although the missile launcher 1 described above has been shown operatively coupled to a transport vehicle 5, in particular a land-based vehicle, such a missile launcher in an alternative configuration may be constructed as a stand-alone system equipped with a mounting frame 2, directly installable on a support surface that allows it to be secured to a bearing surface that may be secured to any land or naval transport vehicle.

[0047] In accordance with an advantageous embodiment, the missile launcher 1 comprises an electrical power supply system 30 installed on board the mounting

frame 2 comprising an electric generator adapted and configured to make the missile launcher 1 autonomous from external power sources. The aforesaid electrical power supply system 30 allows the missile launcher 1 to be supplied with all the electrical power required to perform its functions (deployment from the transport configuration to the launching configuration and vice versa, fire, surveillance, etc.). In accordance with an embodiment, the aforesaid power supply system further comprises an interface that allows the connection of the power supply system to an external electrical power supply line, for example to a three-phase, 400V line at 50Hz.

[0048] Preferably, the power supply system 30 comprises an uninterruptible power supply - UPS - adapted and configured to power the missile launcher 1 in the event of an electric generator failure.

[0049] In accordance with an advantageous embodiment, the missile launcher further comprises a radiocommunications system 40 installed on board the mounting frame 2 and adapted and configured to allow two-way remote data communication between the missile launcher 1 and a remote unit such as a remote control and command center. In accordance with a particularly advantageous embodiment, the radiocommunications system comprises at least one telescopically extendable support shaft 41 installed on the mounting frame 2. This support shaft 41 for example supports at least one antenna of the aforesaid radiocommunications system.

[0050] Referring now to Figures 12 to 14, a different embodiment of the subject of the invention is illustrated.

[0051] Figure 12 shows the launching assembly 10, wherein numbers identical to the preceding embodiments are used for the same corresponding parts. In particular, there is a support base 11 and a launching frame 20 wherein are insertable launching containers 100 (shown in the preceding figures). The support base 11 comprises, at the rear end RE, a support foot 14, adapted and configured to act as a support element for the support base 11 on the ground during en-bloc loading or unloading of the support base 11 from the mounting frame 2. In accordance with a particularly preferred embodiment, the support foot 14 comprises at least one wheel 13, preferably a pair of wheels 13, pivotally hinged to the support foot 14. Moreover, the support base 11 comprises, at the front end FE, at least one gripping element 12, as illustrated in one of the preceding embodiments. The ends FE and RE are defined along the direction D, indicated with an arrow in Figure 12, and representing the main extension direction of the launching assembly.

[0052] Referring also to Figure 13, the gripping element 12 also comprises two front wheels or rollers 15, which are inclined with respect to the plane of the base 11. Preferably, the inclination is about 45 degrees. This or another inclination of the wheels is used to slide the launching assembly onto a loader (not shown) that has a raised guide with correspondingly inclined walls. Preferably, the wheels 15 are arranged in such a way that they are symmetrical with respect to an axis D' (not

shown) parallel to the axis D and central with respect to the size of the launching assembly with respect to the axis D.

[0053] Referring now to Fig. 14, in addition to or alternatively to the wheels 13, one or more additional wheel assemblies 16, 17 may be hinged to the support foot 14 (more precisely, to the frame that constitutes or supports it). These additional wheel assemblies may be secured to the opposite side with respect to the side of the frame of the support foot 14 where the wheels 13 are hinged. Each wheel assembly may have one or more wheels. For example, it is only possible to provide a wheel 16 that has an axis of rotation parallel to the plane of the support base 11, for example perpendicular to the direction D. In addition to the wheel 16, it is possible to provide also a wheel 17 next to the first one having an axis of rotation inclined with respect to the wheel 16. In particular, the inclination may be about 90°. These directions are defined here with respect to the plane of the support base 11. Such a plane is defined as a plane which, in use, is parallel to the plane of the loader or to the ground. In any case, even if the support base 11 is contoured, it is always possible to define a plane with respect to which the directions mentioned above are defined, and this plane will be defined expediently with respect to the plane of the loader, the ground or any other plane on which the loading assembly is placed or moved.

[0054] It should be noted that the wheel assemblies 16, 17 may be expediently secured directly to the support base 11, and not to the support foot 13, so that they are not affected by the rotation of the latter.

[0055] The one or more wheel assemblies 16, 17 also have the function of moving the launching assembly on the guides of the loader. In particular, the wheels 17, which according to a particular aspect are placed on the outer side of the wheels 16, are used to provide a side register of the launching assembly 10.

[0056] In this way, the loading and unloading of the launching assembly from a special vehicle (loader) is particularly easy and risk-free.

[0057] The design of the launching assembly, and in particular the position of the front rollers (identified with the number 15 in the drawings) and the lifting arm (identified with the number 12) allows the system to be unloaded onto a support vehicle equipped with a floor panel slightly longer than the Flatrack itself (of the order of a few cm). Essentially, with the system according to the invention, one no longer needs large areas to unload the Flatrack and this is a great advantage for the sector.

[0058] Without prejudice to the principle of the invention, the embodiments and the details of implementation may vary widely with respect to those described and illustrated purely by way of non-limiting example, without thereby departing from the scope of the invention as defined in the accompanying claims.

Claims

1. A missile launching assembly (10) comprising:

- a flatrack support base (11) which extends between a front end (FE) and a rear end (RE) along a main extension direction (D), the support base (11) being orientable between a transport angular position and an launching angular position;
- at least one launching frame (20) secured to the support base (11) to be rotationally integral therewith and adapted and configured to support at least one missile launching container; and
- at least one rear wheel assembly (16, 17) at the rear end (RE), the rear wheel assembly (16, 17) comprising at least one first rear wheel (16) with a first rear rotation axis which is substantially parallel to said support base (11);

and wherein:

- the support base (11) comprises at least one gripping element (12), configured to allow the lifting of the support base (11) by lifting means in order to unload the support base (11) from, or to load the support base (11) onto the mounting frame (2) of a transport vehicle (5);
- the launching frame (20) comprises at least one pair of uprights (21, 22);
- a first launching container (100) containing a respective first missile is included;
- coupling elements (S1, S2) are included, by means of which the first launching container (100) is removably secured to the launching frame (20) between the pair of uprights (21, 22), wherein the coupling elements (S1, S2, 101, 102) comprise a first guide system (S1) adapted and configured to allow a guided sliding movement of the first launching container (100) between said uprights (21, 22) along a first stroke delimited between a first initial insertion position and a first final securing position.

2. A missile launching assembly (10) according to claim 1, wherein:

- the first guide system (S1) comprises a first pair of opposed tracks, each secured to or integrated in a respective upright of said pair of uprights (21, 22);
- the first launching container (100) comprises a pair of sliders (101, 102) which protrude from opposite outer side walls of the first launching container (100) to be slidably received in the first pair of opposed tracks.

3. A missile launching assembly (10) according to one

or more of the preceding claims, wherein the launching frame (20) comprises two pairs of uprights (21, 22) spaced apart from each other along a prevalent longitudinal extension direction of the first launching container (100) and wherein the first guide system (S1) is provided on both pairs of uprights (21, 22).

4. A missile launching assembly (10) according to claim 2 or 3, wherein each track of said pair of tracks comprises, from the initial coupling position to said first final securing position, a first rectilinear segment and a second segment joined to the first rectilinear segment, the second segment being a segment inclined with respect to the first rectilinear segment or being a curvilinear segment.

5. A missile launching assembly (10) according to one or more of the preceding claims, further comprising a second launching container (100) containing a respective second missile and wherein said coupling elements are such as to secure removably the second launching container (100) to the launching frame (20) between the pair of uprights, wherein said coupling elements comprise a second guide system (S2) adapted and configured to allow a guided sliding movement of the second launching container between said uprights (21, 22) along a second stroke delimited between a first initial insertion position and a second final securing position.

6. A missile launching assembly (10) according to the preceding claim, wherein in the second final securing position, the second launching container (100) is above the first launching container (100) when the latter is in the first final securing position.

7. A missile launching assembly (10) according to one or more of the preceding claims, comprising a plurality of launching frames (20) secured to the support base (11) and oriented parallel to one another.

8. A missile launching assembly (10) according to one or more of the preceding claims, wherein said first rear rotation axis is substantially perpendicular to said main extension direction (D).

9. A missile launching assembly (10) according to one or more of the preceding claims, wherein said at least one rear wheel assembly (16, 17) comprises at least a second rear wheel (17) with a second rear rotation axis which forms a non-null angle with said first rotation axis.

10. A missile launching assembly (10) according to the preceding claim, wherein said non-null angle is a 90° angle.

11. A missile launching assembly (10) according to one

or more of the preceding claims, wherein at least two rear wheel assemblies (16, 17) are included.

12. A missile launching assembly (10) according to one or more of the preceding claims, wherein at least one front wheel assembly (15) is included at the front end (FE), the front wheel assembly (15) comprising at least a first front wheel (15) with a first front rotation axis which is substantially inclined with respect to said support base (11). 5 10
13. A missile launching assembly (10) according to the preceding claim, wherein the first front rotation axis is inclined by about 45°. 15
14. A missile launching assembly (10) according to claim 12 or 13, wherein at least two front wheel assemblies (15) are included.
15. A missile launching assembly (10) according to one or more of the preceding claims, wherein the support base (11) comprises, at the rear end (RE), a support foot (14) adapted and configured to serve as a support element of the support base (11) on the ground during the en-bloc loading or unloading of the support base (11) to/from a mounting frame (2), the support foot (14) comprising at least one wheel (13) pivotally hinged to the support foot (14) and not belonging to the rear wheel assembly (16, 17). 20 25 30
16. A missile launcher (1), comprising:
 - a missile launching assembly (10) according to one or more of the preceding claims;
 - a mounting frame (2) to which the support base (11) of the missile launcher is pivotally connected; 35
 - at least one actuator (3) adapted and configured to rotate the support base (11) with respect to the mounting frame (2) in order to rotate it between the transport angular position and the launching angular position, and vice versa. 40 45 50 55

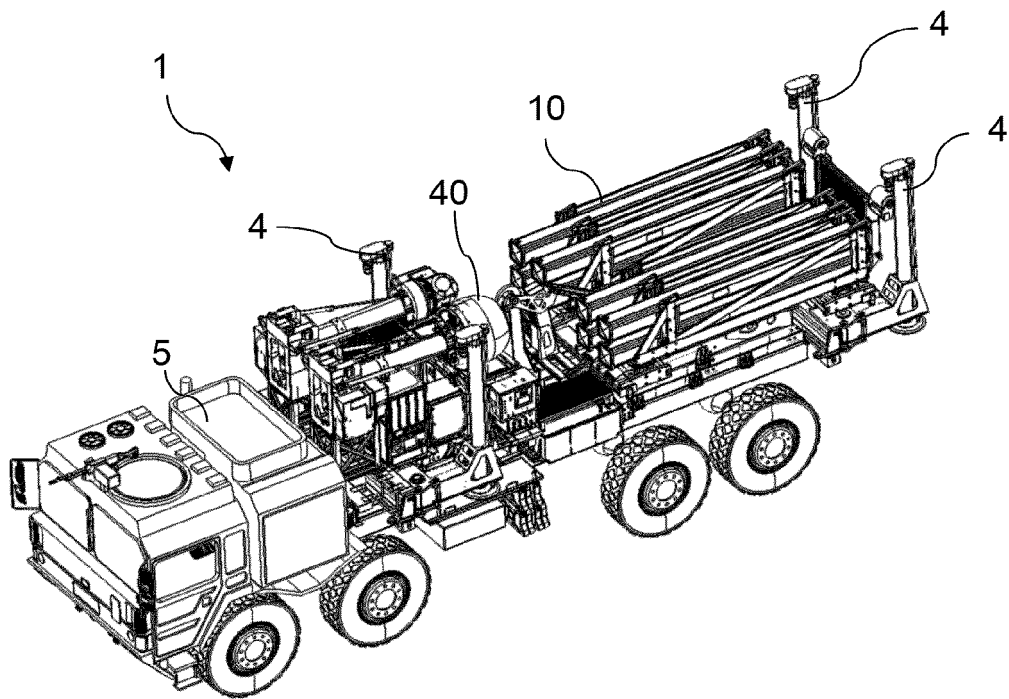


FIG. 1

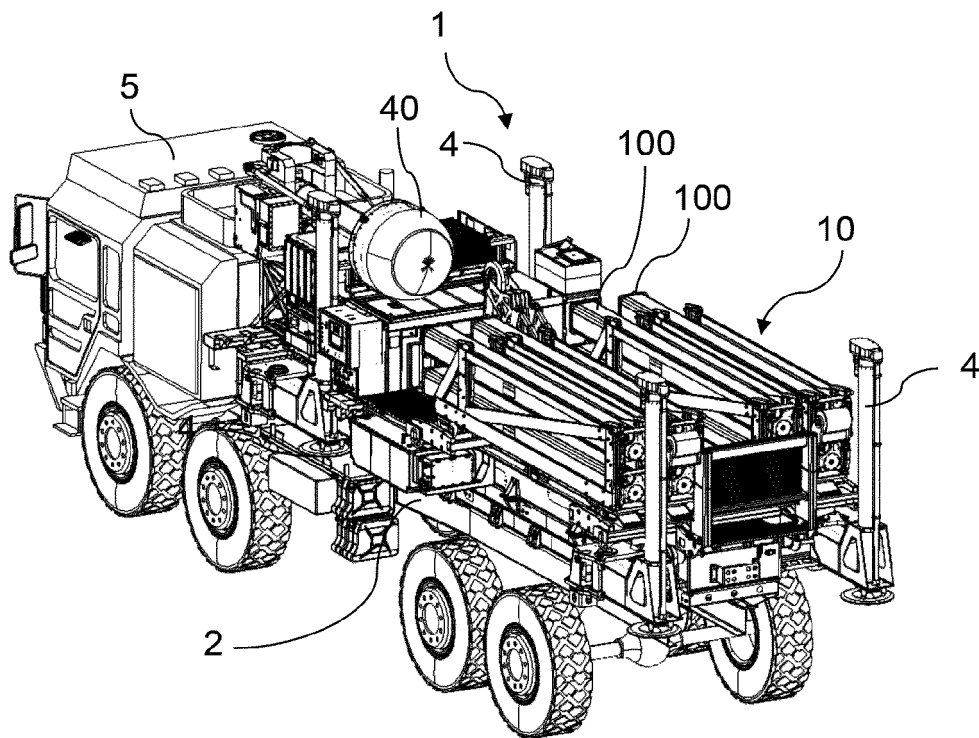


FIG. 2

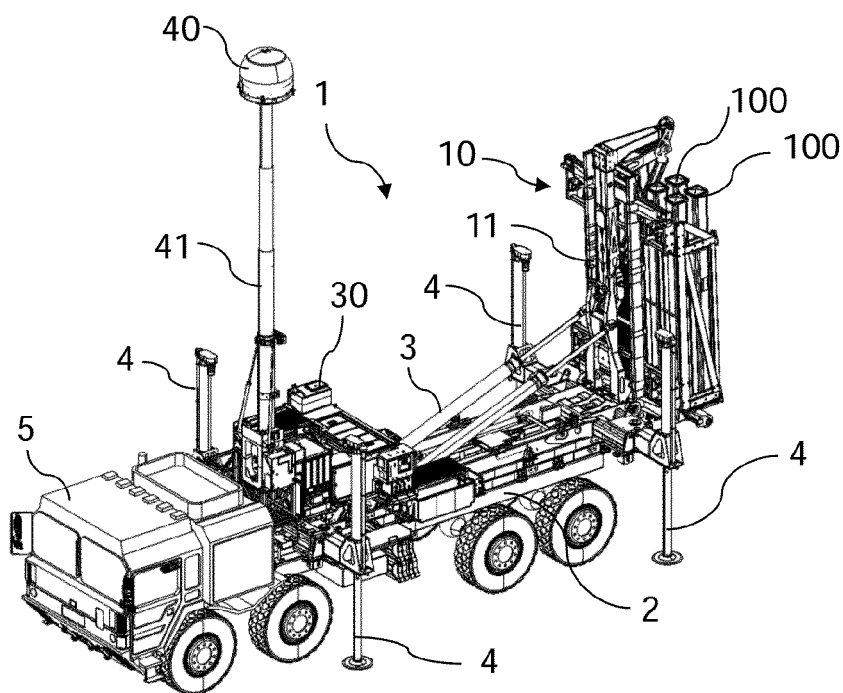


FIG. 3

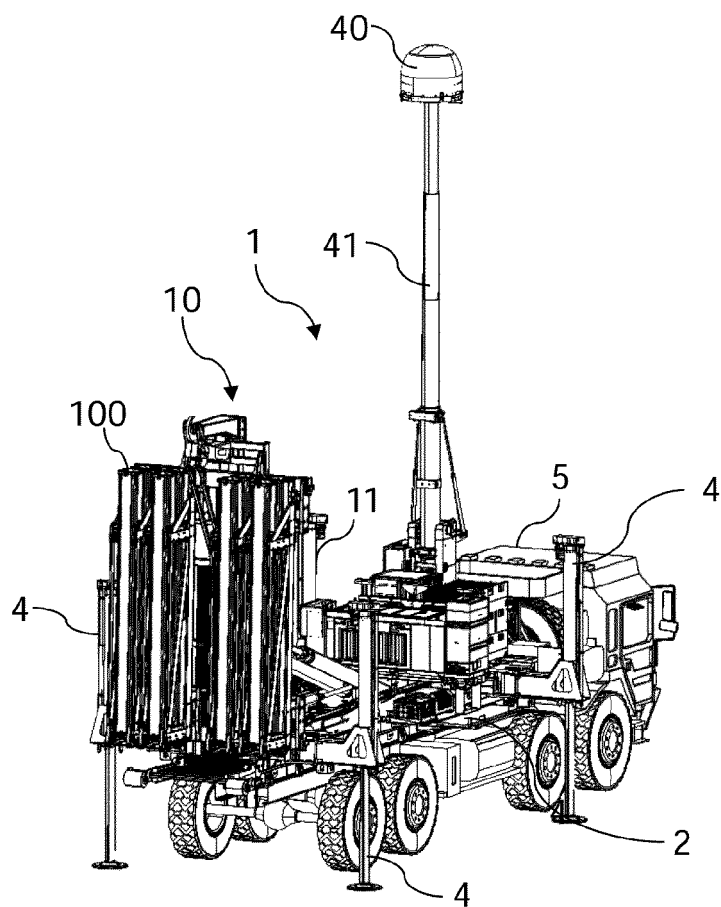


FIG. 4

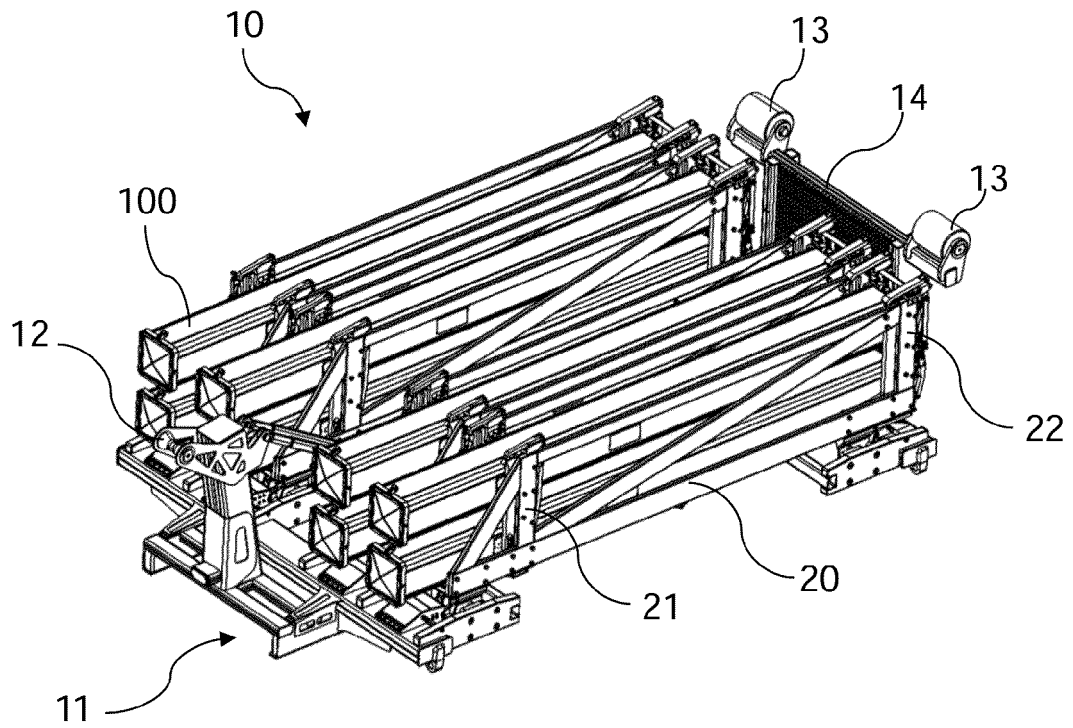


FIG. 5

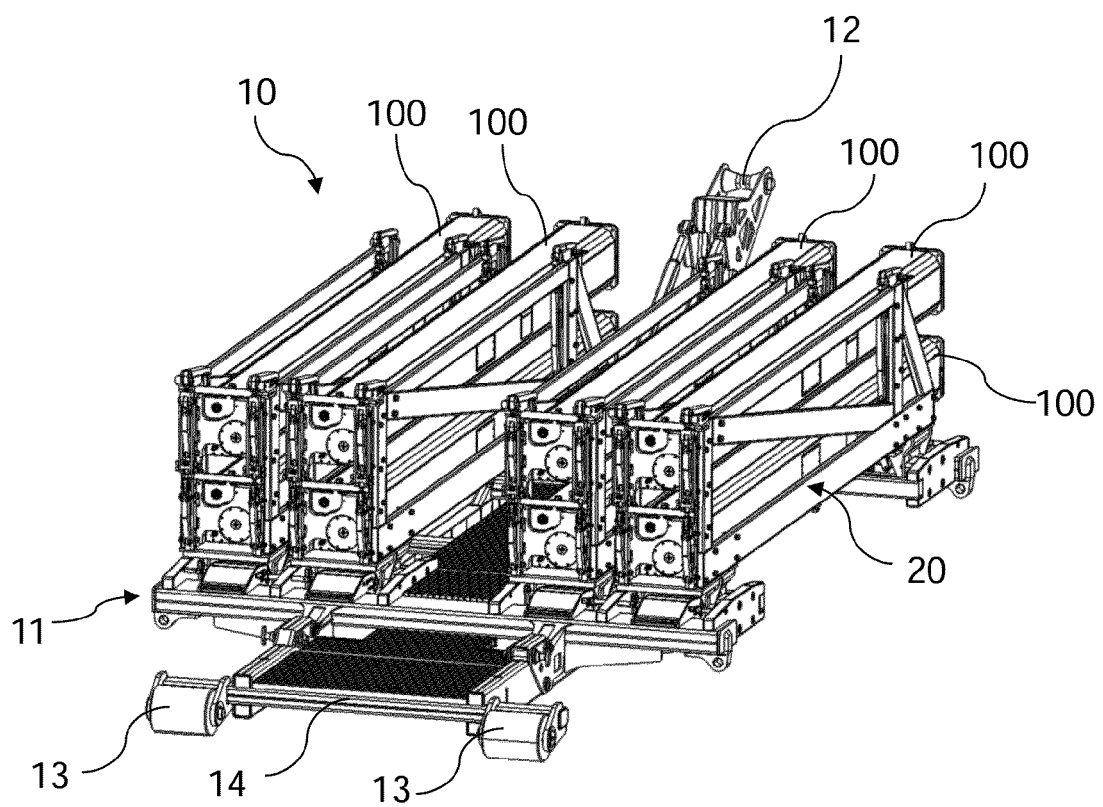


FIG. 6

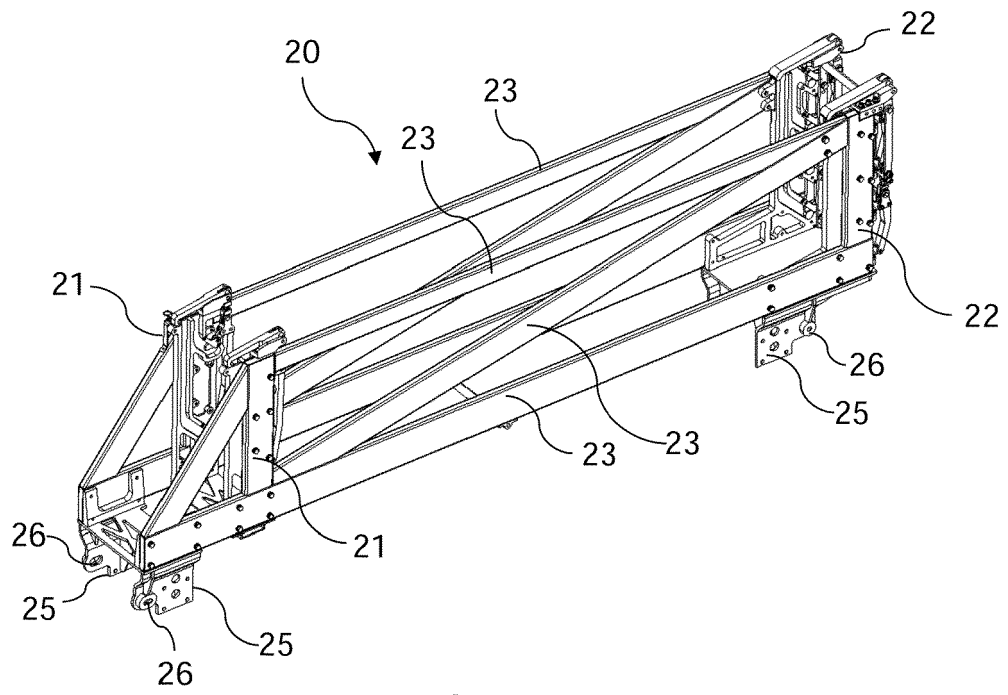


FIG. 7

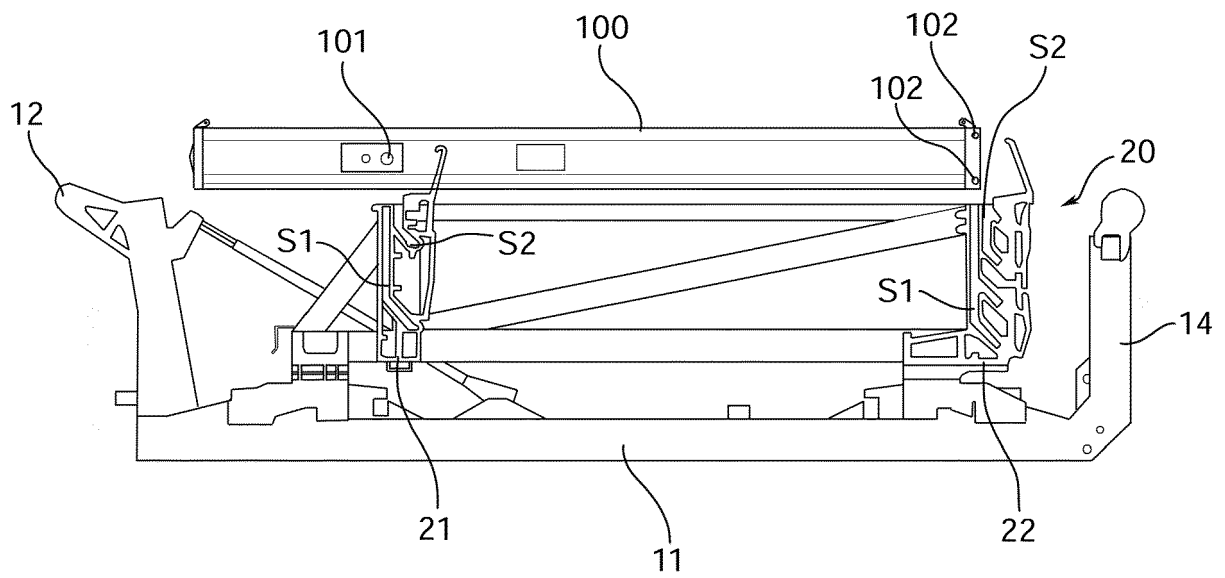


FIG. 8

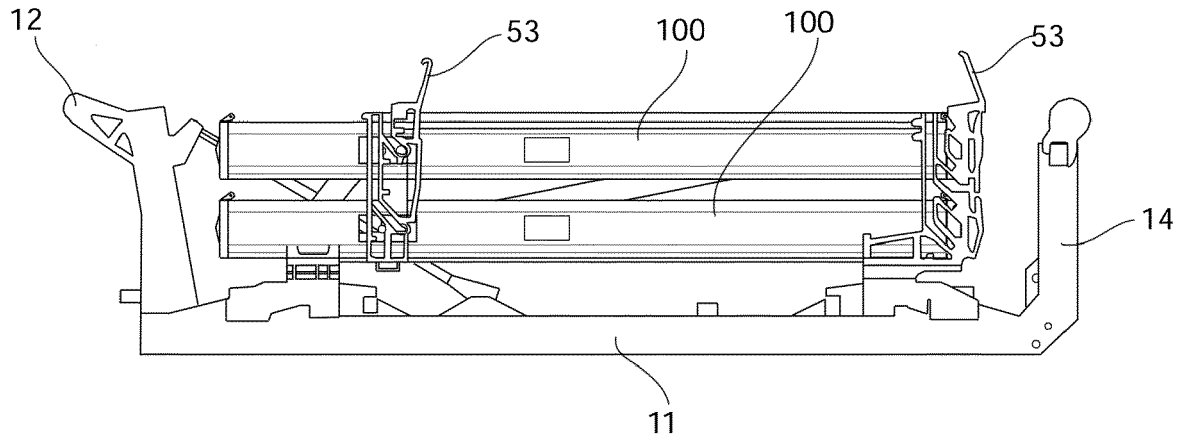


FIG. 9

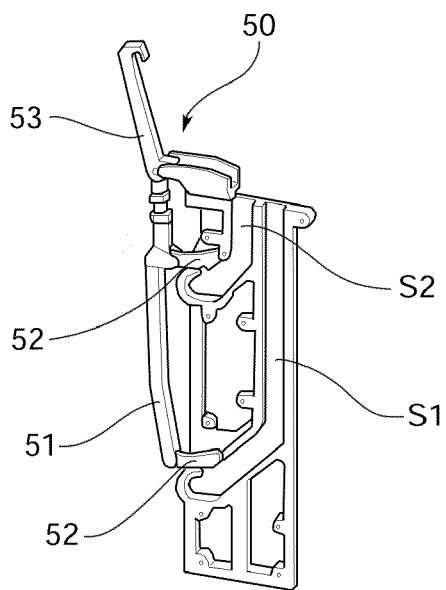


FIG. 10

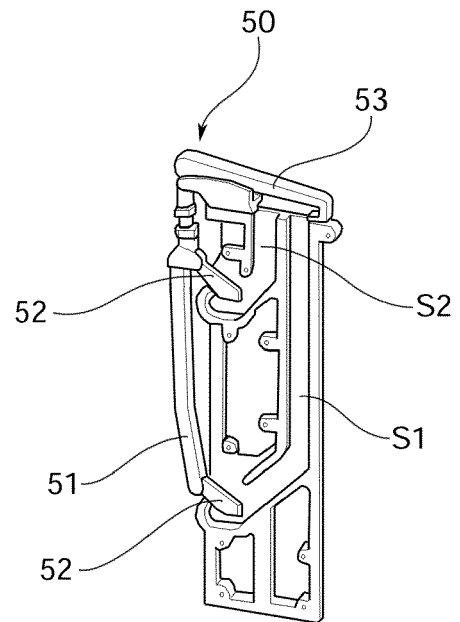


FIG. 11

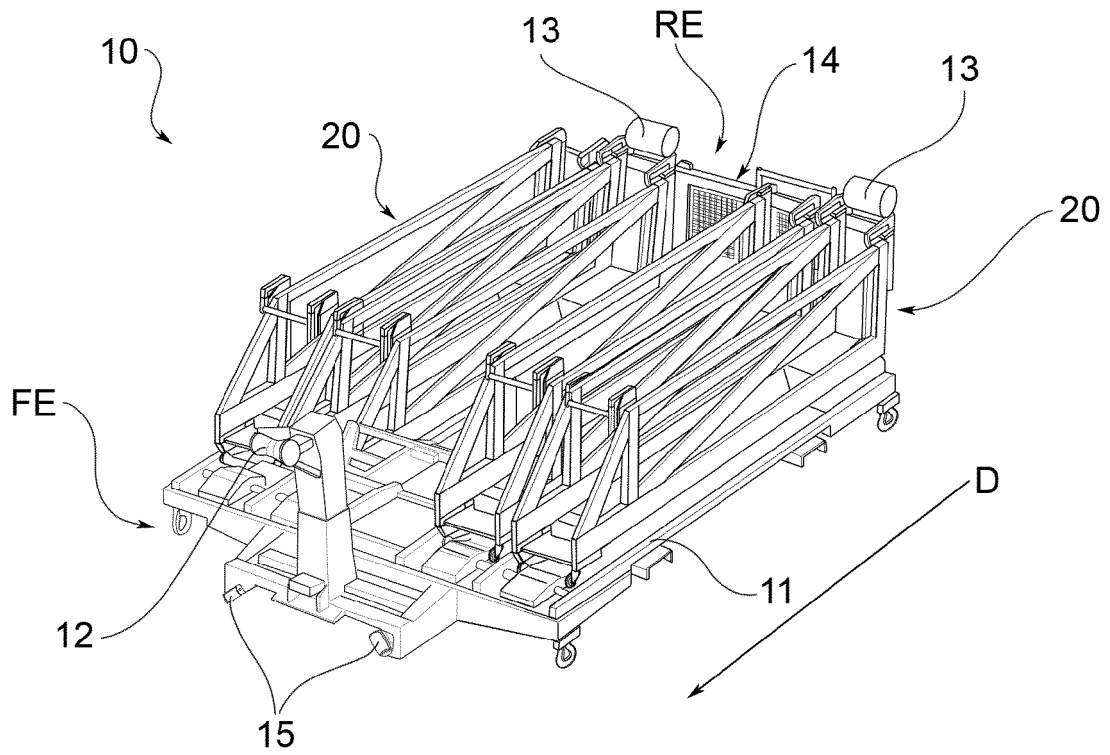


FIG.12

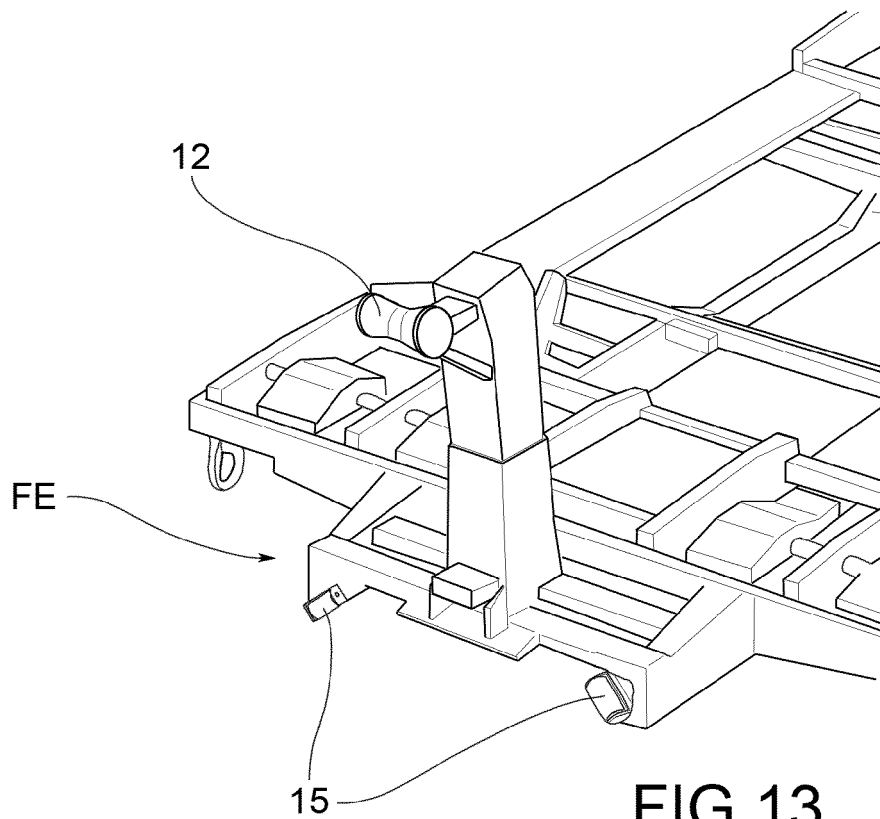


FIG.13

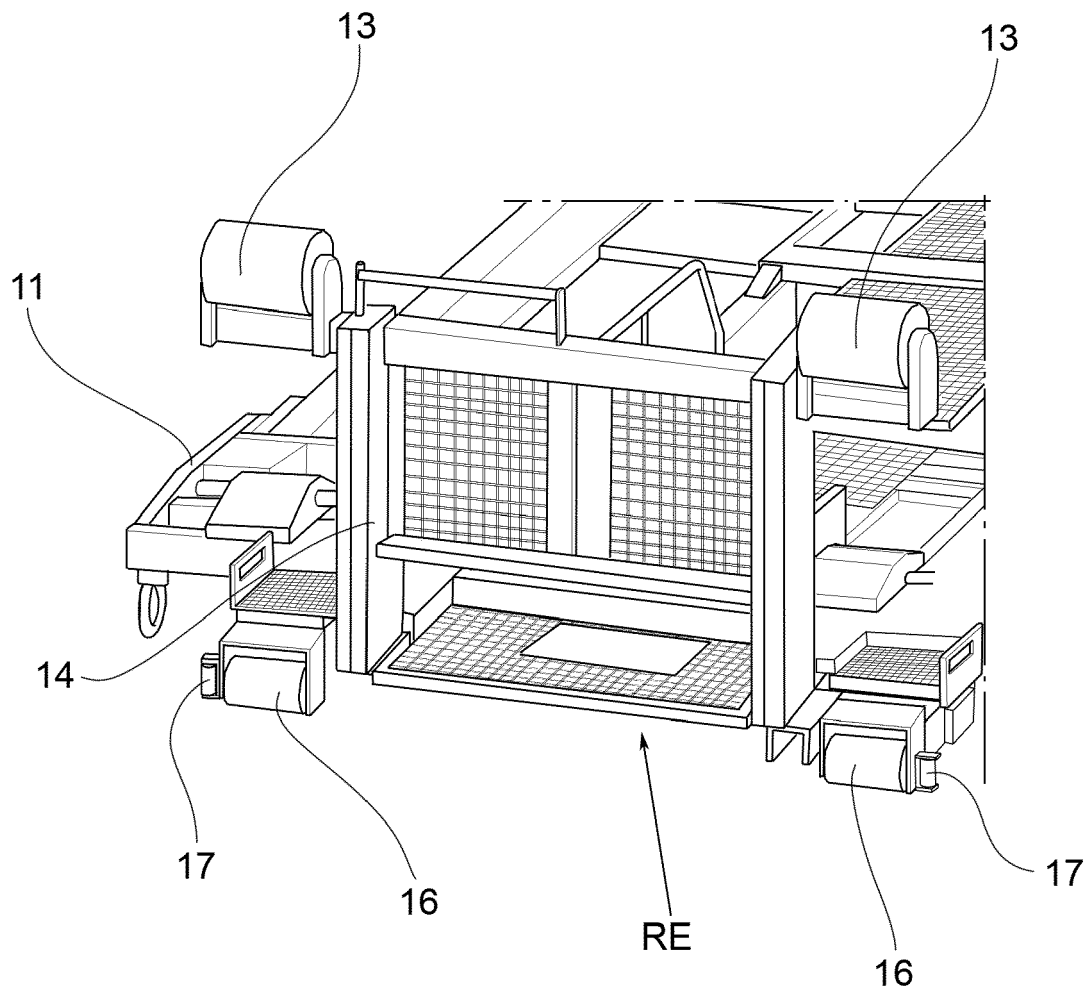


FIG.14



EUROPEAN SEARCH REPORT

 Application Number
 EP 20 15 3069

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	EP 1 710 530 A2 (MBDA ITALIA SPA [IT]) 11 October 2006 (2006-10-11) * paragraphs [0031] - [0033]; figures 7-9,29 *	1-16	INV. F41A23/42 F41F3/04 F41F3/042
A	JP 2017 007400 A (IHI AEROSPACE CO LTD) 12 January 2017 (2017-01-12) * paragraphs [0015] - [0018], [0033]; figures 1-4 *	1-16	
A	JP 4 384968 B2 (SHIN MEIWA IND CO LTD) 16 December 2009 (2009-12-16) * paragraphs [0013] - [0016], [0024]; figures 1-3,5 *	1-16	
A	JP 2016 016758 A (IHI AEROSPACE CO LTD) 1 February 2016 (2016-02-01) * paragraphs [0012], [0016] - [0019]; figures 1,2 *	1-16	
A	KR 101 138 154 B1 (DOOSAN DST CO LTD [KR]) 23 April 2012 (2012-04-23) * paragraph [0020]; figure 1 *	1-16	TECHNICAL FIELDS SEARCHED (IPC)
A	JP S60 60045 A (SHIN MEIWA IND CO LTD) 6 April 1985 (1985-04-06) * figure 2 *	1-16	F41F F41A F42B B60P
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 16 March 2020	Examiner Seide, Stephan
CATEGORY OF CITED DOCUMENTS 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		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 & : member of the same patent family, corresponding document	

 1
 EPO FORM 1503 03.82 (P04C01)

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

EP 20 15 3069

5

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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16-03-2020

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35

40

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50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1710530 A2	11-10-2006	EP 1710530 A2	11-10-2006
		US 2010236391 A1	23-09-2010
JP 2017007400 A	12-01-2017	JP 6499931 B2	10-04-2019
		JP 2017007400 A	12-01-2017
JP 4384968 B2	16-12-2009	JP 4384968 B2	16-12-2009
		JP 2006153302 A	15-06-2006
JP 2016016758 A	01-02-2016	JP 6406899 B2	17-10-2018
		JP 2016016758 A	01-02-2016
KR 101138154 B1	23-04-2012	NONE	
JP S6060045 A	06-04-1985	NONE	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 7207254 B [0003]
- EP 1710530 A2 [0004] [0005]
- US 7207254 B2 [0024]