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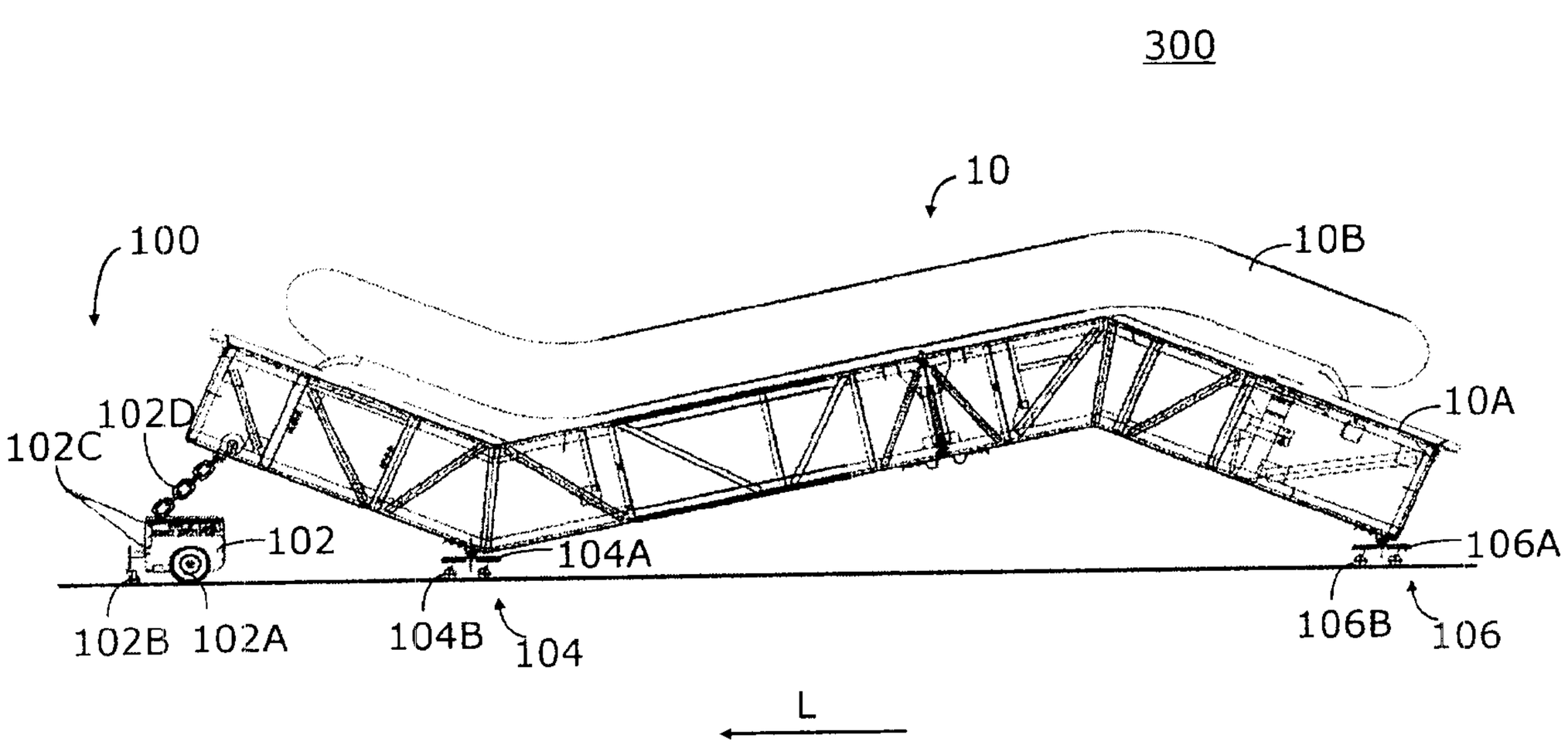
(54) Titre : BERCEAU DE SYSTEME DE TRANSPORT, PRODUIT INTERMEDIAIRE COMPRENANT UN BERCEAU ET UNE STRUCTURE DE SYSTEME DE TRANSPORT, INSTALLATION PERMETTANT DE FABRIQUER UN ENSEMBLE DE STRUCTURE DE SYSTEME DE TRANSPORT, ET METHODE PERMETTANT DE FABRIQUER UN ENSEMBLE DE SYSTEME DE TRANSPORT

(54) Title: TRANSPORTATION SYSTEM CRADLE, INTERMEDIATE PRODUCT COMPRISING A TRANSPORTATION SYSTEM CRADLE AND A TRANSPORTATION SYSTEM STRUCTURE, ASSEMBLY PLANT FOR MANUFACTURING ASSEMBLY OF A TRANSPORTATION SYSTEM STRUCTURE, AND METHOD OF MANUFACTURING ASSEMBLY OF A TRANSPORTATION SYSTEM



(57) Abrégé/Abstract:
Transportation system cradle, intermediate product, assembly plant, and method for executing an assembly of a transportation system structure. The transportation system cradle (100, 200) serves to cradle and move a transportation system structure (10) of a transportation system. The transportation system cradle contains a drive unit (102, 202) that is connectable to the transportation system structure (10) to move or transport the transportation system structure (10). The transportation system cradle also has at least one first cradle unit (104, 204) and a second cradle unit (106, 204) that are embodied to cradle a first or second foot area of the transportation system structure (10).

Abstract

Transportation system cradle, intermediate product, assembly plant, and method for executing an assembly of a transportation system structure. The transportation system cradle (100, 200) serves to cradle and move a transportation system structure (10) of a transportation system. The transportation system cradle contains a drive unit (102, 202) that is connectable to the transportation system structure (10) to move or transport the transportation system structure (10). The transportation system cradle also has at least one first cradle unit (104, 204) and a second cradle unit (106, 204) that are embodied to cradle a first or second foot area of the transportation system structure (10).

(Fig. 1)

Transportation System Cradle, Intermediate Product Comprising a Transportation System Cradle and a Transportation System Structure, Assembly Plant for Manufacturing Assembly of a Transportation System Structure, and Method of Manufacturing Assembly of a Transportation System

The invention relates to a transportation system cradle according to independent Claim 1, an intermediate product according to independent Claim 11, an assembly plant according to independent Claim 15, and a method for the manufacturing assembly of a transportation system according to independent Claim 17. Manufacturing assembly is defined as the assembly of various individual parts and subassemblies of an escalator or of a moving walk.

In the context of the present description, transportation systems are escalators and moving walks. Transportation system cradles within the meaning of the invention are particularly used in rhythmic manufacturing assembly of series of transportation systems in assembly lines as described in Patent Application 05111810.7 of the same applicant. Therein, each transportation system, or each transportation system structure, passes through a plurality of assembly stations. Series of transportation systems can consist of several transportation systems, typically between three and forty transportation systems. The transportation system structures that are simultaneously undergoing manufacturing assembly can be identical or different in their length and/or height and/or width. During an assembly phase, at each assembly station a specific assembly step, that in itself can consist of sub-steps, is executed. These assembly phases are preferably of at least approximately the same duration in the various assembly stations, for example about

three hours. When the assembly steps at all the assembly stations have been completed, a transfer phase follows. During the transfer phase, transportation system structures whose manufacturing assembly is complete are removed, while further transportation system structures are taken into the respective next following assembly station and a "new" transportation system structure is introduced whose manufacturing assembly is only just beginning.

For rationalized and rhythmic manufacture it is important that the transfer of all transportation systems involved takes place as synchronously as possible and is as short as possible even if the individual transportation systems differ in their lengths.

Such a short and synchronous transfer phase cannot be realized with conventional means. The only device known from US-6,808,057 is a stair that is mounted on a loading ramp of a truck and whose angle of inclination is adjustable; and from US-4,260,318 a device is known for moving pre-assembled escalators to their installation site. However, neither device, even with minor design modifications, is suitable for the transfer of transportation systems undergoing manufacturing assembly as described above, since the requirements for stability, rigidity, maneuverability, accuracy, and flexibility in use are higher.

The objective of the invention is to rationalize the manufacturing assembly of transportation system structures and in particular to

- create a transportation system cradle with which a transportation system can be taken to and removed from an assembly station during a transfer phase;

- propose an intermediate product that consists of a transportation system structure and a transportation system cradle;
- propose an assembly plant, for example an assembly shop, for the rationalized manufacturing assembly of an intermediate product; and to
- create a method for the manufacturing assembly of a transportation system.

The objective is fulfilled according to the invention

- for the transportation system cradle, by the characteristics of independent Claim 1;
- for the intermediate product, by the characteristics of independent Claim 11;
- for the assembly plant, by the characteristics of independent Claim 15; and
- for the method, by the characteristics of independent Claim 17.

The new transportation system cradle must, in particular, be so designed that connection to, and disconnection from, the transportation system structure can be performed quickly and easily even though a safe coupling must be effected. Since a plurality of transportation systems must be cradled simultaneously, it is advantageous to make additional reserve transportation system cradles available, and the individual transportation system cradles should therefore be inexpensive and simple in their manufacture and maintenance. As already stated, the transportation system structures can be of different width or length, which means that the transportation system cradles should be correspondingly adaptable.

Preferred details and further developments of the objects according to the invention are defined by the dependent claims.

The transportation system cradle according to the invention consists of a drive unit and at least a first and a second cradle unit. As cradle unit, a cradle platform with rollers or possibly with runners can be used.

The drive unit can be a tractor, preferably with electric drive. Such a tractor can have, for example, two axles and be couplable to the transportation system structure by means of a connecting bar or a flexible element, for example a chain or a rope, so that the drive unit is directly connected to the transportation system structure.

Instead of such a tractor, a kind of forklift truck can be used that docks onto a cradle platform with heavy duty rollers that serves as a cradle unit. The transportation system structure is cradled by this cradle platform and a further cradle unit. In this case, the drive unit is connected to the transportation system structure indirectly via the cradle platform.

The intermediate product according to the invention is an assembly unit that consists of a transportation system cradle, and cradled upon it a transportation system structure of a transportation system that is undergoing manufacturing assembly. The transportation system cradle serves both to transfer the transportation system structure autonomously and thereby to take it to, for example, assembly stations and remove it therefrom, as well as to serve in assembly stations as a support for the transportation system structure so as to hold this stationary and fix it or set it down. At least

during assembly, the transportation system cradle and the transportation system structure form one unit that is therefore referred to hereafter as an intermediate product.

The assembly plant according to the invention can be, for example, an assembly shop, factory workshop, gantry hall, outdoor space, air-inflated tent, roofed hall, or roofed-over space. The assembly plant consists of a number of assembly stations, a plurality of transportation system cradles, and a control system. The assembly stations are visited one after the other and usually in a prespecified sequence by the intermediate products and, during a prespecified assembly period, at each assembly station a station-specific assembly step is performed on a transportation system structure. On completion of this assembly step, during a transfer period the intermediate products are transferred into the respective following assembly stations. The control system ensures that the assembly steps and the transfer steps for all intermediate products that are undergoing manufacturing assembly are executed simultaneously and rhythmically. The control system takes into account that the intermediate products and the transportation system are differently embodied. The assembly steps in the respective individual assembly stations are station-specific but controllable in such manner that they are adapted to the respective intermediate product that is present there. The result is an assembly system in which the advantages and characteristics of individual manufacture are combined with the advantages and characteristics of series manufacture.

Further details and advantages of the invention are explained below in relation to exemplary embodiments and by reference to the drawings. Shown are in

Fig. 1 in a simplified view from the side, a first exemplary embodiment of an intermediate product with a transportation system cradle according to the invention and a transportation system structure in which the transportation system cradle is coupled to a transportation system structure for an escalator, during a movement in a first direction;

Fig. 2 in the same view as in Fig. 1, the intermediate product shown in Fig. 1 during its movement in the opposite direction;

Fig. 3A from the side, a drive unit of the transportation system cradle shown in Fig. 1;

Fig. 3B from above, the drive unit shown in Fig. 3A;

Fig. 4A from the side, a second exemplary embodiment of the transportation system cradle according to the invention, of which only the drive unit and the first cradle unit are shown, with part of a transportation system structure;

Fig. 4B an enlarged view of the detail circled in Fig. 4A;

Fig. 5A from the side, the drive unit of the transportation system cradle shown in Fig. 4;

Fig. 5B from above, the drive unit shown in Fig. 5A;

Fig. 6A from the side, the drive unit shown in figures 5A and 5B with the docked first cradle unit;

Fig. 6B from above, the drive unit shown in Fig. 6A with cradle unit;

Fig. 7A from the front, the drive unit shown in figures 6A and 6B with cradle unit;

Fig. 7B from above, the cradle unit shown in Fig. 7A;

Fig. 7C from the side, the cradle unit shown in figures 7A and 7B;

Fig. 8A from behind or in front without drive unit, an intermediate product consisting of the cradle unit shown in figures 7A to 7C and a transportation system structure;

Fig. 8B from the side, the front, and the back, the cradle unit shown in Fig. 8A on the transportation system structure and without drive unit; and in

Fig. 9 highly simplified, an assembly plant according to the invention.

Identically functioning parts are not referenced with the same numbers in all of the figures. Descriptions such as above, below, right, left relate to the illustration of the parts in the figures or the direction of movement of the transportation system cradle.

Shown in Fig. 1 is an intermediate product 300 with a transportation system cradle 100 that consists of a drive unit 102, a first cradle unit 104, and a second cradle unit 106. The transportation system cradle 100 is coupled to the left, lower end of a transportation system structure 10, in

other words to the structure 10A of an escalator with a balustrade 10B, in such manner that movement to the left in the direction of the arrow L is possible.

In the present exemplary embodiment, the drive unit 102, that is shown enlarged in figures 3A and 3B and can be described as a pulling element or self-propelled drive element, is a tractor with a roller-wheel pair 102A and a steering-roller arrangement 102B. Furthermore, the drive unit 102 contains an actuating member 102C. Fastened onto the drive unit 102 is a coupling element 102D with which the drive unit 102 is coupled, for example electromagnetically, to or onto the transportation system structure that is to be moved.

In the present exemplary embodiment, the coupling element 102D is a flexible element that only responds to tension and that is therefore only suitable for pulling the transportation system structure 10. The coupling element 102D can also be rigid, for example a push bar or a push-pull bar, so that the transportation system structure 10 can also be pushed and steered.

The cradle units 104 and 106 can each consist of a pair of part-cradle units and can be identically or differently formed. The cradle units 104, 106 consist of a platform proper, 104A, 106A and two respective roller axles that are fitted with the roller pairs 104B, 106B. Instead of the roller pairs, one or more cylinders or one or more runners can be provided.

Shown again in Fig. 2 are the transportation system cradle 100 with the drive unit 102 and cradle units 104 and 106, and

the transportation system structure 10. The drive unit 102 is coupled to or onto the right, upper end of the transportation system structure 10 in such manner that the transportation system structure 10 can be pulled to the right in the direction of the arrow R.

Figures 4A to 8B relate to a second exemplary embodiment of the transportation system cradle according to the invention. Fig. 4A shows this transportation system cradle 200, but with no second cradle unit, with part of the transportation system structure 10 including balustrade 10B and truss 10A.

The transportation system cradle 200 consists of a drive unit 202 in the form of a conventional forklift truck or self-propelled heavy-duty forklift truck that is shown more precisely in figures 5A and 5B.

Moreover, the transportation system cradle 200 contains a drive unit 202 with a first, docked cradle unit 204 and usually at least one second cradle unit that is not shown. Figures 6A and 6B show the drive unit 202 with the docked cradle unit 204.

Details of the cradle unit 204 are shown in figures 7A to 7C. The cradle unit 204, essentially a cradling platform, is mounted so as to be mobile on four heavy-duty rollers 208. Provided to connect the drive unit 202 to the cradle unit 204 are docking means, in the present example a pin or bolt on the drive unit 202. Complementary pin receptacles or tongues and/or eyes and/or loops or rings or eyebolts or chain links or carabiner are present on the cradle unit 204. In the present embodiment, the cradle unit 204 has several, namely

four, pin receptacles. The drive unit 202 docks onto the cradle unit 204 by its pin or bolt engaging into any one of the four pin receptacles. By pulling and pushing, it is thereby possible to move the cradle unit in different and highly diverse directions.

The cradle unit 204 also has transport foot receptacles 220. The transport foot receptacles 220 are embodied as transport foot claws or transport foot forks. The transport foot receptacles 220 serve to accommodate corresponding transport feet 20 of the transportation system structure 10 and can also be height- depth- and width-adjustable. For a first transfer phase, the transportation system structure 10 is lowered, usually by means of lifting tackle or bridge crane or gantry crane onto the cradle unit 204 in such manner that its transport feet 20 are lowered into the transport foot receptacles 220 (see Fig. 8A). The transport foot receptacles 220 prevent vertical downward movement and horizontal sliding or slipping away of the transportation system structure 10 from the cradle unit 204. The transport foot 20 of the transportation system structure 10 is embraced by the transport foot receptacle 220 since, with respect to shape and size in both the lengthwise direction and the crosswise direction, the recess of the transport foot receptacle 220 and the transport foot 20 are matched to each other or complementarily embodied. In the present exemplary embodiment, the fork-shaped or claw-shaped transport foot receptacle 220 prevents a forwards and backwards movement of the transportation system structure 10 relative to the cradle unit 204. With some play, the width of the transport foot receptacle 220 is also adapted to the transport foot 20 in such manner that a lateral movement or crosswise movement of the transportation system structure 10 relative to the cradle unit 204 is also impossible. In addition, lateral bounding

plates prevent sliding away or slipping of the transport foot 20 in the crosswise direction.

The transport foot receptacles 220 are fastened pairwise on the cradle platform proper 205 of the transportation system cradle 204 in such manner that each pair of the transport foot receptacles 220 can accommodate a left and a right transport foot 20 of the transportation system structure 10, left and right referring to the direction of travel of the finished transportation system (see Fig. 8A).

Since the transportation system structures 10 that are to be moved do not all have the same width, the cradle unit 204 is width-adjustable. To this end, firstly the cradle platform proper 205 and secondly the transport foot receptacles 220 are embodied in such manner that the latter, depending on the width of the transportation system structure 10 that is to be accommodated or transferred, can be arranged in various widths or at various mutual distances on the cradle platform 205. Especially simple is an arrangement in which the transport foot receptacles 220 need only be reinserted or regripped or rescrewed. This has the advantage that faulty or worn transport foot receptacles 220 can be replaced in simple manner. The transport foot receptacles 220 can also be laterally adjustably and lockably held in guides on the cradle platform 205 in such manner that stepless or stepped width adjustment is possible.

The transport foot receptacles 220 and the transport feet 20 are embodied in such manner that slight adjustment of the vertical position and/or inclination and/or horizontal

position of the transportation system structure 10 is possible.

The cradle units 204 of the transportation system cradles can be embodied in such manner that they serve not only during the transfer phases as mobile, but also during the assembly phases as stationary, supports for the transportation system structures 10.

Alternatively, the assembly stations can also contain their own stationary cradle units. In this case, preferably foot receptacles or transport foot receptacles 220 are provided that are embodied in such manner and can be arranged in such manner that they can accommodate the transport feet 20.

In a further type of embodiment, the assembly stations can contain stationary cradle units 204 but without foot receptacles. In this case, for the assembly phases the transportation system structures 10 together with their transport feet 20 and the transport foot receptacles 220, or without the transport foot receptacles 220, are supported on the stationary cradle units 204 in the assembly stations.

Furthermore, the transportation system structure 10 and/or the transport foot 30 rest on the cradle platform 205.

The feet or transport feet 20 and the foot receptacles 220, especially if they serve not only as mobile transport foot receptacles during the transport phases but also as stationary foot receptacles during the assembly phases, are preferably but not necessarily height-adjustable. By this means, the vertical position of the individual foot areas of the transportation system structures 10 is set or adjusted.

The height-adjustability can be attained with an arrangement in which the foot receptacle 220 has two supporting surfaces T that are arranged at an angle W1 and symmetrically to a vertical plane V. The transport foot 20 that is to be accommodated is embodied in complementary fashion and rests at least partly on or against this supporting surface T. The distance of the supporting surface T from the vertical plane V can be changed. On reduction of this distance, the transport foot 20 is raised, on increasing this distance the transport foot 20 is lowered, the vertical axis of the transport foot 20 remaining in place, so that no horizontal movement of the transport foot 20 and thereby the transport system structure 10 occurs. An additional advantage of this arrangement is that lowering of the transport feet 20 is facilitated in that through the inclined supporting surface T of the foot receptacle 220, to some extent a self-centering effect is produced.

The cradle unit 204 is also fitted with two lifting brackets 230 that are mounted on the cradle platform proper 205. Alternatively, only one lifting loop, or one or more eyebolts or other means, could be provided into which a lifting crane can engage for the purpose of transporting the transportation system cradle 200 with the aid of a lifting device such as a crane. The lifting brackets can also be so formed and arranged that they can be grasped and raised by a forklift truck.

In Fig. 7C, an important aspect is indicated by the arrows B1 and B2. This is that, in a currently preferred embodiment, the cradle unit 204 according to the invention can be moved both forwards (in direction B2) and sideways (in direction

B1). This obviates complicated and prolonged maneuvering of the very large and heavy load or loads. In Fig. 9 this type of lateral movement is used at the lower end of the assembly plant where movement from left to right takes place. Self-evidently, movement in the opposite direction, to B1 und B2, is also easily possible, meaning backwards and to the other side.

Figures 8A and 8B show an intermediate product 300, namely the cradle unit 204 with the transportation system structure 10 arranged on it, the transport feet 20 being arranged in the transport foot receptacles 220.

Fig. 9 shows an assembly plant 400 during a transfer phase. The assembly plant 400 consists of several assembly stations 410 that are laid out to execute different station-specific assembly steps, it being possible for each assembly step to comprise individual part-steps. Also belonging to the assembly station 410 is a plurality of transportation system cradles 200 and a control system 430 that fully or partly automatically controls the processes in the assembly plant 400. A hoisting device 420, for example a gantry crane or bridge crane or swing-jib crane, serves to lower the transportation system structures 10 into the transportation system cradle 200 and remove them again from the transportation system cradles 200. Further hoisting devices are not necessary, so the assembly plant 400 does not need any elaborate building structures, which is a clear advantage by comparison with conventional assembly shops.

A first transportation system cradle 200, shown at top left of Fig. 9, is provided to cradle a transportation system

structure 10. Further transportation system cradles 200 have already cradled transportation system structures 10 and, together with these, form intermediate products 300. During the transfer phases, the intermediate products 300 are transported by means of the autonomously movable transportation system cradles 200 in the direction of the arrows to the individual assembly stations 410 or removed from these respectively. The intermediate products 300 can be transferred both in their lengthwise direction and perpendicular to this direction, as between the assembly stations shown at the bottom of Fig. 9. During the assembly phases, the intermediate products 300 are stationary in the assembly stations 410. On conclusion of all individual assemblies, the transportation system structure 10 is removed from the respective completely processed intermediate product 300, which can be done with the aid of the already mentioned hoisting device 420, as shown at the top right of Fig. 9. The control system 430, indicated symbolically by chain-dotted lines, serves to control the overall process of the manufacturing assembly. The control system 430 can also include only parts of the assembly plant 400, for example only the assembly stations 410.

The control 430 can control the assembly stations 410 as well as semi-robots and robots that are located in the assembly stations, as for example welding robots, spot-welding robots, glass-insertion robots, etc.

Patent Claims

1. Transportation system cradle (100, 200) for cradling and moving a transportation system structure (10) of a transportation system, having a mobile drive unit (102, 202) that can be connected to the transportation system structure (10) to move the transportation system structure (10), and at least one first cradle unit (104, 204) and a second cradle unit (106, 204) that can be driven by the drive unit (102, 202) and are embodied in such manner as to cradle the transportation system structure (10).

2. Transportation system cradle (100) according to Claim 1, characterized in that
it contains a coupling element (102D) for the purpose of connecting the drive unit (102) to the transportation system structure (10).

3. Transportation system cradle (200) according to Claim 1, characterized in that
the drive unit (202) can be docked onto one of the cradle units (204).

4. Transportation system cradle (100, 200) according to Claim 1,
characterized in that
the cradle unit (104, 106; 204) has one or more transport-foot receptacles (220), for example transport foot forks or transport foot claws, each of which accommodates a transport foot (20) of a foot area of the transportation system structure (10) in such manner that

it is secured against horizontal displacement and vertical downward displacement relative to the transport foot receptacle (220).

5. Transportation system cradle (100, 200) according to Claim 4, characterized in that the transport foot receptacles (220) are arranged in pairs preferably mirror-symmetrically to a lengthwise central plane and in that the distance between the transport foot receptacles (220) of a pair can be changed to adapt the width of the transportation system cradle (100, 200) to the transportation system structure (10).

6. Transportation system cradle (200) according to Claim 3, characterized in that it has docking means (102D, 202D) to dock the drive unit (202) to the cradle unit (204), with a first docking element (102D) to the drive unit (202) and a second docking element (202D) to the cradle unit (204).

7. Transportation system cradle (200) according to Claim 6, characterized in that the cradle unit (104, 204) has several docking elements (202D) that are arranged in such manner that the docking element (102D) can be alternatively brought into engagement with one of these docking elements so as to move the cradle unit (104, 204) by means of the drive unit (202, 102) in different and highly diverse directions.

8. Transportation system cradle (200) according to Claim 7, characterized in that each docking element (202D) on the cradle unit (104, 204)

is a pin receptacle or bolt receptacle and the docking element (102D) on the drive unit (202, 102) is a pin or bolt.

9. Transportation system cradle (200) according to one of the preceding claims, characterized in that the cradle device (104, 204) has means, for example lifting loops or lifting tongues (230), to allow engagement of an external lifting device or lifting tackle or crane.

10. Transportation system cradle (200) according to Claim 4, characterized in that the transport foot receptacle has two supporting surfaces (T) that stand relative to each other at a foot angle (W1), whose mutual distance increases upwardly and/or is settable and whose purpose is to serve as supporting surface for complementarily formed, preferably round, crowned, barrel-shaped, or spherical foot surfaces of the transport foot (20) so that the supporting surfaces (T) and the foot surfaces form a hoisting system for the height-adjustment of the transportation system structure (10).

11. Intermediate product (300) for the assembly of a transportation system comprising a transportation system structure (10) that is undergoing assembly and a transportation system cradle (100, 200) on which the transportation system structure (10) is cradled, the intermediate product (300) being autonomously transferable, for the purpose of being taken to an assembly station (410) and removed from the assembly station (410), and/or can be stationarily positioned in

the assembly station (410) for the purpose of executing a station-specific assembly step.

12. Intermediate product (300) according to Claim 11, characterized in that
the transportation system structure (10) has several feet (20) and in that the transportation system cradle (200) has several foot receptacles (220), each foot receptacle (220) being embodied and arranged complementarily, preferably round, crowned, barrel-shaped or spherical, to a foot (20) of the transportation system structure (10) and cradling a foot (20) of the transportation system structure (10).

13. Intermediate product (300) according to Claim 11, characterized in that
during assembly phases the feet (20) of the transportation system structure (10) are secured against horizontal and/or vertical and downwards directed movements relative to the foot receptacles (220) of the transportation system receptacle (200).

14. Intermediate product (300) according to Claim 11, characterized in that
the foot receptacles (220) of the transportation system cradle (200) are height adjustable for the purpose of horizontalizing or horizontally aligning the transportation system structure (10) for the assembly phase before execution of the station-specific assembly step.

15. Assembly plant (400) for manufacturing assembly and/or assembly of transportation systems, with a sequence of

assembly stations (410), each of which is capable of executing a station-specific assembly step on a transportation system structure (10) of a transportation system, with several transportation system cradles (100, 200), of which at least several together with a respective transportation system structure (10) form intermediate products (300), and with a control system (430) to simultaneously and/or rhythmically transfer each of the intermediate products (300) into a respective one of the assembly stations (410), to assemble or manufacturing assemble the transportation system structures (10) of the intermediate products (300) in the respective assembly stations (410) and subsequently transfer the intermediate products (300) into the respective subsequent assembly station (410).

16. Assembly plant (400) according to Claim 15, characterized in that it has at least one lifting device (420), for example a crane or lifting tackle or travel crab, for the purpose of bringing or lifting the transportation system structures (10) onto the transportation system cradle (100, 200) or removing them or lifting them out.

17. Method for the assembly of transportation systems, in which from one transportation system structure (10) of a transportation system and one transportation system cradle (100, 200) respectively an intermediate product (300) is formed, the intermediate products (300) pass sequentially, rhythmically, and/or simultaneously through an assembly plant (400), during the transfer phases each of the intermediate products (300) is transferred or transported between one of the assembly stations (410) and the respective subsequent assembly station (410), and

during the assembly phases in the respective assembly stations (410) a station-specific assembly step is executed on the transportation system structures (10) of the intermediate products (300).

18. Method according to Claim 17,
characterized in that
a control system (430) of the assembly plant (400) keeps the assembly phases and/or the transfer phases at least approximately equal in terms of time and controls the transfer of the intermediate products (300).

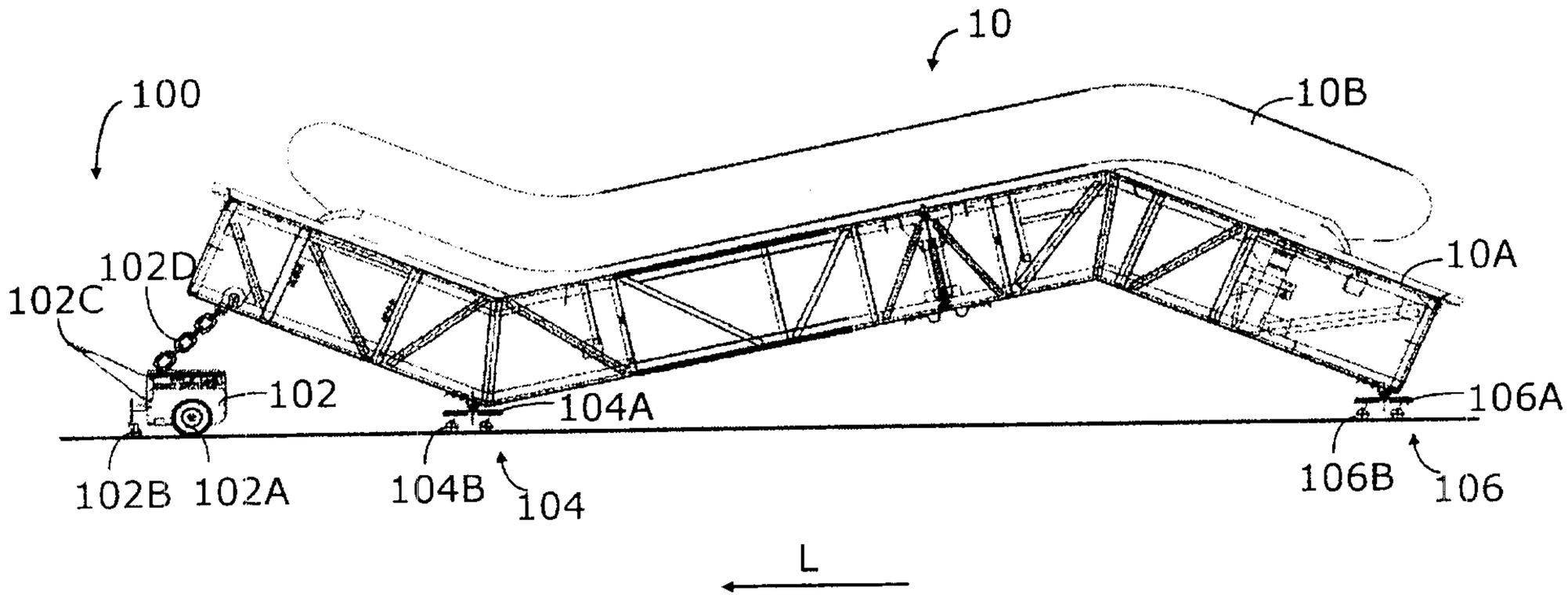
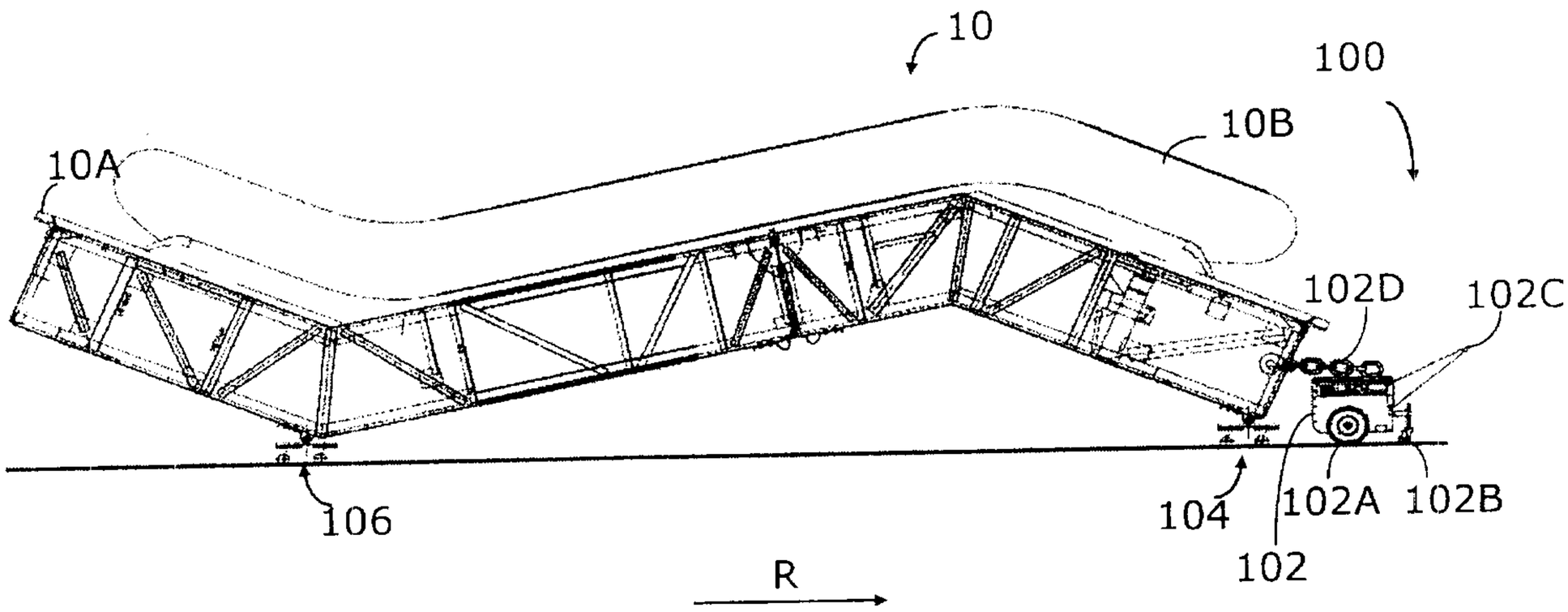

300
10
100
10B
10A
102D
102C
102
104A
106A
102B
102A
104B
104
106B
106
L

FIG. 1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10
100
10B
10A
102D
102C
106
104
102A
102B
102
R

FIG. 2

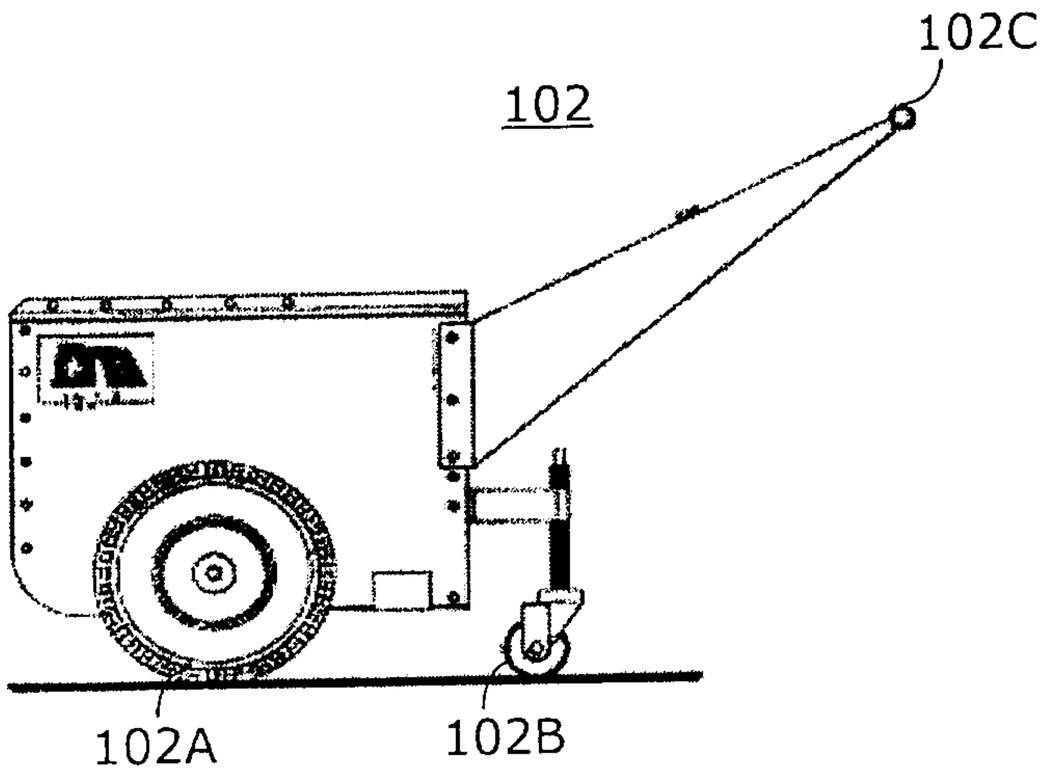


FIG. 3A

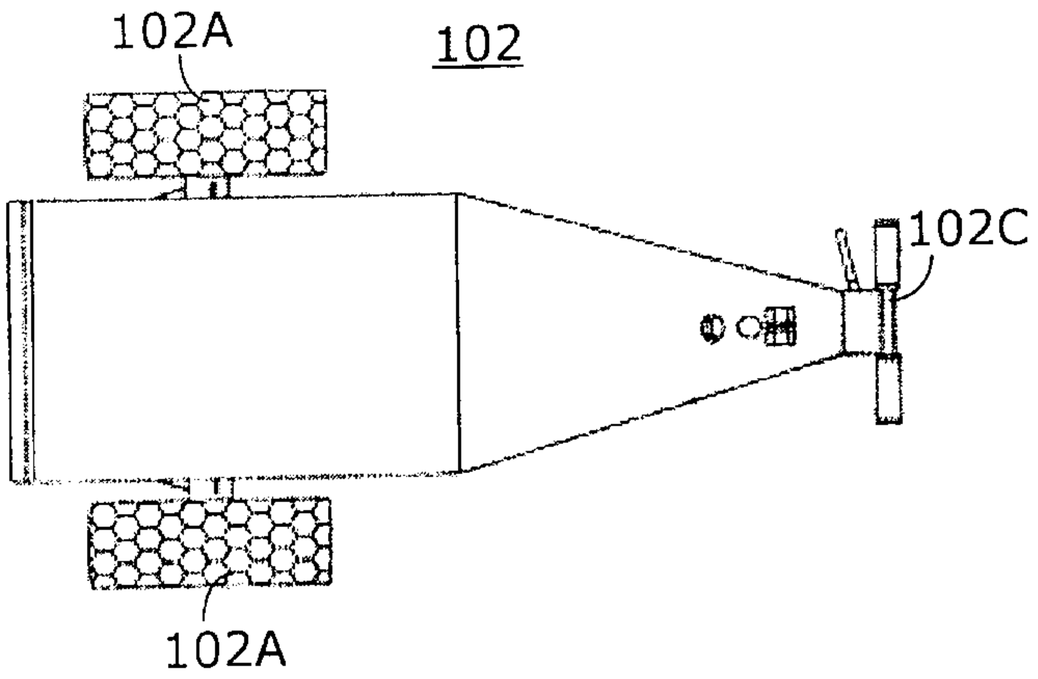


FIG. 3B

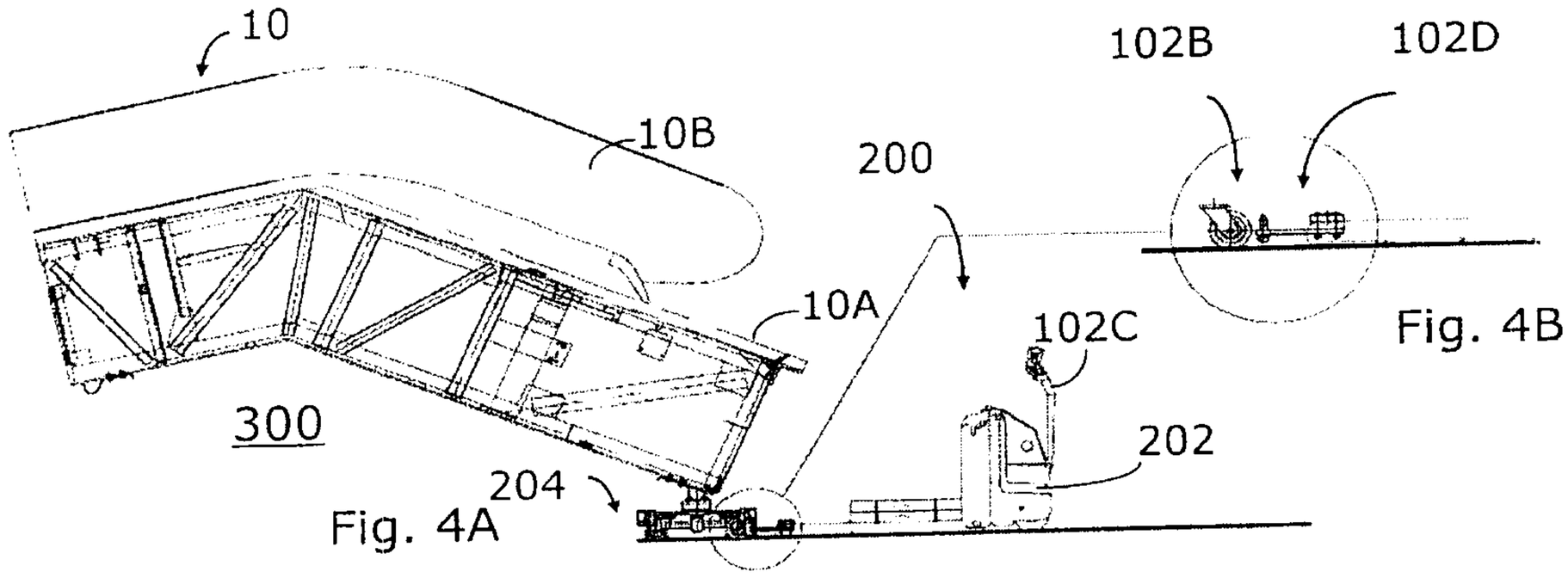


Fig. 4A

Fig. 4B

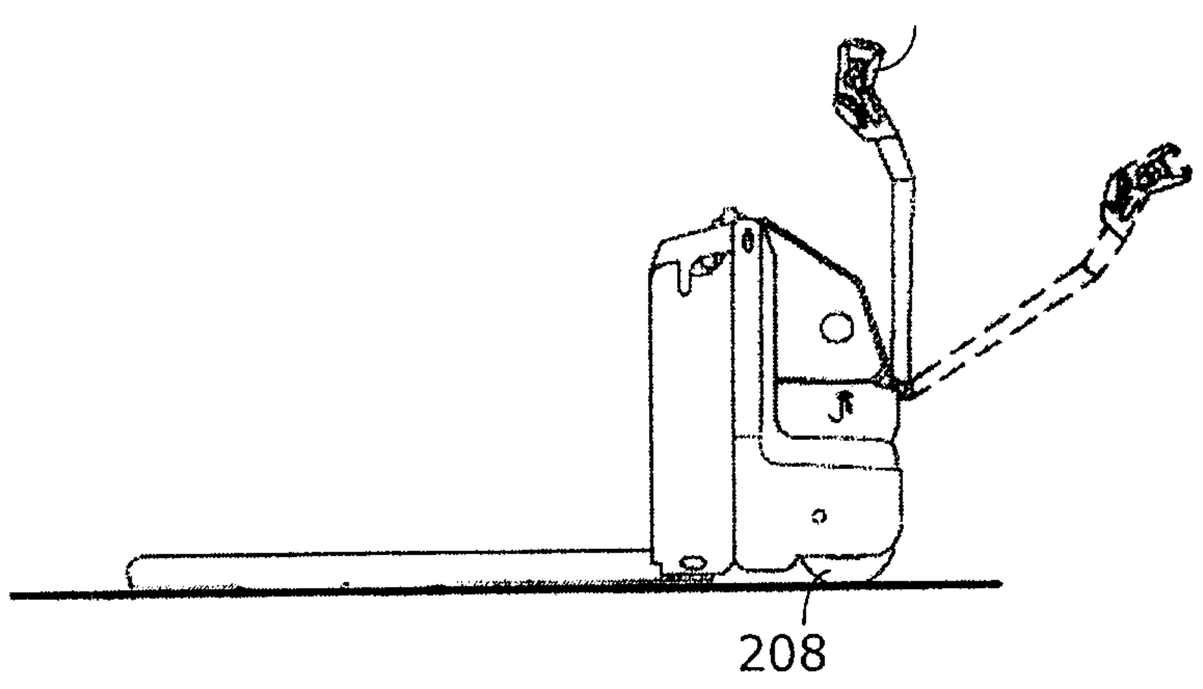


FIG. 5A

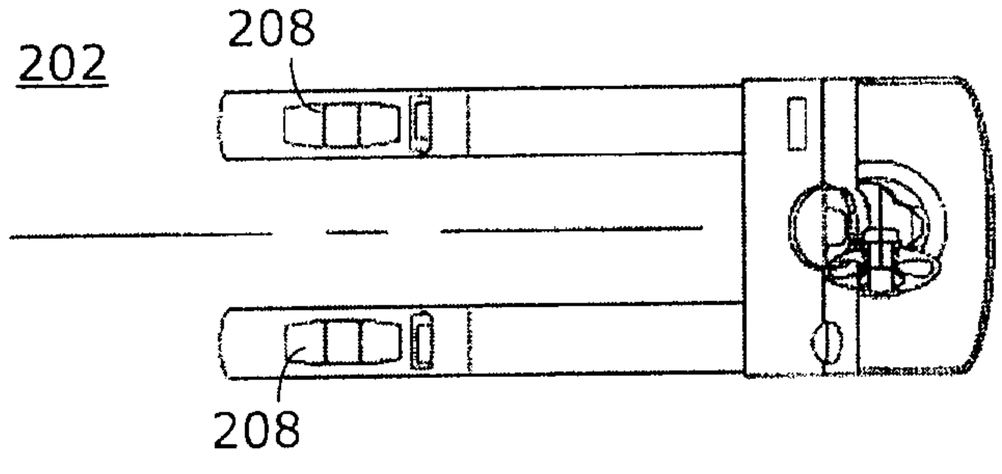


FIG. 5B

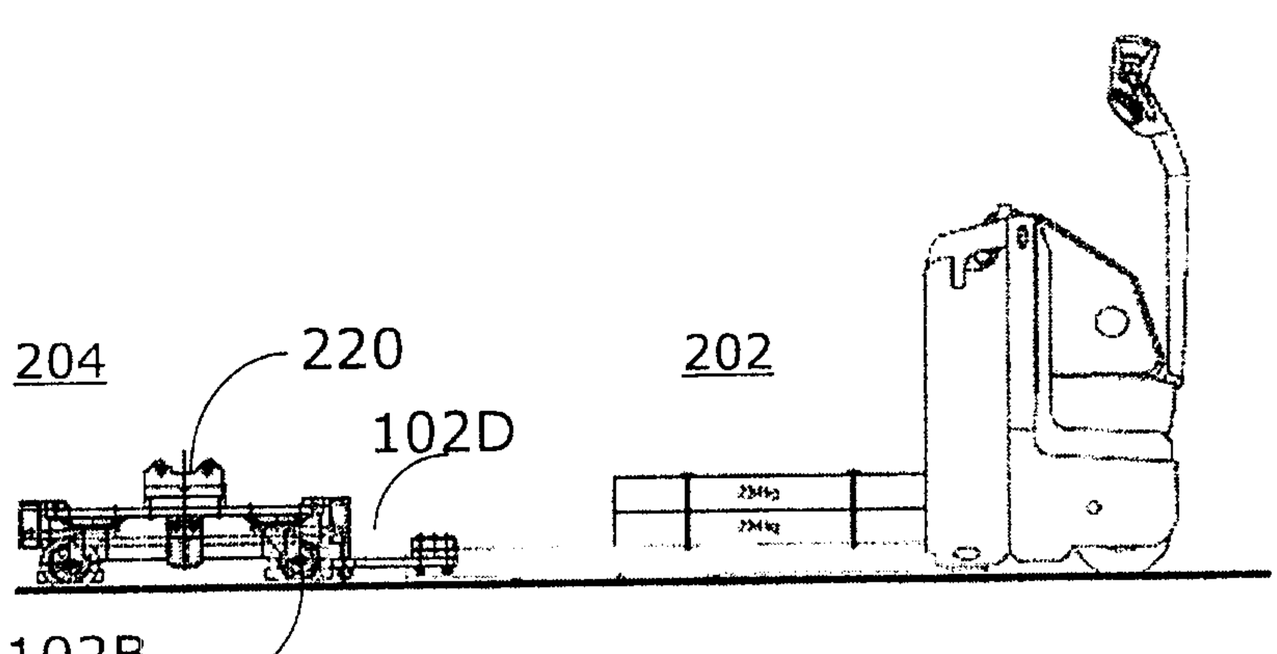


FIG. 6A

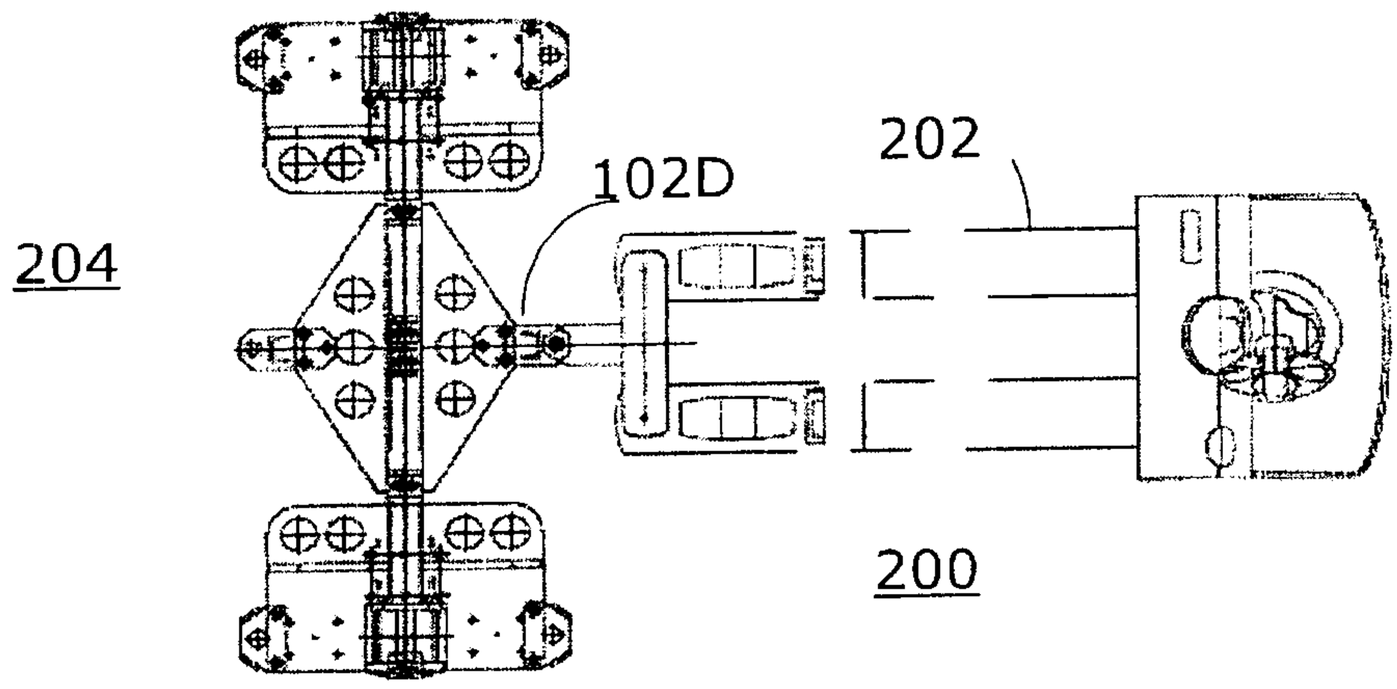


FIG. 6B

FIG. 7A

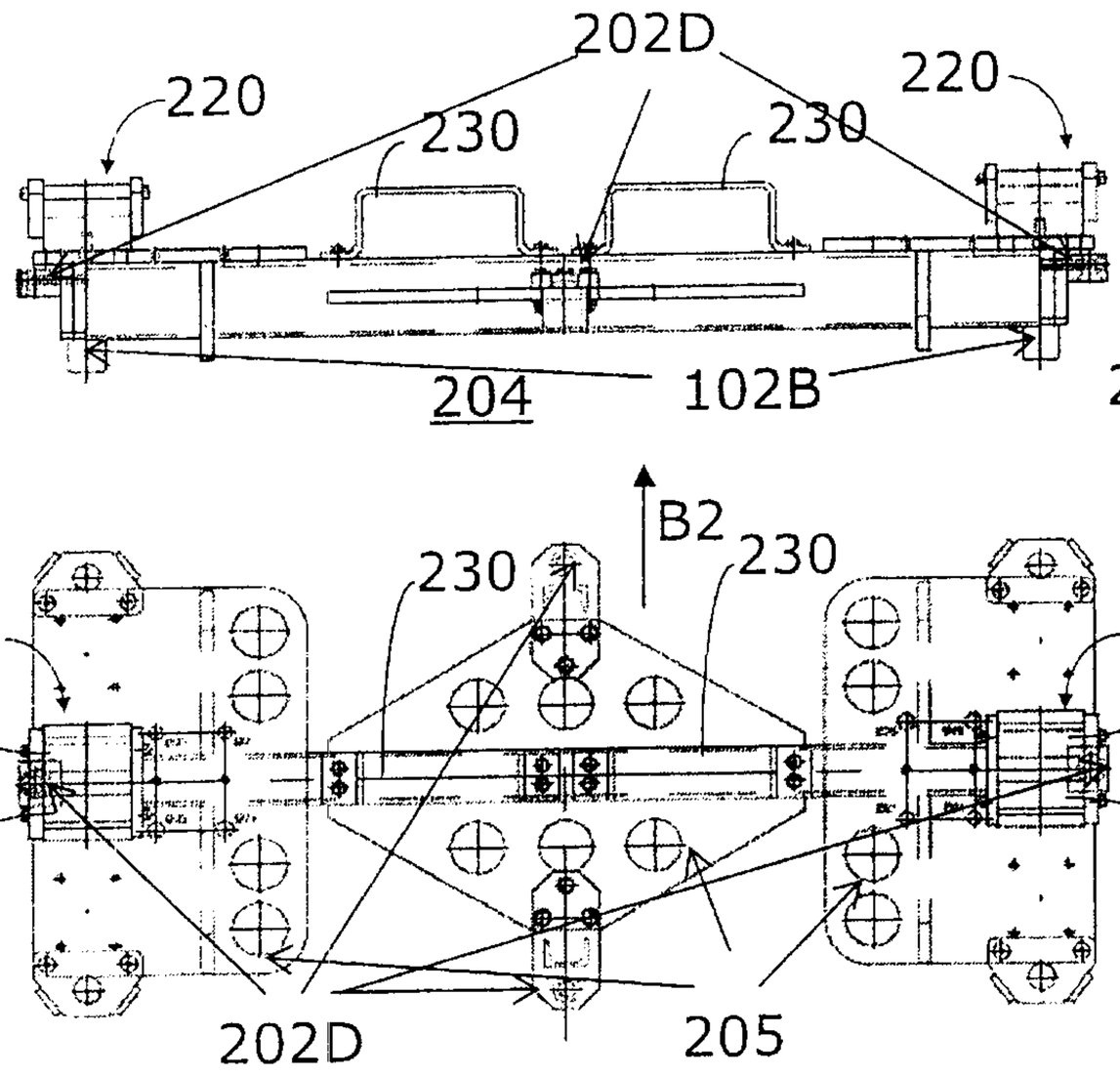


FIG. 7B

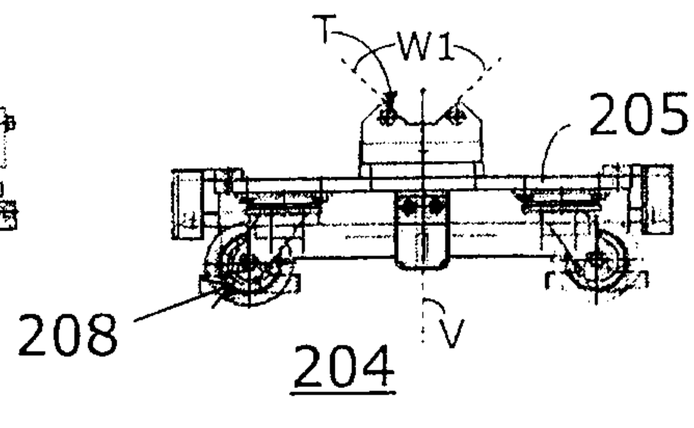


FIG. 7C

220

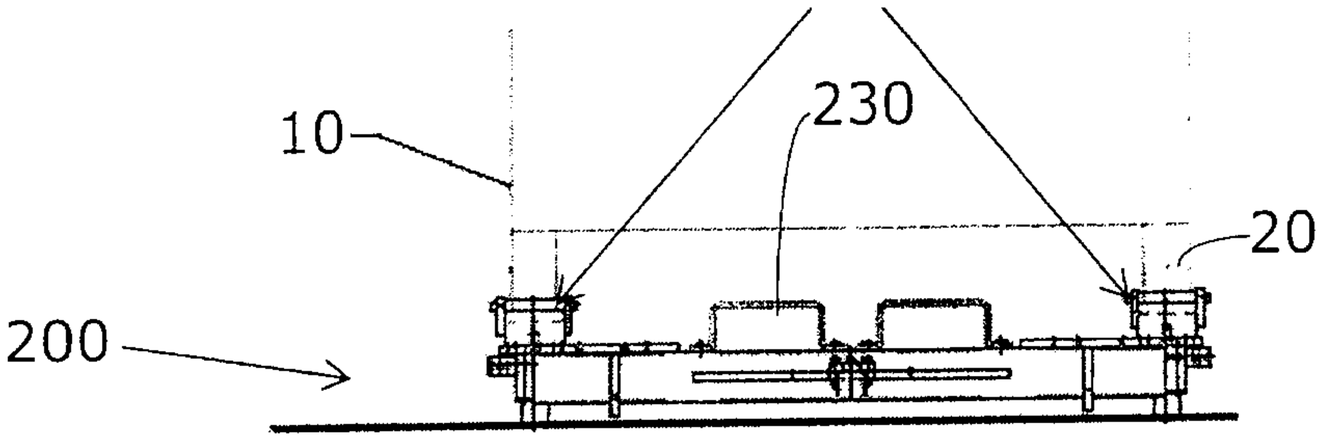


FIG. 8A

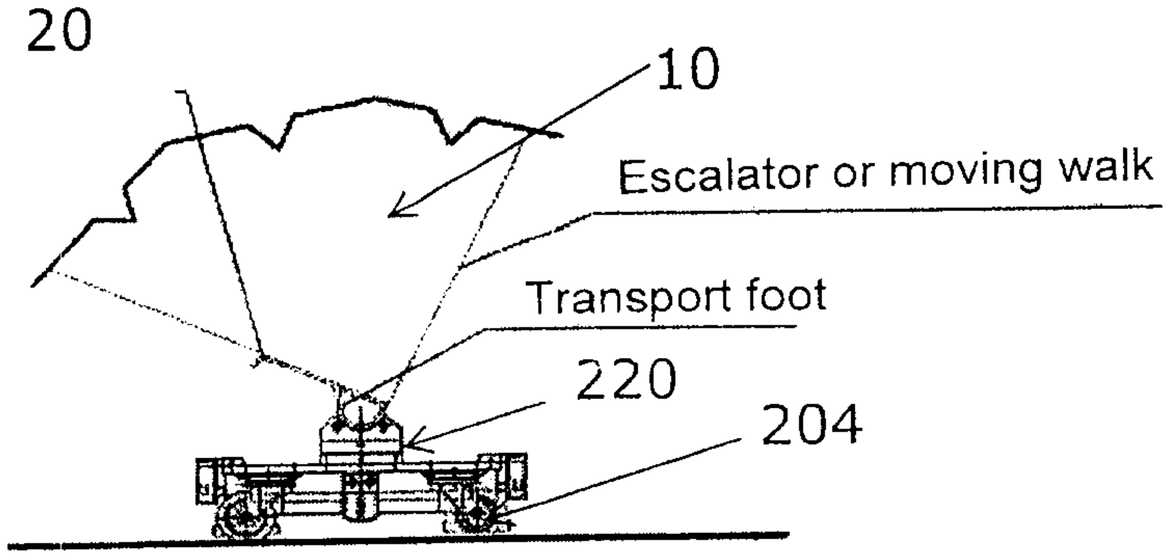


FIG. 8B

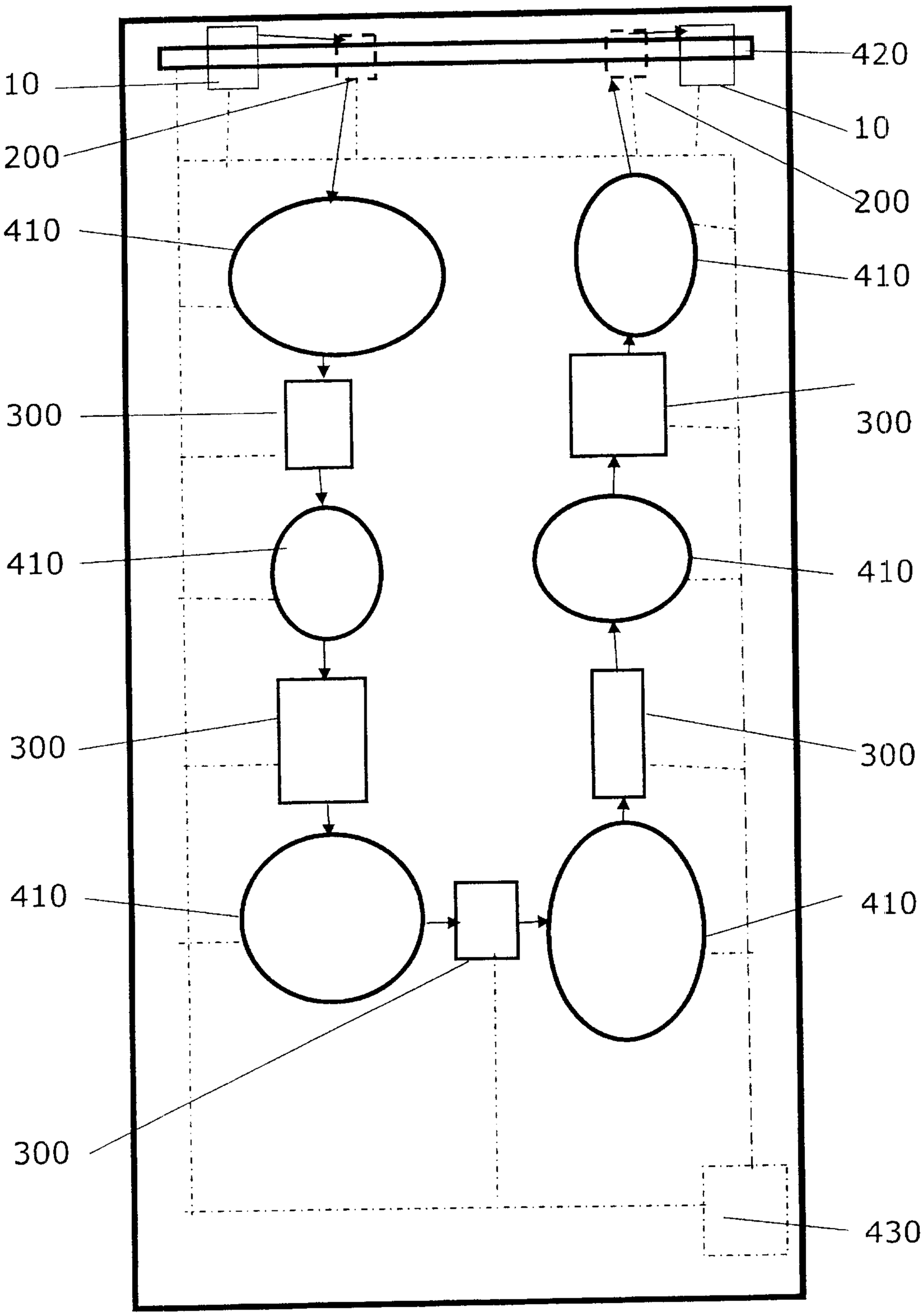
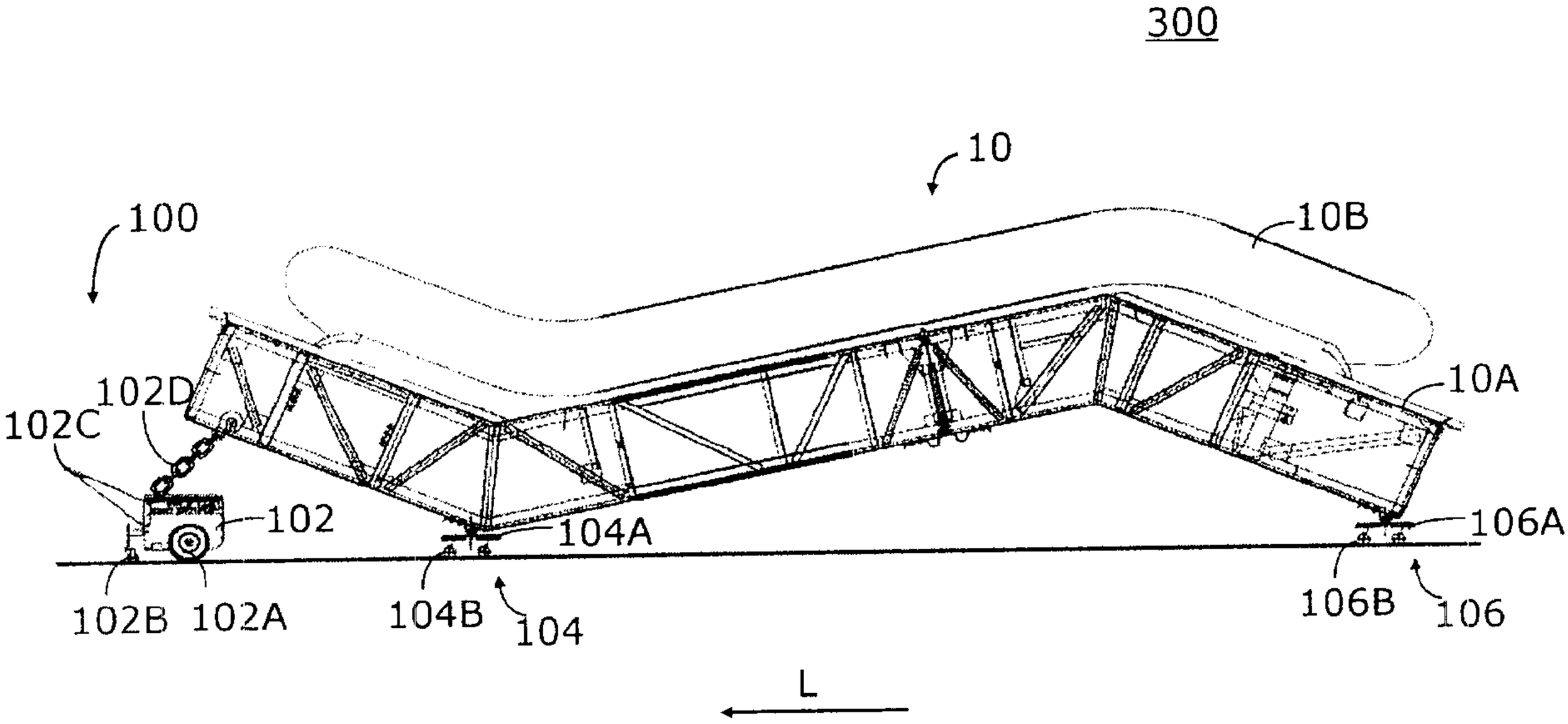


FIG. 9

400


300
10
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10B
10A
102D
102C
102
104A
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102B
102A
104B
104
106B
106
L