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(54) PIECE OF EQUIPMENT FOR THE PREPARATION OF A CONCRETE MIX

(57) Piece of equipment (1) for the preparation of a concrete mix comprising:
- a load-bearing frame (2);
- at least one collection container (3) for collecting inert material associated with the load-bearing frame (2);
- first containment means (4) of a first concrete material associated with the load-bearing frame (2);
- at least one mixing tank (5) associated with the load-bearing frame (2), provided with mixing means of the

materials to obtain a fluid concrete mixture;
- transferring means (6) of the inert material from the collection container (3) to the mixing tank (5);
- first extraction means (7) adapted to convey the first concrete material from the first containment means (4) to the mixing tank (5); and
- dispensing means (10) of the fluid concrete mixture communicating with the mixing tank (5).

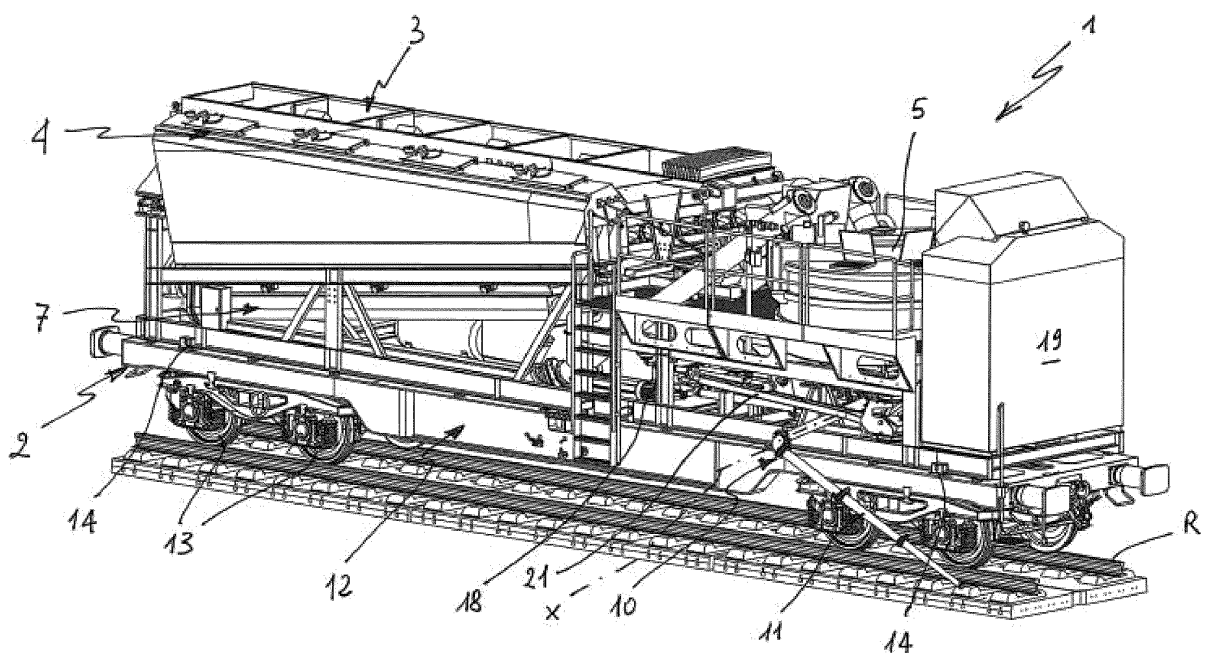


Fig. 1

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Description

Technical Field

[0001] The present invention relates to a piece of equipment for the preparation of a concrete mix.

Background Art

[0002] The need to prepare, in place, a ready-to-use concrete mix has long been known. In particular, the use of a concrete mix called "grout" made by mixing an inert material, such as sand, with two concrete materials of different types, together with water and additives, is well known.

[0003] This material is now being used to prepare prefabricated modules which are used in railways as rail supporting elements to replace the ballast.

[0004] Specifically, it is necessary to dispense the grout within such prefabricated modules once they are set in place, prior to their use.

[0005] It therefore turns out that it is necessary for the grout, or an equivalent material of a cementitious nature, to be ready and available for use, in liquid form, once the prefabricated modules have been set in place on the rail background.

Description of the Invention

[0006] The aim of the present invention is to devise a piece of equipment which enables the preparation of a concrete mix in a short time while at the same time allowing it to be set directly in place.

[0007] Within this aim, one object of the present invention is to devise a piece of equipment for the preparation of a concrete mix which is adapted to be used in the railway industry.

[0008] Yet another object is to devise a piece of equipment which allows minimizing the risk of failure to dispense the prepared concrete mix.

[0009] The aforementioned objects are achieved by this piece of equipment for the preparation of a concrete mix according to claim 1.

Brief Description of the Drawings

[0010] Other characteristics and advantages of the present invention will become more apparent from the description of a preferred, but not exclusive, embodiment of a piece of equipment for the preparation of a concrete mix, illustrated by way of an indicative, yet non-limiting example in the accompanying tables of drawings in which:

Figure 1 is a first axonometric view of a piece of equipment according to the invention;

Figure 2 is a second axonometric view of the piece of equipment in Figure 1;

Figure 3 is a side elevation view of the piece of equipment in Figure 1;

Figure 4 is an exploded view of the piece of equipment in Figure 1.

Embodiments of the Invention

[0011] With particular reference to these figures, reference numeral 1 globally denotes a piece of equipment for the preparation of a concrete mix.

[0012] According to the invention, the piece of equipment 1 comprises a load-bearing frame 2, at least one collection container 3 of an inert material (e.g., sand) associated with the load-bearing frame 2, first containment means 4 of a first concrete material associated with the load-bearing frame 2 and at least one mixing tank 5 associated with the load-bearing frame 2.

[0013] The piece of equipment 1 then comprises transferring means 6 of the inert material from the collection container 3 to the mixing tank 5 and first extraction means 7 adapted to convey the first concrete material from the first containment means 4 to the mixing tank 5.

[0014] Appropriately, a water reservoir 22 and a vessel 23 which is adapted to contain the additives required for the preparation of the concrete mix are also provided, where both the reservoir 22 and the vessel 23 are set in communication with the mixing tank 5.

[0015] In the preferred embodiment shown in the figures, suitable for the preparation of so-called "grout", the piece of equipment 1 also comprises second containment means 8 of a second concrete material, of a different type from the first concrete material, and second extraction means 9 adapted to convey the second concrete material from the second containment means 8 to the mixing tank 5.

[0016] It is believed that the materials used for the preparation of the so-called "grout" may be known to the technician in the field and easily found in the literature.

[0017] Preferably, the first containment means 4 and the second containment means 8 are arranged on opposite sides of each other with respect to the collection container 3.

[0018] In more detail, the collection container 3, the first containment means 4 and the second containment means 8 have an elongated conformation and extend along relevant directions of development substantially parallel to each other. Advantageously, the transferring means 6 are of the type of an extractor belt, arranged inferiorly to the collection container 3, and the extraction means 7,9 are of the auger type.

[0019] Appropriately, both the transferring means 6 and the extraction means 7,9 extend from the bottom to the top so that the mixing tank 5 is fed from above.

[0020] The mixing tank 5 is provided with mixing means of the materials being conveyed within it, such as rotating paddles, to obtain a fluid mixture.

[0021] According to the invention, the piece of equipment 1 also comprises dispensing means 10 of the fluid

mixture communicating with the mixing tank 5.

[0022] More particularly, the dispensing means 10 comprise at least one dispensing nozzle 11 provided with a calibrated opening which allows controlling the outflow of the fluid mixture.

[0023] Preferably, the dispensing nozzle 11 is operable in rotation around a relevant axis of rotation X so as to be able to direct the output of the fluid mixture according to the specific requirements of the case. In particular, by means of the dispensing nozzle 11 it is possible to direct the flow of the fluid mixture prepared within the mixing tank, e.g., to convey it within small openings.

[0024] Appropriately, the dispensing nozzle 11 protrudes sideways from the defined overall dimensions of the load-bearing frame 2.

[0025] Advantageously, the piece of equipment 1 comprises a transport device 12 provided with wheels 13 movable on rails R and the load-bearing frame 2 is provided with removable anchoring means 14 to the transport device itself. The anchoring means 14 may be of the type of threaded members or other type known to the engineer in the field.

[0026] The transport device 12 thus enables the movement of the piece of equipment 1 along the rails R and its use in the railway sector. By means of the transport device 12 it is therefore possible, through the dispensing means 10, to dispense the fluid mixture prepared within the cavities of the prefabricated modules which are placed laterally to the rail R which is occupied by the transport device itself and which are intended to form the base on which the rails will rest.

[0027] More particularly, the mixing tank 5 comprises at least a first draining port 15 of the fluid mixture and the dispensing means 10 are set in communication with such a first draining port 15.

[0028] Preferably, the dispensing means 10 comprise at least one collection tank 17 of the fluid mixture communicating with the first draining port 15 and with the dispensing nozzle 11. Between the mixing tank 5 and the collection tank 17 are interposed first valve means, e.g. of the type of a damper or the like (not shown in detail in the figures), adapted to allow/prevent the flow of the fluid mixture towards the collection tank itself. Appropriately, the dispensing means 10 also comprise pumping means 18 adapted to transfer the fluid mixture from the collection tank 17 towards the outside through the dispensing nozzle 11.

[0029] The collection tank 17 has a smaller volume than the mixing tank 5 and must therefore be properly fed so as to prevent the pumping means 18 from sucking in air, thus risking cavitation.

[0030] Advantageously, the dispensing means 10 comprise one or more level sensors adapted to detect the presence or not of the fluid mixture within the collection tank 17 at a given elevation. Specifically, the dispensing means 10 comprise at least two level sensors, namely a minimum level sensor and a maximum level sensor.

[0031] In more detail, such level sensors, not shown in the figures, are of the conductive type, that is, they comprise an anode and a cathode which are spaced apart from each other and positioned at a certain elevation so that, when the fluid mixture reaches such elevation, an electric arc is defined which closes the relevant circuit thus sending a corresponding electric signal.

[0032] Preferably, the piece of equipment 1 also comprises an electronic control unit 19 operationally connected to at least the aforementioned level sensors and to the first valve means interposed between the mixing tank 5 and the collection tank 17.

[0033] The electronic control unit is programmed to open and close the first valve means when the fluid mixture contained in the collection tank 17 reaches the minimum level and the maximum level, respectively.

[0034] The electronic control unit can also be operationally connected to the pumping means 18 in such a way as to disable their operation when the fluid mixture contained within the collection tank 17 falls below the minimum level. Advantageously, the mixing tank 5 comprises at least a second draining port 20 of the fluid mixture which is separate from the first draining port 15.

[0035] The second draining port 20 turns out to be particularly useful in the event of, as a result of a malfunction, the first valve means arranged where the first draining port 15 is located being unable to allow the fluid mixture to flow within the collection tank below. Thanks to the presence of the second draining port, in fact, it is still possible to drain the prepared fluid mixture, thus avoiding its deterioration and, possibly, also the consequent damage of the mechanical components with which it comes into contact. Appropriately, second valve means (not visible in detail in the figures) are arranged where the second draining port 20 is located so as to allow/prevent the flow of the fluid mixture through the second draining port itself.

[0036] More particularly, the dispensing means 10 comprise at least one distribution arm 21 of the fluid mixture communicating with the second draining port 20.

[0037] Appropriately, the distribution arm 21 has at least one receiving area 21a for receiving the fluid mixture communicating with the second draining port 20 and one distribution area 21b for distributing the fluid mixture opposite the receiving area 21a.

[0038] As particularly visible from the exploded view in Figure 4, the distribution arm 21 has an elongated conformation, where the receiving area 21a and the distribution area 21b are arranged where its opposite longitudinal ends are located.

[0039] Advantageously, the distribution arm 21 is operable in rotation around a vertical axis Y passing through the receiving area 21a. Thus, the distribution arm 21 is movable around the vertical axis Y between at least one home position, wherein it is contained within the overall dimensions defined by the load-bearing frame 2, and at least one working position, wherein it is rotated around the vertical axis Y with respect to the home position and

protrudes from the overall dimensions defined by the load-bearing frame 2. More particularly, since the fulcrum of rotation is defined where the receiving area 21a is located, the latter remains fixed during the displacement of the distribution arm 21, while the distribution area 21b moves between the home position and the working position, wherein it is arranged outside the overall dimensions defined by the load-bearing frame 2.

[0040] Preferably, the distribution arm 21 is tilting around an axis incident the vertical axis Y. Specifically, the tilting axis of the distribution arm 21 (identified in the figures by the reference letter Z) is substantially horizontal and, as a result of this tilting, the elevation of the distribution area 21b can be varied with respect to the ground.

[0041] In the embodiment shown in the figures, the piece of equipment 1 comprises two distribution arms 21 arranged from opposite sides of the mixing tank 5.

[0042] The operation of this invention is as follows.

[0043] The inert material is first placed within the collection container 3 and the concrete materials (one or more depending on the type of conglomerate to be obtained) within the containment means 4,8.

[0044] The piece of equipment 1 is then brought to the area of setting in place by means of the transport device 12. Specifically, once the load-bearing frame 2 has been attached to the transport device 12 by means of the anchoring means 14, the transport device 12 is moved along the relevant rail until it reaches the position adjacent laterally to the area of setting in place.

[0045] The inert material and the concrete materials are conveyed by the transferring means 6 and the extraction means 7,9 respectively, within the mixing tank 5, where the water and additives required to obtain the concrete mix are then added. As a result of the action of the mixing means, the various components are properly mixed together until a fluid mixture is obtained which is ready to be distributed in the area of interest.

[0046] At this point, the first valve means arranged where the first draining port 15 is located open so that the collection tank 17 below can be filled.

[0047] Once the fluid mixture has reached the maximum level, the electronic control unit returns the first valve means to the closed position. At the same time, the pumping means are enabled so that the fluid mixture can be dispensed to the outside.

[0048] In more detail, as a result of the activation of the pumping means 18, the fluid mixture contained within the collection tank 17 is dispensed to the outside through the dispensing nozzle 11.

[0049] At the moment when the level of the fluid mixture within the collection tank reaches the minimum level, the electronic control unit commands the opening of the first valve means so that the fluid mixture contained within the mixing tank 5 can flow out again.

[0050] If necessary, it is then also possible to drain the fluid mixture contained within the mixing tank 5 through the second draining port 20 and then proceed with its

dispensing outwards through the distribution arms 21.

[0051] Specifically, in order to proceed with the dispensing of the fluid mixture, the dispensing arms 21 are brought from the home position to the working position. It has, in practice, been ascertained that the described invention achieves the intended objects, and in particular, the fact is emphasized that the piece of equipment covered by the present invention makes it possible to prepare a concrete mix at the area of setting in place and to carry out the setting in place directly.

[0052] The use of removable anchoring means to a rail transport device makes the claimed piece of equipment particularly suitable for preparing rail background.

[0053] In addition, the special design of the mixing tank provided with two separate draining ports and with the dispensing means communicating with both draining ports makes it possible to minimize the risk of failure to dispense the prepared fluid mixture within the mixing tank.

Claims

1. Piece of equipment (1) for the preparation of a concrete mix **characterized by** the fact that it comprises:

- a load-bearing frame (2);
- at least one collection container (3) for collecting inert material associated with said load-bearing frame (2);
- first containment means (4) of a first concrete material associated with said load-bearing frame (2);
- at least one mixing tank (5) associated with said load-bearing frame (2);
- transferring means (6) of the inert material from said collection container (3) to said mixing tank (5);
- first extraction means (7) adapted to convey the first concrete material from said first containment means (4) to said mixing tank (5);
- wherein said mixing tank (5) is provided with mixing means of said materials to obtain a fluid mixture;
- dispensing means (10) of said fluid mixture communicating with said mixing tank (5).

2. Piece of equipment (1) according to claim 1, **characterized by** the fact that it comprises a transport device (12) provided with wheels (13) movable on rails and by the fact that said load-bearing frame (2) is provided with removable anchoring means (14) to said transport device (12).

3. Piece of equipment (1) according to claim 1 or 2, **characterized by** the fact that it comprises second containment means (8) of a second concrete material associated with said load-bearing frame (2) and

second extraction means (9) adapted to convey the second concrete material from said second containment means (8) to said mixing tank (5).

4. Piece of equipment (1) according to one or more of the preceding claims, **characterized by** the fact that said first containment means (4) and said second containment means (8) are arranged on opposite sides of each other with respect to said collection container (3). 5
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5. Piece of equipment (1) according to one or more of the preceding claims, **characterized by** the fact that said collection container (3), said first containment means (4) and said second containment means (8) have elongated conformation and extend along relevant directions of development substantially parallel to each other. 15
6. Piece of equipment (1) according to one or more of the preceding claims, **characterized by** the fact that said mixing tank (5) comprises at least a first draining port (15) of the fluid mixture and by the fact that said dispensing means (10) are set in communication with said first draining port (15). 20
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7. Piece of equipment (1) according to claim 6, **characterized by** the fact that said dispensing means (10) comprise at least one collection tank (17) of the fluid mixture communicating with said first draining port (15) and at least one dispensing nozzle (11) communicating with said collection tank (17). 30
8. Piece of equipment (1) according to claim 7, **characterized by** the fact that said dispensing means (10) comprise one or more level sensors of the conductive type adapted to detect the presence or absence of the fluid mixture. 35
9. Piece of equipment (1) according to one or more of claims 6 to 8, **characterized by** the fact that said mixing tank (5) comprises at least a second draining port (20) of the fluid mixture separate from said first draining port (15). 40
45
10. Piece of equipment (1) according to claim 9, **characterized by** the fact that said dispensing means (10) comprise at least one distribution arm (21) of the fluid mixture communicating with said second draining port (20). 50
11. Piece of equipment (1) according to claim 10, **characterized by** the fact that said distribution arm (21) has at least one receiving area (21a) for receiving the fluid mixture communicating with said second draining port (20) and a distribution area (21b) for distributing the fluid mixture opposite said receiving area (21a). 55

12. Piece of equipment (1) according to claim 11, **characterized by** the fact that said distribution arm (21) is operable in rotation around a vertical axis (Y) passing through said receiving area (21a).

13. Piece of equipment (1) according to claim 12, **characterized by** the fact that said distribution arm (21) is tilting around an axis incident said vertical axis (Y).

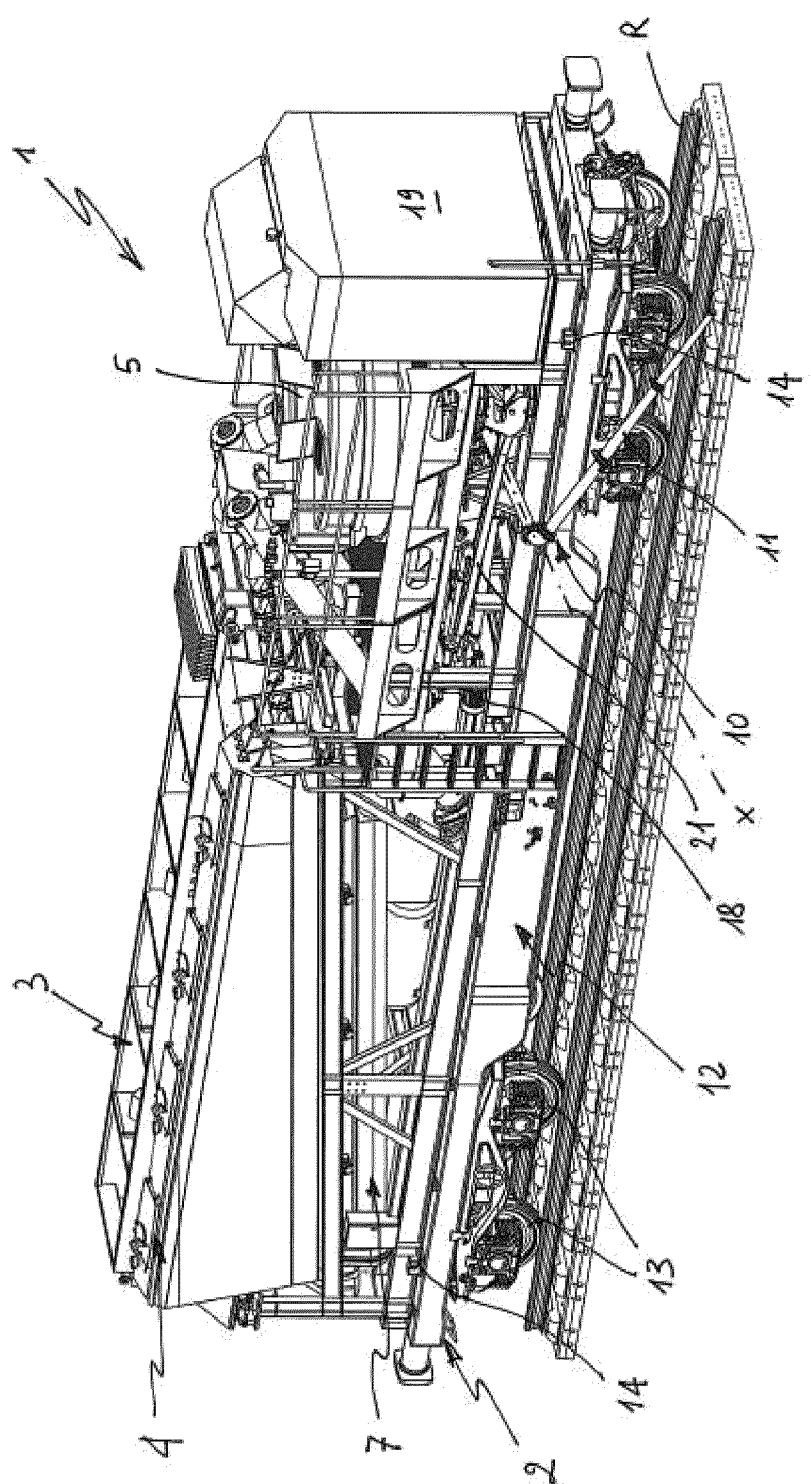
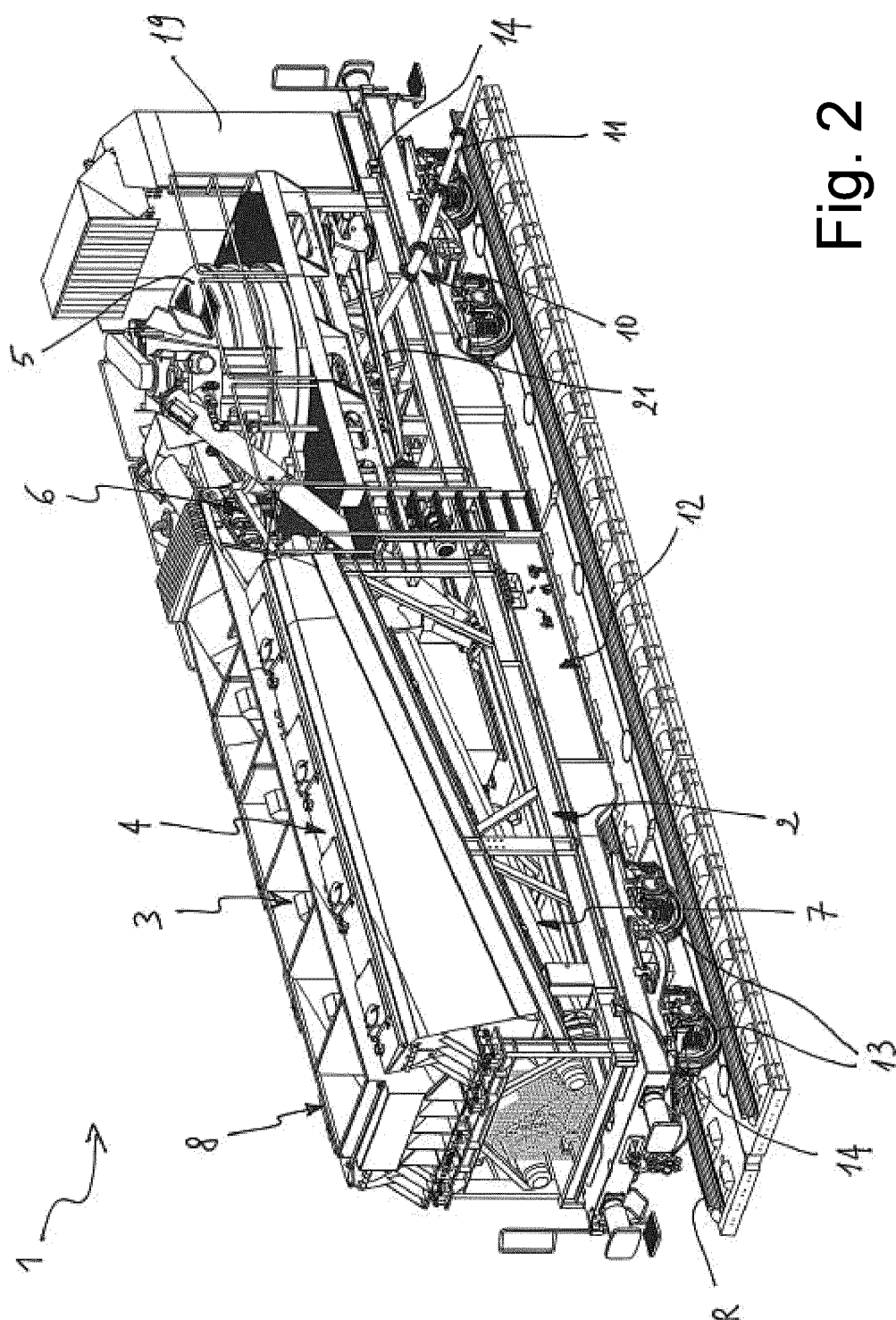


Fig. 1



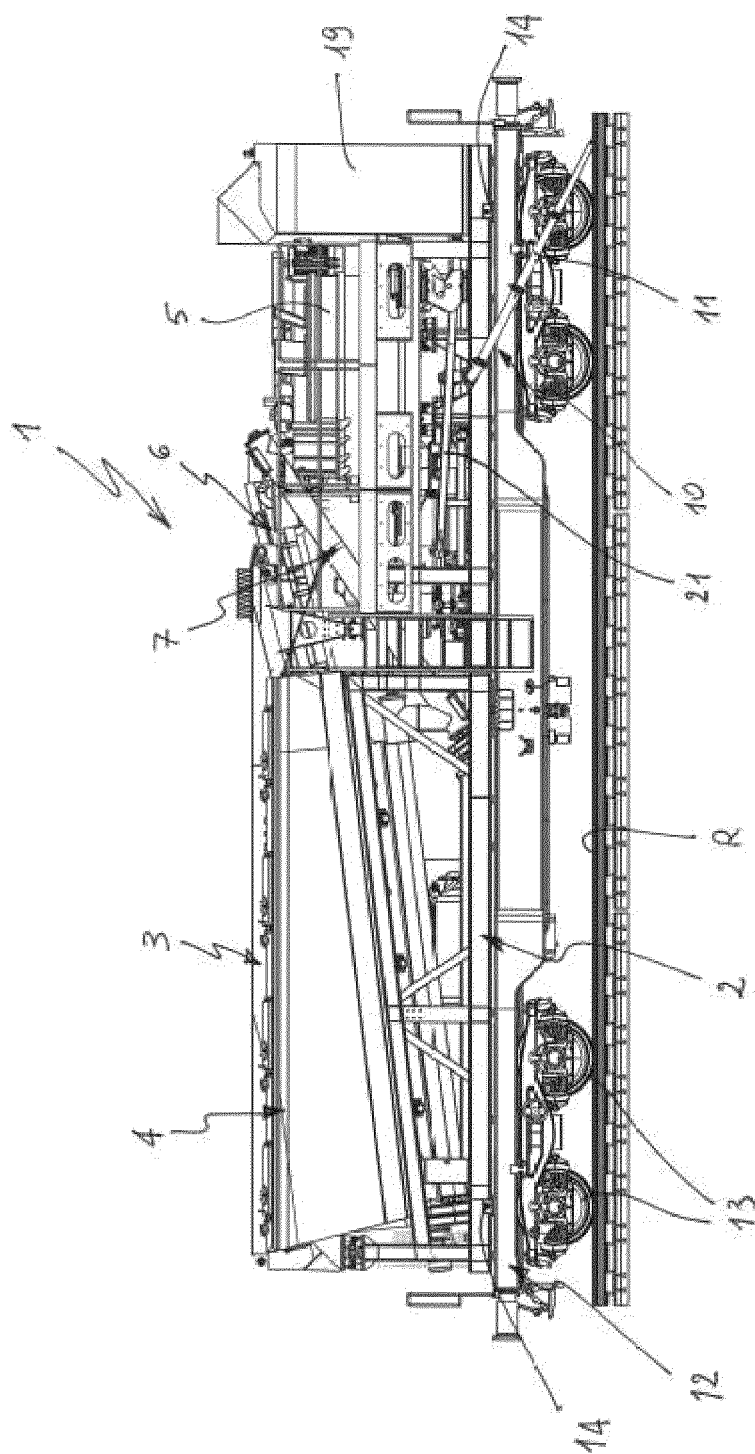


Fig. 3

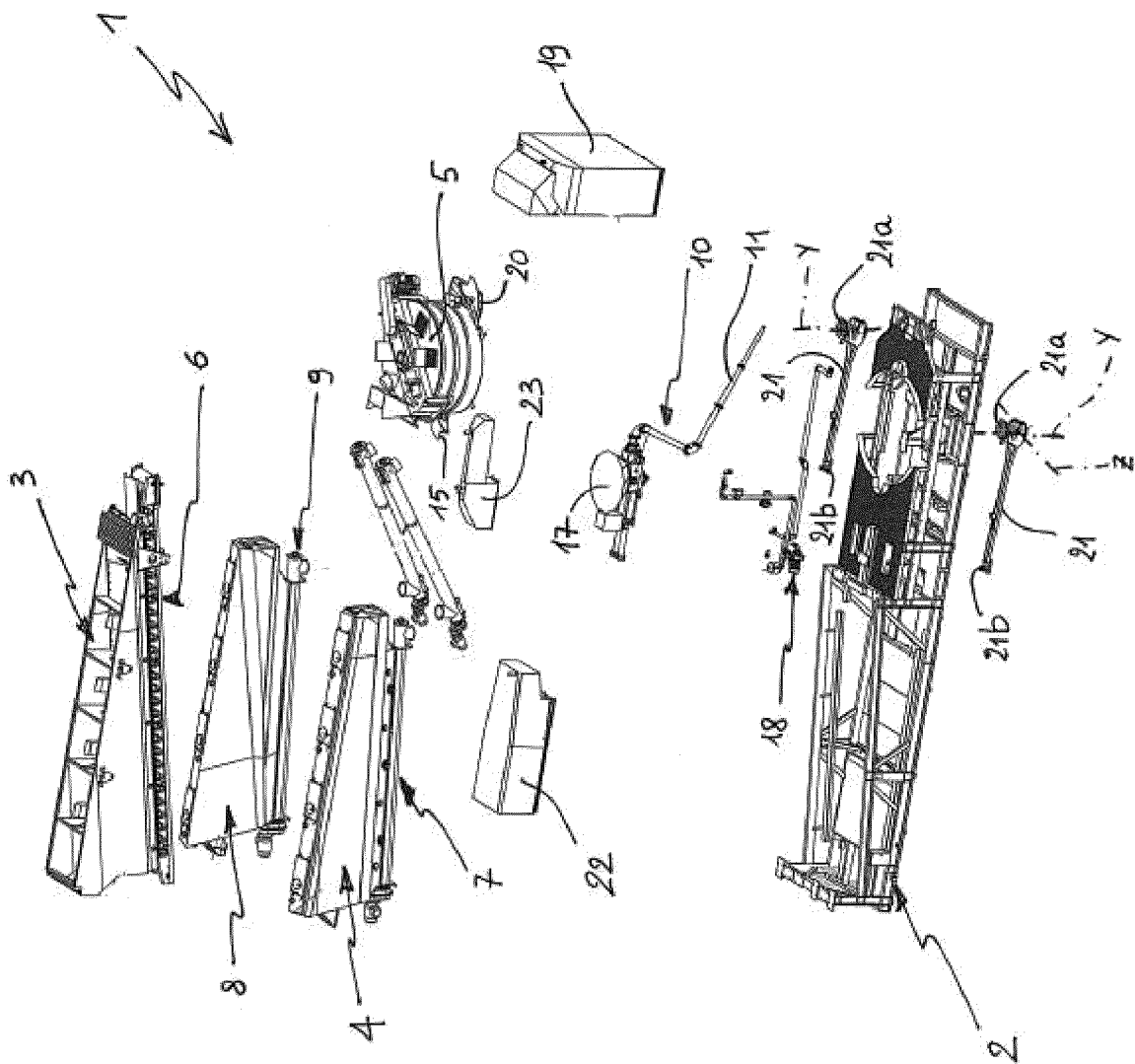


Fig. 4