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(54) **IMPROVED LADDER FOR A WORK VEHICLE AND WORK VEHICLE COMPRISING SUCH LADDER**

(57) Ladder system (5) for a work vehicle (1), comprising a body (2) movable on ground via ground engaging means (3), the ladder system (5) comprising a support structure (6) and a plurality of rungs (7) carried by support

structure (6), the ladder system (5) comprising anchoring means (9) configured to selectively fix ladder system (5) with respect to body (2).

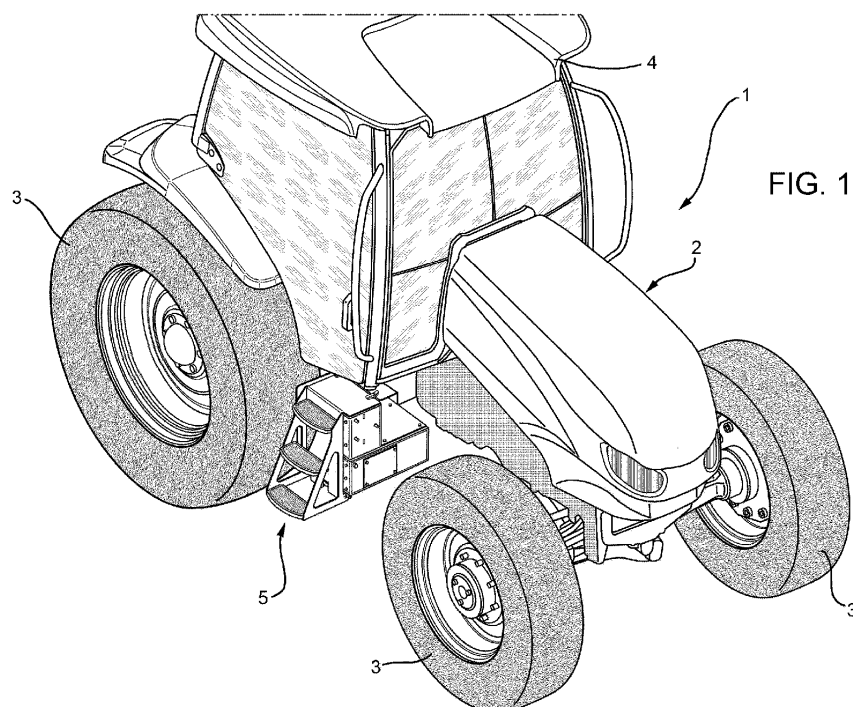


FIG. 1

Description

TECHNICAL FIELD

[0001] The present invention concerns a ladder for a work vehicle and a work vehicle comprised this latter.

[0002] The present invention finds its preferred, although not exclusive, application in an agricultural vehicle such as a tractor. Reference will be made to this application by way of example below.

BACKGROUND OF THE INVENTION

[0003] Work vehicles such as agricultural vehicles, e.g. a tractor, are provided with a body that is movable on ground via ground engaging means such as wheels or crawlers. As known, such agricultural vehicles are provided with a cab and operational elements such as cooling system.

[0004] The driver may need to access on the top portion of the cab, such as the windscreen or the roof or to the aforementioned operational elements. In such occurrences, the driver needs to jump on vehicle body in order to reach the elevated position of the aforementioned vehicular portions.

[0005] Clearly, such operation is not safe for the driver that may fall on ground with risk of injuries. Moreover, it should be possible to store in the cab, e.g. near driver's seat, a portable ladder system that however reduces the useful space within the cab.

[0006] Therefore, the need is felt to provide a ladder that is suitable for being used for allowing the driver to access high position vehicular portion in a safe manner without reducing useful space on the work vehicle.

[0007] An aim of the present invention is to satisfy the above mentioned needs in a cost-effective and optimized manner.

SUMMARY OF THE INVENTION

[0008] The aforementioned aim is reached by a ladder for a work vehicle and a vehicle as claimed in the appended set of claims.

BRIEF DESCRIPTION OF DRAWINGS

[0009] For a better understanding of the present invention, a preferred embodiment is described in the following, by way of a non-limiting example, with reference to the attached drawings wherein:

- Figure 1 is a perspective view of a work vehicle comprising a ladder according to the invention;
- Figures 2 and 3 are front perspective view of a ladder for a work vehicle in two different mounting configurations with respect to the ladder; and
- Figures 4 and 5 are rear perspective view of a ladder for a work vehicle in two different operative configurations with respect to the ladder.

rations with respect to the ladder.

DETAILED DESCRIPTION OF THE INVENTION

[0010] Figure 1 discloses a work vehicle 1 such as an agricultural vehicle, in particular a tractor that comprises a body 2 movable via ground engaging means 3 on ground, such as wheels. The body 2 further defines a cab 4 realized in an upper position on the body 2 opposite to ground.

[0011] The work vehicle 1 is provided with a ladder system 5 according to the invention. The ladder system 5 is preferably carried by vehicle body 2, as described below, in a selectively detachable manner in order to assume a first configuration wherein the ladder system 5 is fixedly coupled to the vehicle body 2 and a second configuration wherein the ladder system 5 is detached with respect to the vehicle body 2. The ladder system 5 may be carried on left or rear side of the vehicle, preferably.

[0012] Referring to figure 2 and 3, the ladder system 5 comprises, as per se known, a structure 6 configured to support, preferably in fixed manner, a plurality of rungs 7 extending one above the other along a first, vertical, axis A and suitable for being stepped by the user.

[0013] Preferably, rungs 7 are stepped along a second, transversal, axis B and are fixed to the structure 6 that defined a spaced along a third, longitudinal, axis C to house the aforementioned rungs 7. In the disclosed example, the rungs 7 are for instance three.

[0014] In the shown embodiment, the structure 6 comprises a pair of side elements 8 connected to opposite sides of the rungs 7 along the third axis C direction. In detail the side elements 8 are preferably plate-shaped and more preferably they have a triangular shape defining a central through opening.

[0015] The ladder system 5 further comprises anchoring means 9 configured to selectively fix the structure 6 to the vehicle body 2. In particular, the anchoring means 9 are configured to assume a first configuration wherein they fixedly couple the structure 6 to the vehicle body 2 (as in figure 2) and a second configuration wherein they detach the structure 6 from the vehicle body 2 (as in figure 3).

[0016] In the shown embodiment the anchoring means 9 may comprise a tightening hook mechanism/clip mechanism configured to selectively engage a corresponding portion/protrusion on vehicle body.

[0017] Preferably, the structure 6 further comprises a connection portion connecting together side members 8 together and the aforementioned anchoring means 9 are carried by such connection portion.

[0018] In the advantageous shown embodiment, the connection portion comprises a rear wall 11 connecting together the side members 8 along third axis C direction and a top wall 12 extending cantilevered from an upper portion of the rear wall 11 opposite to rungs 7 and above these latter.

[0019] Anchoring means 9 are preferably carried by such top wall 12 on an extremity thereof opposite to the rear wall 11. In this way, the space delimited under the top wall 12 may be occupied by vehicle body 2, as shown in figure 2 that shows a mounted configuration of the latter on the body 2.

[0020] As better shown in figures 4 and 5, the ladder system 5 further comprises stabilization means 15 carried by structure 6 and configured to assume a first, retracted, configuration wherein they occupy a minimum extension space with respect to structure 6 allowing its mounting to vehicle body 2 and a second, extracted, configuration wherein they extend from support structure 6 to cooperate at contact with ground to compensate a load acting on rungs 7.

[0021] The stabilization means 15 comprises essentially an arm 16 carried in a movable manner by structure 6 in order to assume alternatively the aforementioned first or second configuration.

[0022] In detail, the arm 16 is hinged by hinge mechanism 17 to the structure 6 in order to move between the first and the second configuration. In particular hinge mechanism 17 is configured to allow motion of arm 16 about an axis parallel to third axis C.

[0023] Preferably hinge mechanism 17 is realized in a lower portion of the rear wall 11 thereby allowing the arm 16 to pass from the first configuration wherein it is adjacent to the rear wall 11 under said top wall 12 and a the second configuration wherein it extends along second axis direction B from the rear wall 11.

[0024] Advantageously, arm 16 is "T shaped", i.e. comprises a longitudinal member 16' that is hinged to the hinge mechanism 11 from one extremity thereof and a transversal member 16'' that extends transversally with respect to longitudinal member 16' on the opposite extremity thereof.

[0025] In detail, the transversal member 16'' extends substantially the same extension of structure 6, i.e. of the extension of rungs 7, in other words of the space comprised between the side members 8.

[0026] In particular, the hinge mechanism 17 is defined by a bracket 18 positioned in the lower portion of the rear wall 11 as above defined.

[0027] The ladder system 5 further comprises locking means 21 configured to selectively lock the arm 16 in one between the first and second configuration.

[0028] In particular, locking means 21 comprises a rod 22 configured to be inserted into one among openings 19', 19'', 23 realized in an element fixedly carried by structure 6 and corresponding to the positions of the aforementioned first and second configurations and in an opening 19''' realized in the arm 16 thereby locking together the arm 16 to structure 6.

[0029] In detail, the openings 19', 19'' are realized in the bracket 18 and in particular along an arched path about axis of pin of hinge mechanism 17 while opening 23 is realized in side members 8.

[0030] The rod 22 may be inserted in alternatively

openings 23, 19' and 19''' or 19'' and 19''' to defined respectively the position of first and second configuration of arm 16. In order to lock the movement of rod 22 with respect to third axis C direction, the locking means 21 further comprises coupling means, such as a fork 24, configured to retain the rod 22 within the respective openings.

[0031] Preferably, as better shown in figures 2 and 3, the locking means 21 are configured to allow further fixation of the structure 6 to vehicle body 2 in addition to anchoring means 19. In such occurrence, openings 23, 19' are used in combination with further openings 25 realized on vehicle body 2.

[0032] The operation of the embodiment of the invention as described above is the following.

[0033] In a standard driving or operative condition of the vehicle 1, the ladder system 5 is fixedly carried by vehicle body and allows the user to jump on/off the cab 4.

[0034] If needed, the user may detach the ladder system 5 from vehicle body, in particular, by unlocking locking means 21 and anchoring means 12. In this way ladder system 5 is detached from the vehicle body 2 and may be positioned where needed.

[0035] When positioned, the driver may lock the stabilization means 15 in their second operative position so that it can jump on the latter. Indeed, the weight of the driver acting on the rungs of the ladder will be compensated by arm 16 and in particular by its longitudinal portion 16' and, if present, transversal portion 16'' can compensate transversal loads.

[0036] When the need of the ladder 5 is finished, the driver can unlock the arm 16 and fix again the ladder system 5 on the vehicle body 2.

[0037] In view of the foregoing, the advantages of the ladder and the work vehicle according to the invention are apparent.

[0038] Thanks to the proposed ladder system, the driver may have the opportunity to have a displaceable, stable and safe system that can be attached and detached from vehicle body at need.

[0039] In particular, the proposed ladder system is configured to avoid waste of useful space on the vehicle.

[0040] Thanks to the presence of stabilization means and locking means, it is possible to allow use of the ladder system on ground without risk of overturning with consequent injuries of the driver.

[0041] Moreover, the peculiar geometry and realization of the aforementioned stabilization means and locking means allows to occupy a very small space and allows to compensate loads acting on different direction.

[0042] Furthermore, since locking means can be used to lock the position of the stabilization means and the structure of the ladder to the vehicle body, the ladder is stable also when attached to the vehicle during its operation.

[0043] It is clear that modifications can be made to the described ladder and work vehicle which do not extend beyond the scope of protection defined by the claims.

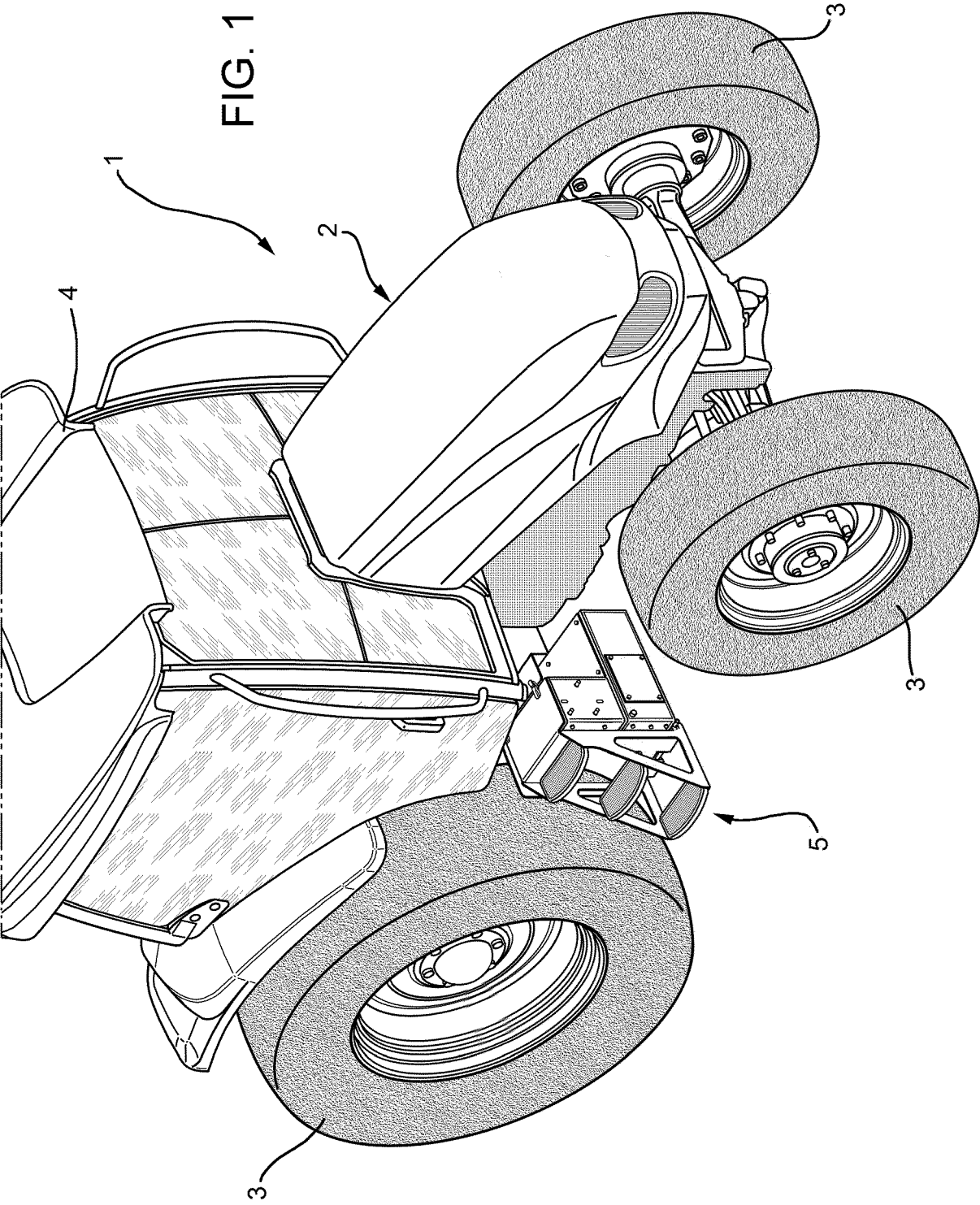
[0044] For example, the peculiar number and shape of rungs may be modified according to the typology and dimension of the vehicle.

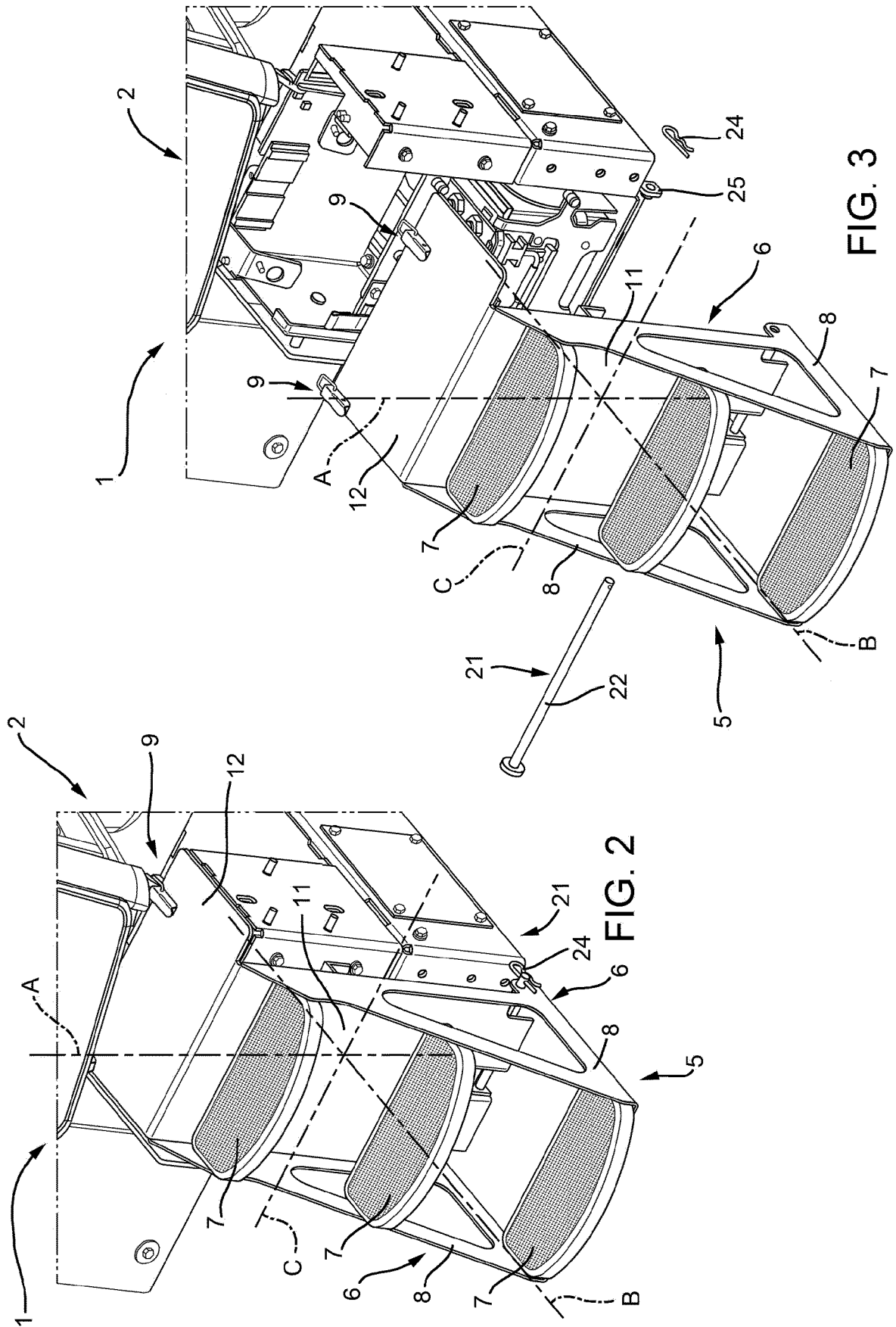
[0045] Furthermore, the shape of stabilization means and of locking means may be varied while maintaining their functionality.

[0046] Clearly, the ladder system may be applied to different typologies of work vehicle.

Claims

1. Ladder system (5) for a work vehicle (1), said work vehicle (1) comprising a body (2) movable on ground via ground engaging means (3), said ladder system (5) comprising a support structure (6) and a plurality or rungs (7) carried by said support structure (6), said ladder system (5) comprising anchoring means (9) configured to selectively fix said ladder system (5) with respect to said body (2).
2. Ladder system according to claim 1, wherein said anchoring means (9) comprising a tightening hook mechanism/clip mechanism configured to assume a first configuration into which engages a corresponding portion of said body (2) thereby coupling said ladder system (5) to said body (2) or a second configuration into which are decoupled from said corresponding portion of said body (2) thereby allowing detaching of said ladder system (5) from said body (2).
3. Ladder system according to claim 1 or 2, wherein said support structure (6) comprises a pair of side members (8) and a top wall (12) extending from said side members (8) over said rungs (7), said anchoring means (9) being carried by said top wall (12) in an extremity of said top wall (12) opposite to said rungs (7).
4. Ladder system according to any of the preceding claims, further comprising stabilization means (15) carried by said support structure (6) and configured to assume a first position wherein they occupy a minimum spaced with respect to said support structure (6) and a second position wherein they extend from said support structure (6) to cooperate at contact with ground to compensate a load acting on said rungs (7).
5. Ladder system according to claim 4, wherein said stabilization means (15) comprise an arm (16) movably carried by said support structure (6).
6. Ladder system according to claim 4 or 5, wherein said arm (16) is hinged to said support structure (6) via a hinge mechanism (17).
7. Ladder system according to claim 3 and 6, wherein said support structure (6) comprises a rear wall (11) connecting together said side elements (8), said hinge mechanism (17) being realized in an extremity of said rear wall (11) opposite to said top wall (12) so that in said first position said arm (16) is maintained adjacent to said rear wall (11) under said top wall (12).
8. Ladder system according to any of claims 5 to 7, wherein said arm (16) is T-shaped comprising a longitudinal member (16') coupled to said structure (6) from one side and a transversal member (16'') extending from said longitudinal members (16') on the opposite side thereof.
9. Ladder system according to any of claims 4 to 7, further comprising locking means (21) configured to selectively lock said stabilization means (15) into one between said first and second positions.
10. Ladder system according to any of claims 1 to 3, further comprising locking means (21) configured to further lock said support structure (6) to said vehicle body (2) in addition to said anchoring means (9).
11. Ladder system according to claim 9 and 10, wherein said locking means (21) are the same locking means.
12. Ladder system according to claim 9, wherein said locking means (21) comprise a rod (22) configured to be inserted into holes (23, 19', 19'') realized fixedly with respect to said support structure (6) and holes (19''') realized into said stabilization means (15).
13. Ladder system according to claim 10, wherein said locking means (21) comprise a rod (22) configured to be inserted into holes (23) realized fixedly with respect to said support structure (6) and holes (25) realized into said body (2).
14. Ladder system according to claim 12 or 13, comprising coupling means (24) configured to avoid extraction of said rod (22) from respective openings.
15. Ladder system according to any of claims dependent on claim 3, wherein said side elements (8) comprise plate walls.
16. Work vehicle (1) comprising a body (2) movably on ground via ground engaging means (3) and a ladder system (5) as claimed in any of the preceding claims.





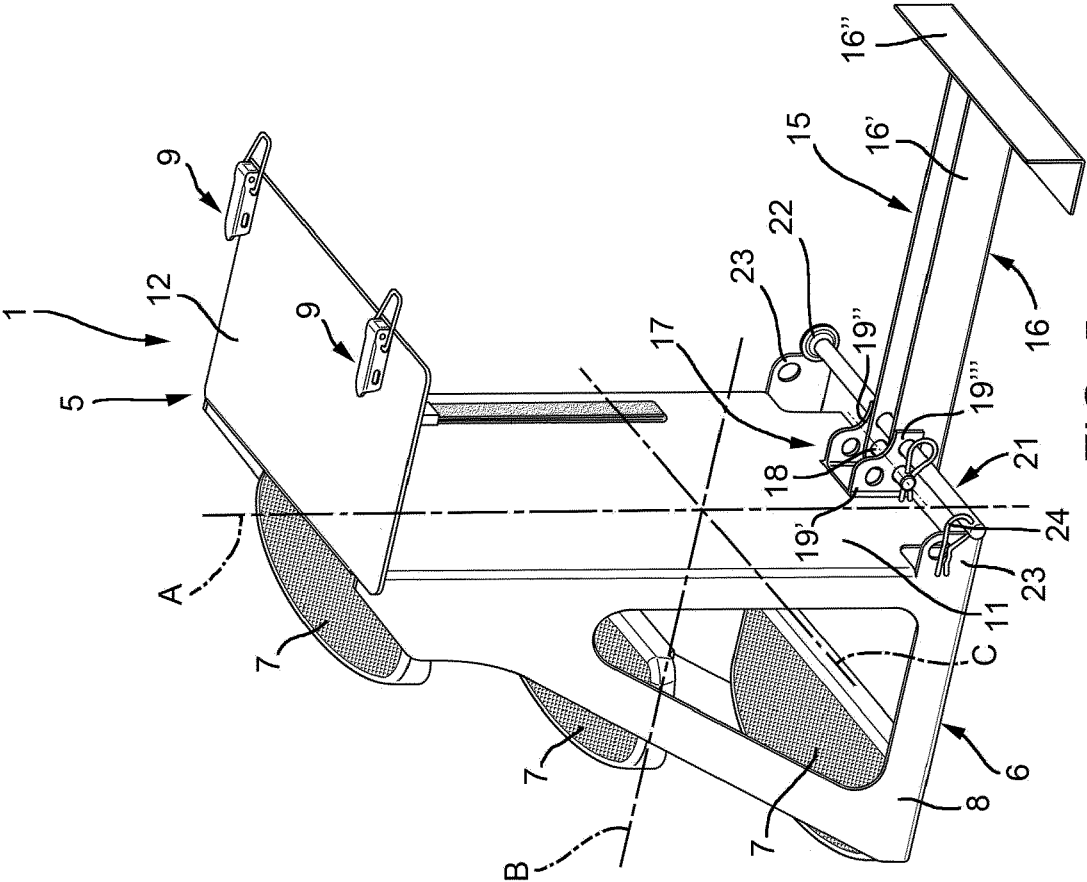


FIG. 5

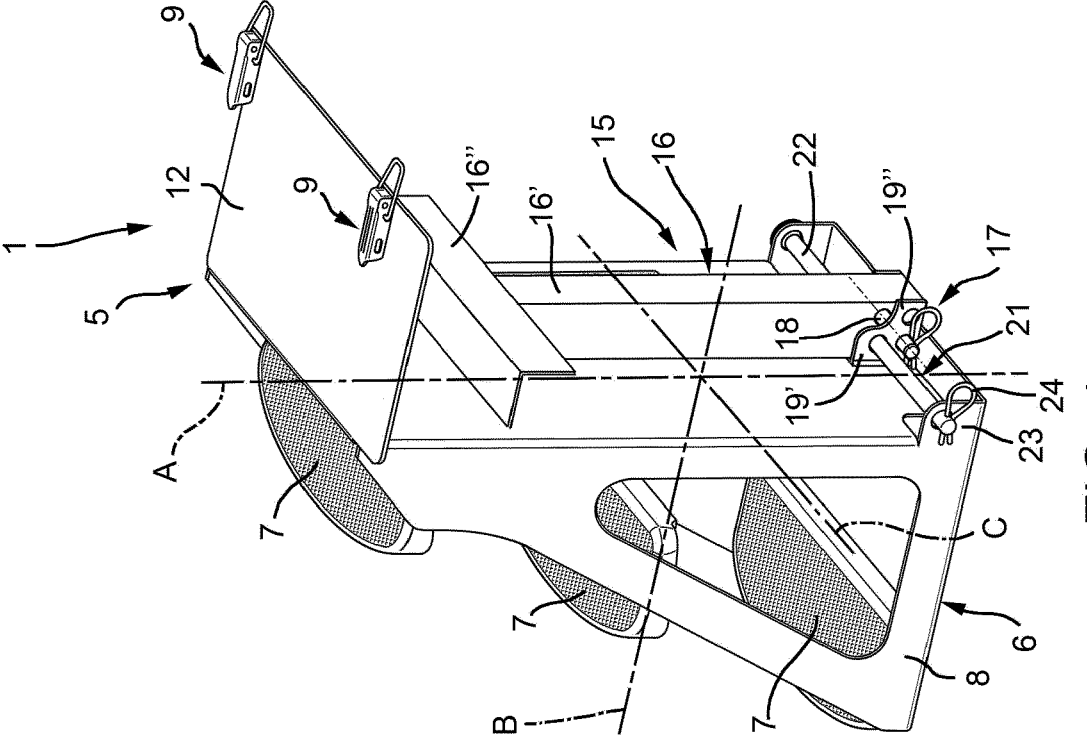


FIG. 4



EUROPEAN SEARCH REPORT

Application Number

EP 24 17 0355

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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)
X	US 6 422 344 B1 (COX JOHN J [US]) 23 July 2002 (2002-07-23)	1-6,9, 12,15,16	INV. E06C5/02
A	* figures 1-6 * -----	7	E06C5/04
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	* figures 1-10 * -----		
			TECHNICAL FIELDS SEARCHED (IPC)
			E06C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 13 August 2024	Examiner Petrinja, Etjel
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	

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

EP 24 17 0355

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	US 6422344	B1	23-07-2002	NONE

15	US 2005211502	A1	29-09-2005	NONE

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