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(54) **Self-moving car, particularly suitable to support suspended scaffolding**

(57) A self-moving car (1) for assembling and using suspended scaffoldings or platforms, comprising:
- a bearing structure (2) in metal frame, defining a raised trampling work floor (3) and bearing supporting beams (51-71) projecting in a cantilevered manner and which can be connected directly to the scaffolding; and

- tracked-type locomotion means (15), whereon the bearing structure (2) is mounted,

wherein the whole configuration is so as to allow processings on scaffoldings arranged both above and below the trampling work floor (3) (Fig. 1).

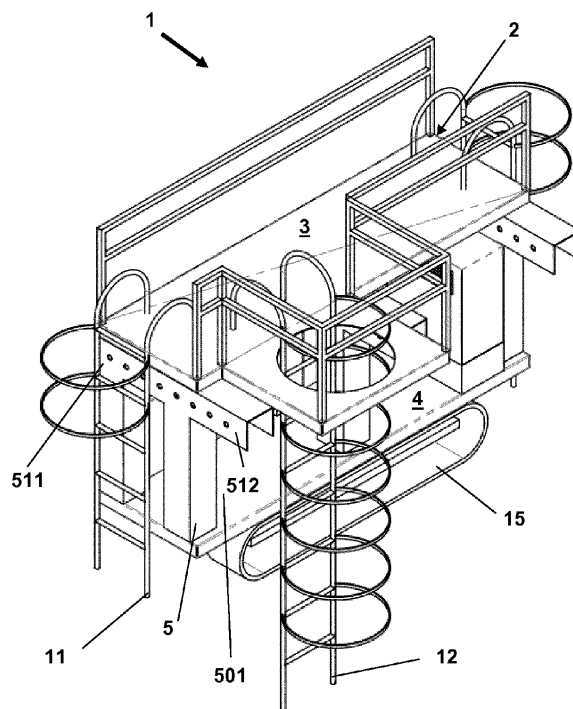


FIG. 1

Description**Technical field of the invention**

[0001] The present invention relates to a self-moving car, particularly suitable for supporting a scaffolding with a suspended work floor, for example in building work for restoring a viaduct.

Background

[0002] Several construction works require implementing suspended scaffoldings, the manufacturing and the access thereto take place by means of lorries or similar wheeled vehicles. The latter bear an aerial working platform which is implemented by means of a cradle moved by a lifting arm.

[0003] A typical application of such aerial platforms on lorry is the restoration of viaducts, which generally requires a specific treatment of the kerbs and of the edge beams. In all the cases wherein the viaduct height is high and/or the underneath ground cannot be easily reached or used - for example in presence of water flows or other natural obstacles - the areas to be restored must be indeed reached by means of a suspended scaffolding. For working involving not the whole intrados, but only the edge beams and/or the side kerbs, one prefers avoiding to install a fixed suspended scaffolding for the whole length of the viaduct and it results to be more rational arranging a scaffolding module which can then translate along the viaduct, with less use of materials and shorter preparation time. The so-implemented scaffolding is used as work floor to perform interventions of waterproofing, varnishing, structural reinforcement by means of carbon fibres, post-compression cable laying, waste management and whatever provided for restoring the degraded structural elements.

[0004] The inventor has found that the aerial platforms on lorries known on the market result to be difficult to be used in the following aspects:

- the load transfers to the ground in localized points - typically the stabilizing small feet - which often weaken the resting subsoil (especially the asphalt in the summer season), with consequent sinking of the vehicle;
- the typical sizes of the lorry (overall width dimensions general of 2.50 m) do not allow a wide safe use on the road carriageways without partializing the same and they do not allow the access to mountain streets;
- it is not possible performing work at a height, both in negative sense and positive sense, that is on work floors arranged both on the lower side and on the upper side of the lorry;
- no translation of the vehicle with platform in under-

neath work position is allowed;

- it is not possible arranging several stable work floors allowing two or more users to operate simultaneously;
- no horizontal translation in combination with a swinging motion (tilting or rotation) is allowed;
- none of the known systems has an enclosed scaffolding, in particular a scaffolding with sizes and features according to the use requirements, being always "permanent" aerial platforms - consequently, the known systems have very low flexibility with respect to different applications.

[0005] US 2005/0056484 describes a tracked vehicle comprising a mobile working platform which can be translated vertically and bearing a telescopic structure which can be extended horizontally.

Summary of the invention

[0006] The technical problem placed and solved by the present invention is then to provide a self-moving car allowing to obviate the drawbacks mentioned above with reference to the known art.

[0007] Such problem is solved by a self-moving car according to claim 1.

[0008] Preferred features of the present invention are subject of the depending claims.

[0009] The present invention provides some important advantages.

[0010] In particular, thanks to the whole configuration and to the fact of providing tracked locomotion means, the self-moving car of the invention has minimum overall dimension, maximum stability and possibility of safe use on any type of road surface.

[0011] The arrangement with direct means for supporting a scaffolding equipped with a suspended work floor (or a suspended working platform) allows an extension of the working area both in positive and negative sense with respect to the road surface, that is both above and below the trampling floor provided on the car.

[0012] Furthermore, the possibility of a removable connection to the scaffolding and/or platform allows an extreme application flexibility, allowing to select the specific configuration of the car and of the scaffolding/platform according to the needs. Under "removable connection" it is indeed meant that the car is configured to allow connecting and disconnecting thereto a scaffolding, a portion thereof or a suspended platform according to the application needs.

[0013] The car configuration further allows implementing several trampling work floors accessible to several operators contemporaneously, under conditions of total safety, both on the same car and on the scaffolding connected thereto.

[0014] Still, the invention car, in particular in the preferred embodiment discussed later, allows a full motion of the suspended work floor of the scaffolding or the suspended platform both in translation and in rotation.

[0015] Preferably, an electric motor is used to move the car.

[0016] Other advantages, features and use modes of the present invention will result evident from the following detailed description of some embodiments, shown by way of example and not for limitative purposes.

Brief description of the figures

[0017] The figures of the enclosed drawings will be referred to, wherein:

■ Figures 1 and 2 show each one a perspective, front and rear, respectively, view of a first preferred embodiment of the self-moving car of the present invention;

■ Figures 3 and 4 show, respectively, a front and rear view of the car of Figure 1;

■ Figure 5 shows a side view of the car of Figure 1;

■ Figure 6 shows a top plan view of the car of Figure 1;

■ Figure 7 shows a perspective view of a portion of a second preferred embodiment of the self-moving car of the present invention, wherein for better clarity some components already shown for the first embodiment, in particular a raised trampling work floor, have been omitted;

■ Figures 8A to 8C refer to the self-moving car of Figure 7, by showing respectively a side view thereof, underlying the mobility in translating and swinging a work floor or suspended platform of the scaffolding connected to the car, a section view thereof according to line B-B of Figure 8A and a top plan view thereof.

[0018] The mentioned sizes in some of the above-shown figures are to be meant by pure way of example and not with limitative purpose.

Detailed description of preferred embodiments

[0019] With reference to the enclosed figures, a self-moving car according to a preferred embodiment of the invention is designated as a whole with 1.

[0020] The car 1 is specifically suitable to the use with a suspended scaffolding, in particular for restoring a viaduct, thus allowing the assembly and the access to such suspended scaffolding. In particular, as it will be illustrated in greater detail later, the self-moving car has means

for the removable connection to a scaffolding, and in particular with components of the latter. The scaffolding, mounted on the car 1 by means of the above-mentioned means for the removable connection, can be moved by the car itself even in the work position, that is even after the connection to the car in the final use configuration.

[0021] The self-moving car 1 first of all includes a bearing structure 2, defining a raised trampling work floor 3. The latter can be engaged by a plurality of operators simultaneously and/or used to rest machines and components, for example a compressor, an energy source or other.

[0022] The raised floor 3 is protected by means of fall-prevention elements, the latter typically under the form of one or more banisters or balustrades 30.

[0023] Furthermore, in the present example from the raised floor 3 stairs, or equivalent ascending/descending means, in particular three stairs designated with 11, 12 and 13, respectively, depart downwards.

[0024] The bearing structure 2 further comprises a base 4, substantially extending parallelly to the raised floor 3, below it. From the base 4 three supporting vertical frames depart, preferably configured substantially like a squared arc and designated with 5, 6 and 7, respectively. Each frame 5-7 is then interposed between the base 4 and the raised floor 3. In the present example, the frames 5-7 are arranged substantially in an equidistant way in the horizontal direction.

[0025] A horizontal supporting beam, designated with 51, 61 and 71, respectively, projecting in a cantilevered manner from the bearing structure 2, departs from each frame 5-7. In particular, each beam 51-71 defines the arc upper portion of the respective frame 5-7 - that is the related horizontal cross member - and it then proceeds in a cantilevered manner. The two portions of each just mentioned beam 51-71, that is the one embedded in the arc and the projecting one, by way of example are designated with 511 and 512, respectively, for the beam 51. The beams 51-71 are then arranged in the position immediately adjacent to the raised trampling floor 3.

[0026] Each beam 51-71 preferably is "C" shaped in cross section.

[0027] Furthermore, each beam 51-71 is arranged with element for the direct connection to the scaffolding which in the present example comprise a plurality of seats 10 suitable for the connection of gudgeon bolts and/or equivalent elements.

[0028] Each frame 5-7 and the related beams 51-71 with the seats 10 implement means for supporting the suspended scaffolding.

[0029] Other embodiments can provide means for the removable connection of the car 1 to a scaffolding, different from those considered herein.

[0030] The whole configuration is so that the self-moving car 1 allows working on scaffoldings arranged both above and below the trampling work floor 3. In fact, the above-mentioned means for the removable connection, which in the present example are based upon the seats

10, allows a connection of the scaffolding both at an upper work level and lower work level than the work floor 3.

[0031] The hooking of the scaffolding to one of the beams 51-71 can be performed by means of a suspension point and possible additional structural elements for stabilizing and transmitting the moment.

[0032] Preferably, below the supporting means, and in particular the beams 51-71, manoeuvring compartments, that are free openings, are provided, apt to allow the cantilevered portion of the beams to extend beyond possible protection barriers, such as for example guardrails or like elements. One of such compartments, in particular the one associated to the beam 51, by way of example is designated with 501 in Figure 1.

[0033] The car 1 can be further equipped with one or more extensions associate or which can be associated to the above-mentioned means for supporting the scaffolding and in particular to the vertical uprights of one or more frames 5-7, ad this to allow overcoming higher obstacles, such as for example protection nets.

[0034] The bearing structure 2 and the components mentioned sofar can be manufactured of metal frame.

[0035] The bearing structure 2 of the car 1 is mounted, at its own base 4, on tracked-type locomotion means 15. In the present example, two substantially parallel tracked elements are provided, arranged below the base 4 and extending on a prevailing portion of the base itself. In particular, each tracked element has a width allowing the full stabilization of the car and which preferably does not exceed 1.20 m and a little smaller length than the one of the base 4 itself.

[0036] The car 1 can include means for feeding locomotion means 15, comprising for example an hydraulic pump and an electric engine actuating it. The engine can even be connected to an energy source existing in the construction site to allow performing work of various type. The energy source can be found in a generator or a construction site switchboard.

[0037] The car 1 obviously includes even controls for translating and steering the locomotion means 15, connected to power supply means too.

[0038] The car 1 can even be translated by means of devices with winch or telescopic levers or by means of other mechanical means available in the construction site.

[0039] The car 1 can further comprise a stabilizing ballast positioned inside the overall dimensions of the car itself.

[0040] Figures 7 to 8C refer to a second embodiment of the invention wherein on the self-moving car, herein designated with 100, is equipped in a removable way with a scaffolding having a suspended work floor or suspended platform 200. Such second embodiment will be described only by referring to the aspects differentiating them from the above-described first embodiment.

[0041] In particular, the self-moving car 100 comprises, like the first embodiment, beams for supporting in a cantilevered manner of a removable structure, in the

present case the suspended platform 200. In the herein considered example two beams designated with 510 and 710 have been represented. The beams allow indeed the removable assembly of the suspended platform 200, shown in an underneath configuration in Figure 7. For such assembly, in the present example vertical uprights 201 and 202 of the platform 200 or of the car 100 are provided.

[0042] Each beam 510, 710 has translation means, by way of example designated with 101 for the beam 510. Such means, in the present example, are of telescopic type. In particular, the translation takes place through telescopic elements integral to, or integrated into, the respective beams 510, 710, typically actuated by hydraulic cylinders and related safety valves. The means 101 allows indeed a translation of the platform 200 connected to the cantilevered beams 510, 710, in the present example by means of an elongation or shortening of the latter.

[0043] The translation means 101 of the present embodiment is configured to allow a horizontal translation perpendicular to the driving direction, the latter designated with an arrow M in Figure 7. Figure 8C exemplifies the allowed translation. In particular, as said, the translation of the suspended platform in operation by moving it away from or bringing it near to the car 100 is allowed. This eases in an important way the work, by allowing to obtain an optimum positioning both of the trampling floor of the scaffolding and that of the platform 200, so as to allow the operators to operate in maximum safety.

[0044] Each one of the beams 510 and 710 further has rotation /swinging means, by way of example designated with 102 for the beam 710. Such means, in the present embodiment, comprises a spherical hinge allowing rotations according to three mutually orthogonal axes. Based upon an embodiment example, the rotation means 102 comprises an articulated frame hinged to the mobile (that is telescopically mobile) portion of the respective beam 510, 710, preferably moved with hydraulic cylinders and related safety valves. In particular, an automatic stop system is provided, implemented by means of double-effect locking valves. The hinges associated to the two beams 510, 710 are joined by a torsion bar with the purpose of compensating the swinging angle difference between the two hinges themselves.

[0045] Figure 8A exemplifies some of the allowed rotations. The rotation means 102 is configured to allow a tilting of hooking points of the suspended platform 200 with respect to the horizontal floor (swinging). This allows adjusting the tilting of the trampling floor of the platform (or of the scaffolding) and it allows to overcome possible obstacles.

[0046] At this point it will be better appreciated that in the invention the use of a half-moving base equipped with tracks able to translate and steer guarantees a high stability against overturning and safety during the motions.

[0047] It will be further understood that the car of the

invention, in particular in the configuration described above, plays in optimum way the functions of support, stability and motion, in whole safety and for a plurality of working procedures. In particular, the car can be used for assembling provisional structures (for example parapets along the viaduct edge), for changing the blade of cement-cutting machines used for cutting the kerb, for measuring and controlling operations, for hydrodemolition operations, reconstruction of tools and plate block and plastering.

[0048] An embodiment example not to be meant as a limiting example provides that the car 1 of the first embodiment has a bearing structure or frame 2 with length equal to about 6 m. The width of the bearing structure 2 is determined depending upon the space which is granted to be used on the road carriageway and it can vary, for example, in a range of about 1.50-1.20 m. In such example, the car can support a scaffolding with cross overall dimensions (width) equal to about 1.30 m.

[0049] Still in the considered example, the three arc-like frames 5-7 in metal frame have a distance of about 3 m the one from the other one and they support the three horizontal beams 51-71 going out in a cantilevered manner at about 1.40 meters above the road floor. At the end of such beams 51-71 the hooking of the scaffolding is implemented, with a cantilever of about 1.20 m from the outer wire of the tracked means 15.

[0050] Still in the present example, a ballast constituted by suitable full blocks made of iron is provided.

[0051] Another dimensionally specific example of a 4 m long car is shown in Figures 4 to 6.

[0052] With said sizes - and more generally in the described configuration, apart from the specific measurements - the car 1 can be used in the emergency lane portion comprised between New Jersey delimiting the construction site area and the side guard-rail barrier.

[0053] The proposed mechanical configuration allows to vary the sizes of the car based upon the needs of the destination construction site both for:

- length
- height
- width.

[0054] Based upon possible modifications, the variation of several hooking points for the positive and negative descending is applied. The negative and positive junction points of the scaffolding could vary in number proportionally to the variation of the sizes of the car. This allows a possible greater length of the work floors in order to allow a greater flexibility in the application of the products and in other working procedures.

[0055] The present invention has been sofar described with reference to preferred embodiments. It is to be meant that other embodiments belonging to the same inventive core may exist, as defined by the protection scope of the

here below reported claims.

Claims

1. A self-moving car (1; 100) suitable for supporting and put in position scaffolding with suspended work floors or suspended platforms, both of them customizable, which self-moving car comprises:
 - a bearing structure (2), defining a raised trampling work floor (3) and bearing means for supporting a suspended work floor of the scaffolding or of a suspended platform (5-7, 51-71, 10), which supporting means is configured for the direct and removable connection of the floor/platform to the self-moving car; and
 - tracked-type locomotion means (15), upon which said bearing structure (2) is mounted, wherein the overall arrangement is so as to allow the use thereof with work floors/platforms placed both above and below said trampling work floor (3).
2. The self-moving car (1; 100) according to claim 1, wherein said means for supporting a scaffolding comprises at least a supporting frame (51), preferably vertical and preferably substantially configured like an arc.
3. The self-moving car (1; 100) according to claim 1 or 2, wherein said means for supporting a scaffolding comprises a plurality of supporting frames (51-71), preferably three frames, preferably vertical and preferably each one substantially configured like an arc.
4. The self-moving car (1; 100) according to claim 2 or 3, wherein said or each frame (51-71) is interposed between said raised trampling floor (3) and a base (4) of said bearing structure (2).
5. The self-moving car (1; 100) according to anyone of the preceding claims, wherein said means for supporting a scaffolding comprises one or more beams (51-71; 510, 710) projecting in a cantilevered manner from said bearing structure (2), each one suitable to be fixed to the scaffolding/platform, each one preferably horizontal and each one preferably "C" shaped.
6. The self-moving car (1; 100) according to the preceding claim, wherein said or each beam (51-71; 510, 710) is provided with elements for direct and removable connection to the scaffolding/platform, which connection elements preferably comprise a plurality of connection seats (10) for gudgeon pins, bolts and/or equivalent elements.

7. The self-moving car (1; 100) according to claim 5 or 6, wherein said or each beam (51-71; 510, 710) is placed in a position immediately adjacent to said raised trampling floor (3). 5
8. The self-moving car (1; 100) according to anyone of the claims 2 to 4 and according to anyone of the claims 5 to 7, wherein said or each beam (51-71; 510, 710) defines a top portion of a respective frame (5-7). 10
9. The self-moving car (1; 100) according to anyone of the preceding claims, having manoeuvring compartments (501) associated to said supporting means (5-7) so as to allow the latter means to extend beyond protection barriers such as guardrails or the like. 15
10. The self-moving car (1; 100) according to anyone of the preceding claims, comprising means (11-13) for ascending/descending on/from said raised trampling floor (3). 20
11. The self-moving car (1; 100) according to anyone of the preceding claims, comprising a stabilizing ballast. 25
12. The self-moving car (100) according to anyone of the preceding claims, comprising translation means (101) configured so as to allow a translation of the scaffolding/platform connected to the car. 30
13. The self-moving car (100) according to the preceding claim, wherein said translation means (101) comprises at least a telescopic structure, preferably connected to, or integrated in, a respective beam of said beams (510, 710) projecting in a cantilevered manner. 35
14. The self-moving car (100) according to anyone of the preceding claims, comprising rotation means (102) configured so as to allow a rotation of the scaffolding/platform connected to the car. 40
15. The self-moving car (100) according to the preceding claim, wherein said rotation means (101) comprises at least a spherical hinge, preferably connected to, or integrated in, a respective beam of said beams (510, 710) projecting in a cantilevered manner. 45
16. The self-moving car (1; 100) according to anyone of the preceding claims, wherein said raised trampling work floor (3) is rotatable according to one or more rotation axes, preferably according to three mutually orthogonal rotation axes. 50
17. A self-moving system, comprising a self-moving car (1; 100) according to anyone of the preceding claims and extension means associated or associable to 55

said means (5-7, 51-71, 10) for supporting a scaffolding/platform.

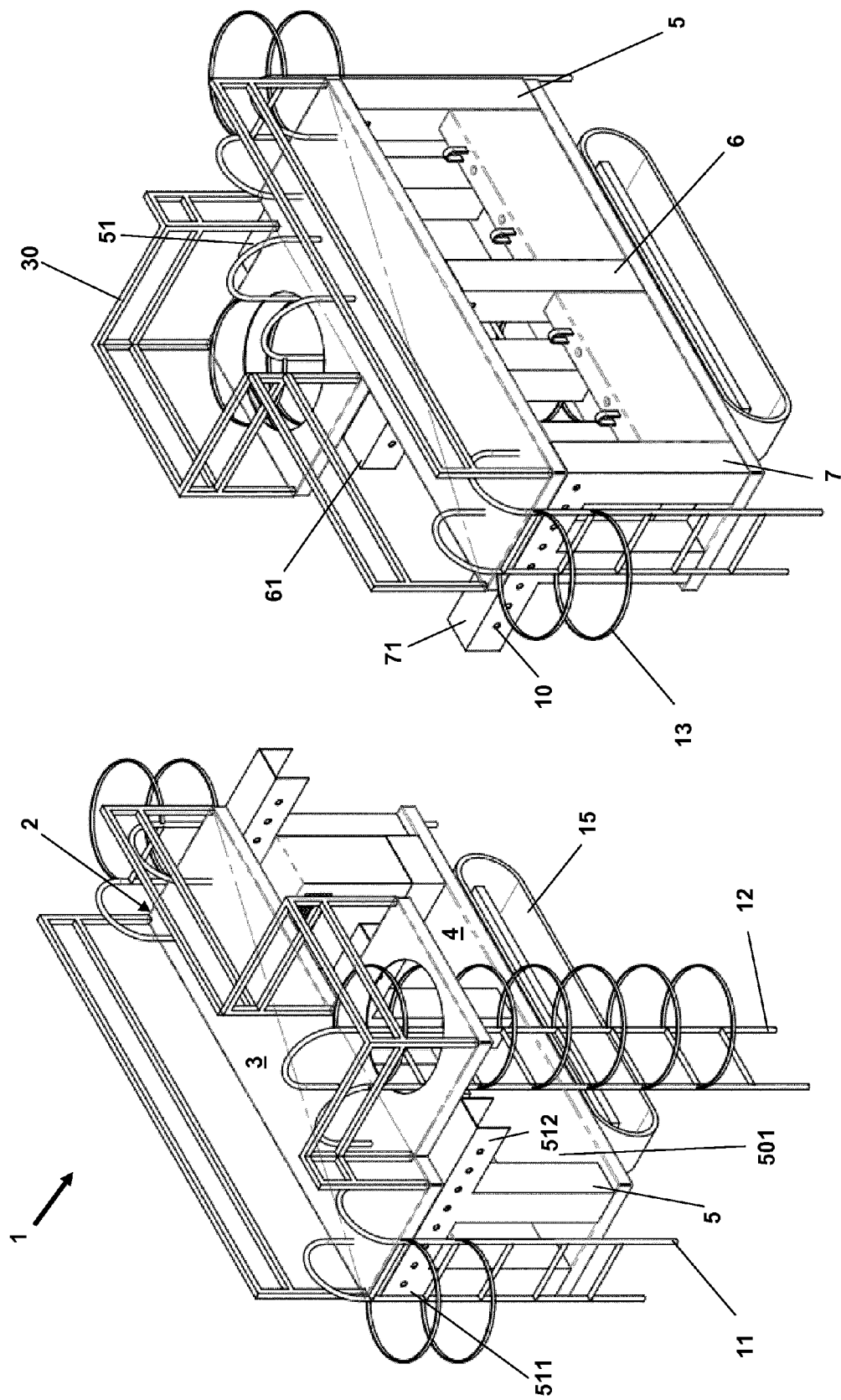


FIG. 2

FIG. 1

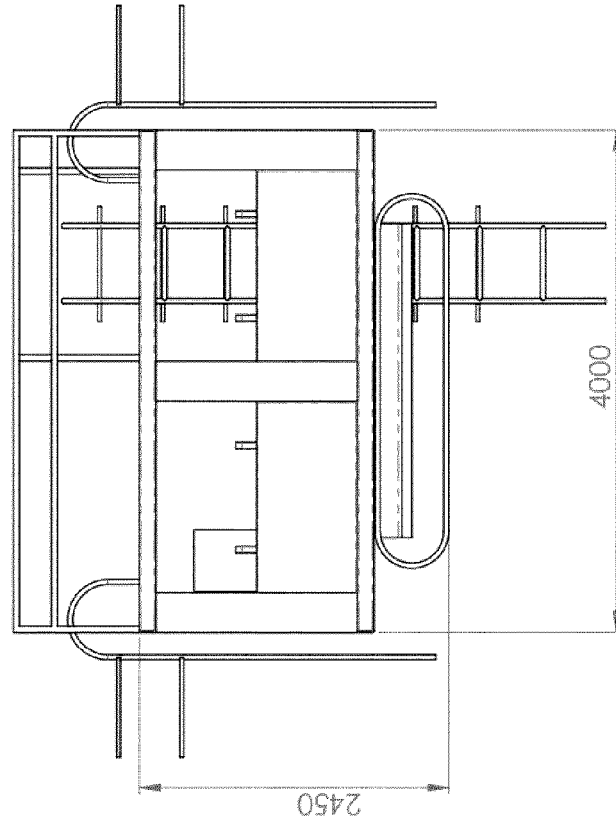


FIG. 4

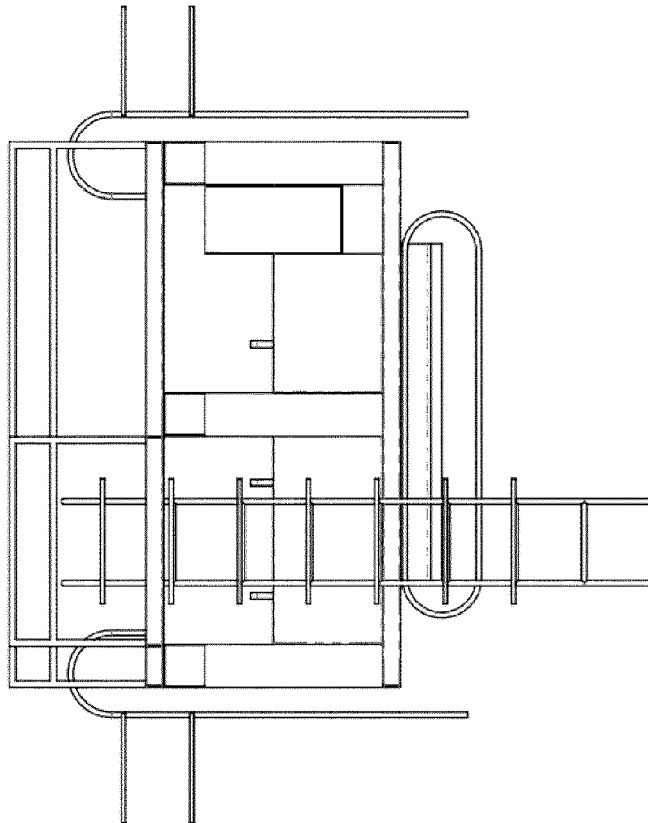


FIG. 3

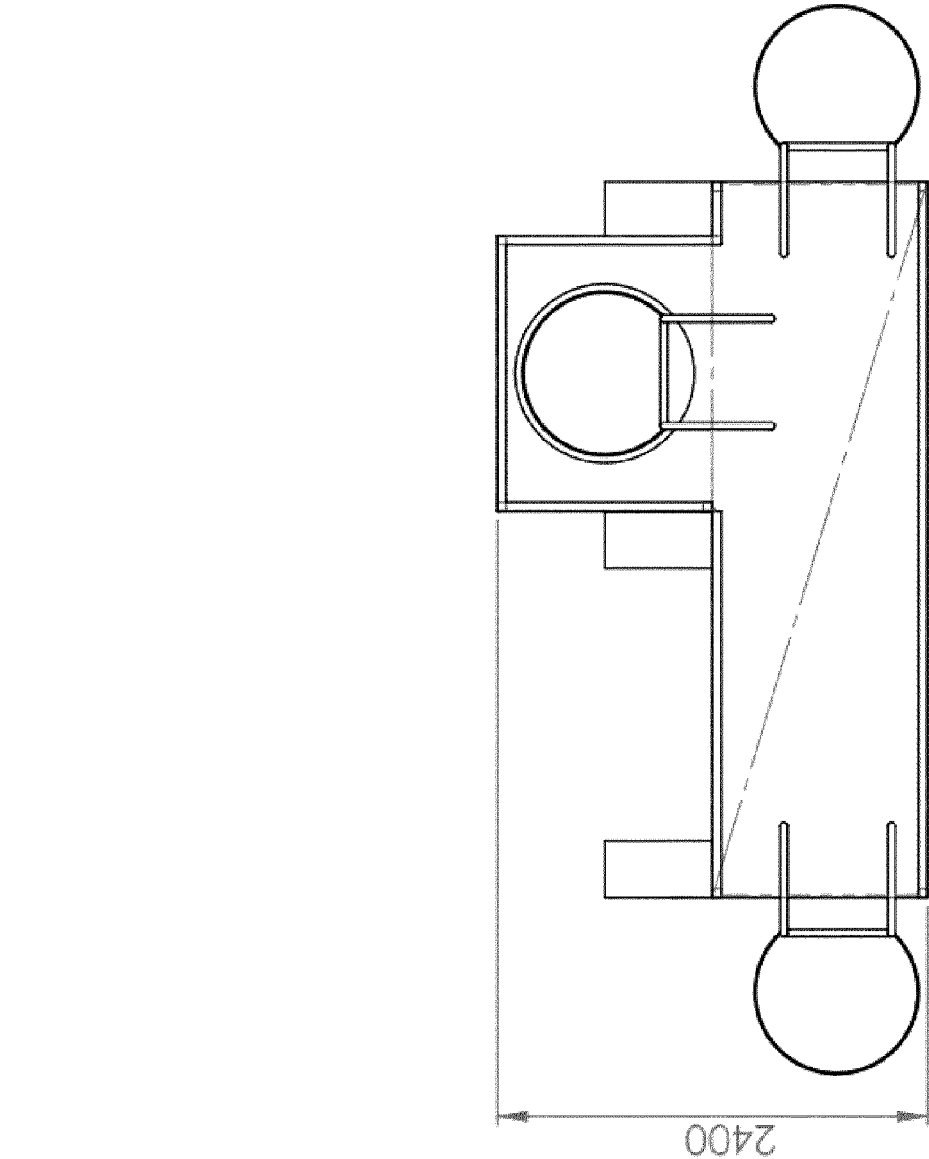


FIG. 5

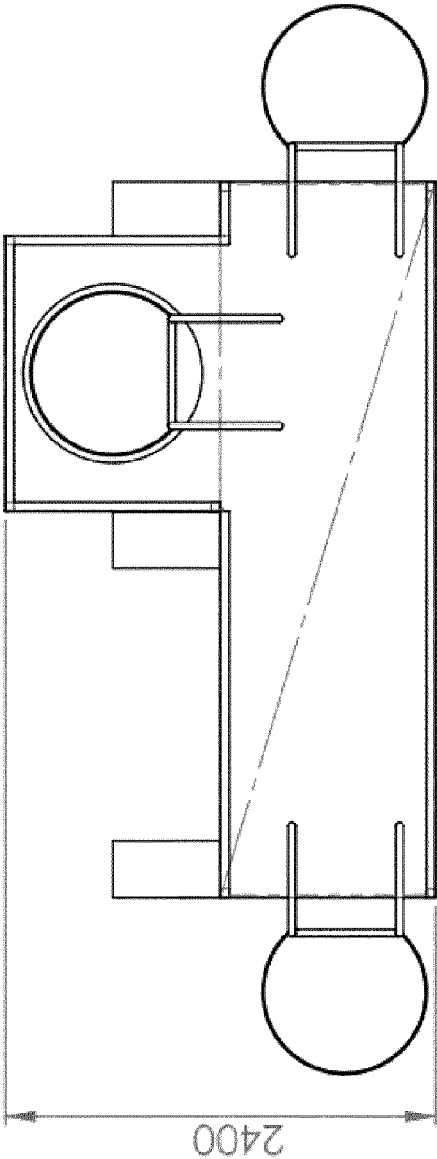


FIG. 6

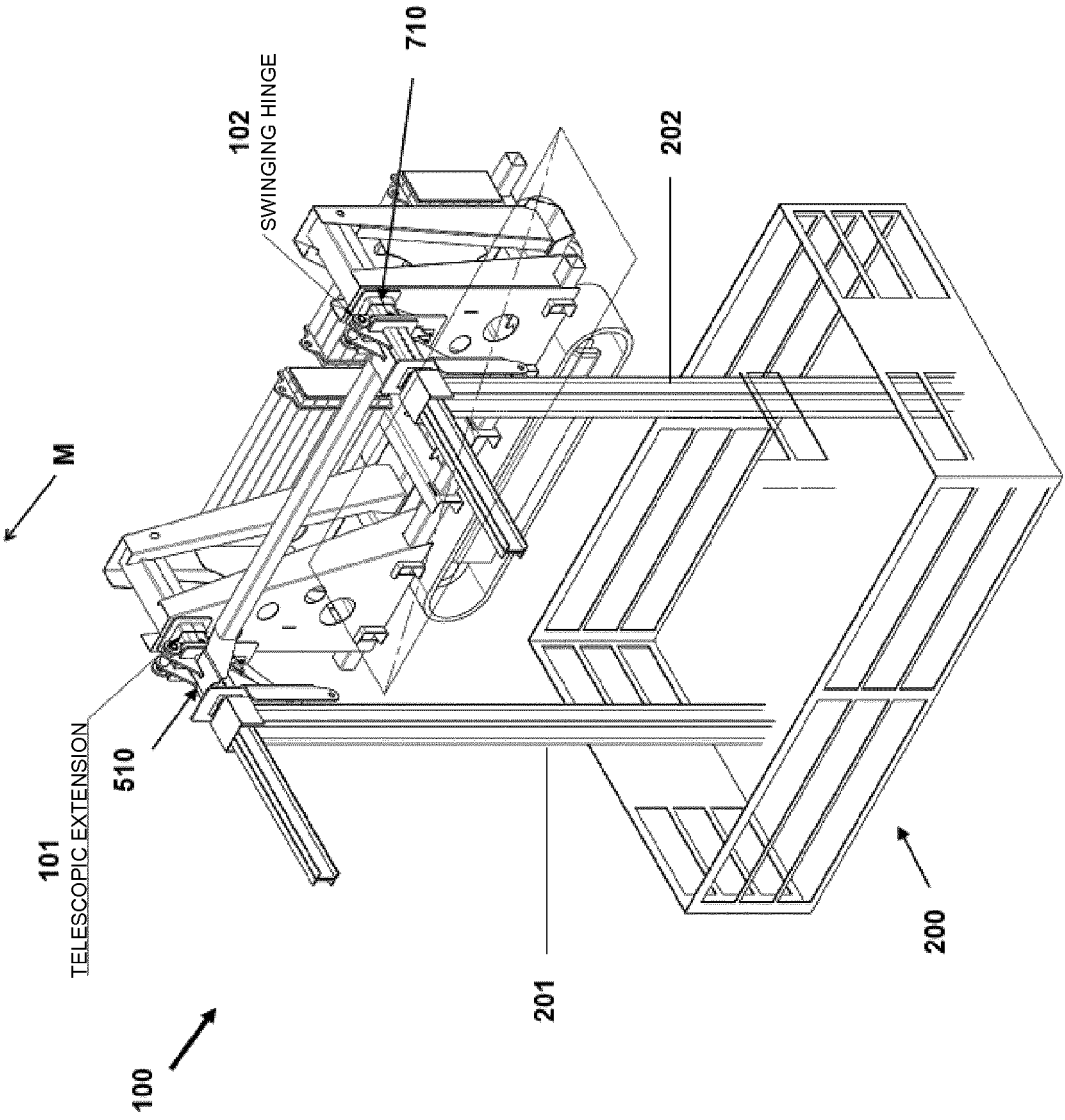


FIG. 7

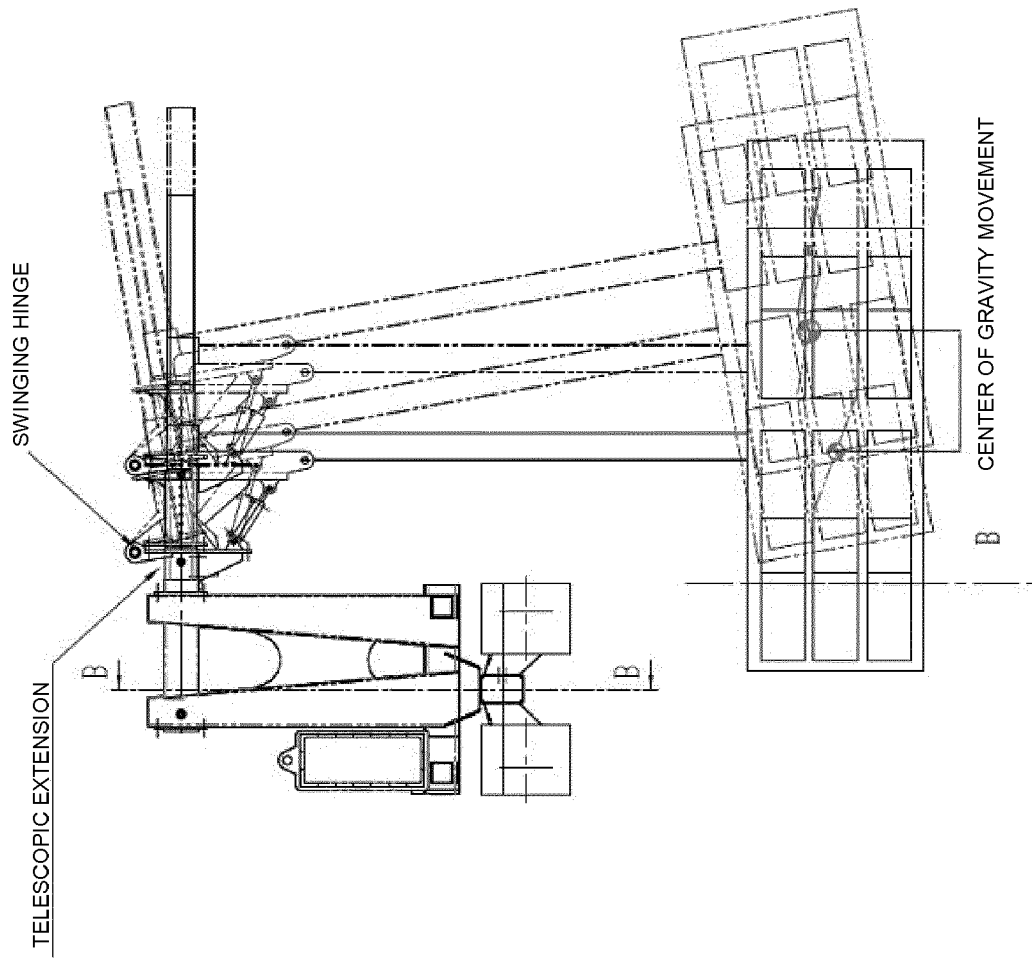


FIG. 8A

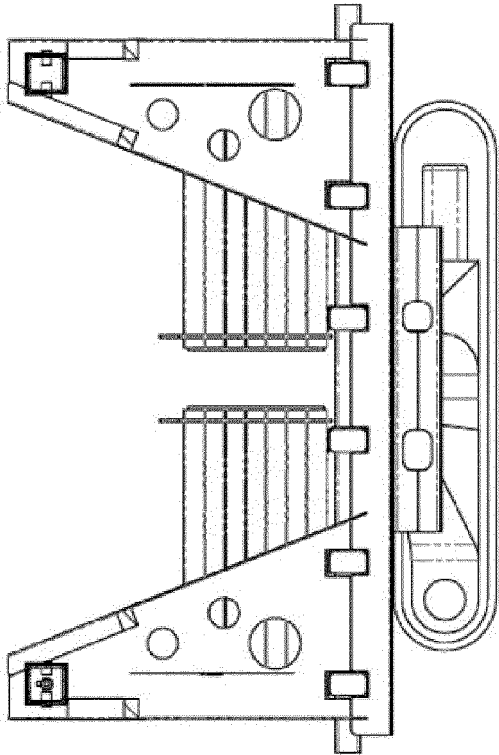


FIG. 8B

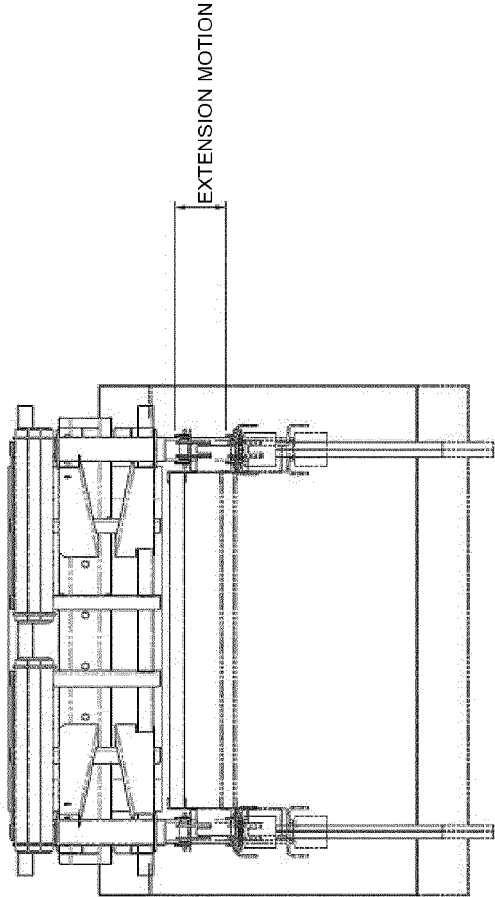


FIG. 8C



EUROPEAN SEARCH REPORT

Application Number
EP 14 15 4951

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		23 April 2014	Faymann, L
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EP 14 15 4951

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