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(54) Title: ARRANGEMENT AND VEHICLE

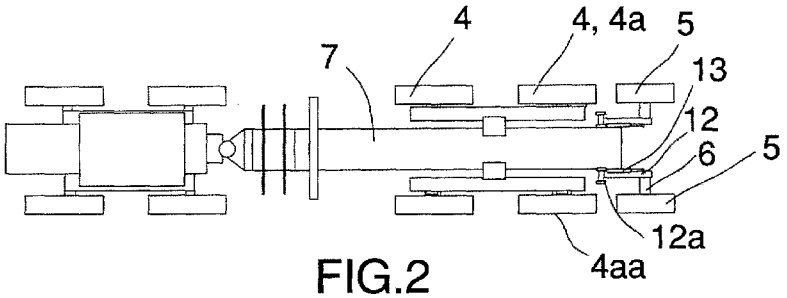

FIG.2

(57) Abstract: This invention concerns an arrangement (1) intended to be mounted at a vehicle (2) intended for forestry, comprising a load-bearing part (3) and driving bogie wheels (4) where the arrangement (1) comprises at least two extra wheels (5) that can be individually controlled in the vertical direction where each extra wheel is arranged at a shaft (6) that is fixed and that is not rotatable, pivotable, and is arranged at the frame (7) of the vehicle in order to distribute the weight of the machine. The individually controlled extra wheels (5) are subject to a driving force and mounted at least two arms (12) arranged at the frame of the vehicle, that a track (18) is placed around each set of bogie wheels (4) and the extra wheel (5) in order to protect against skidding and to distribute the weight, reducing the ground pressure, and that a tension arrangement (19) in the form of a cylinder under pressure or a coiled spring unit is arranged at each arm in order to absorb motions in the length of the arm (12) such that the length of the track does not change when the arm (12) moves up and down. The invention concerns also a vehicle (2) comprising such an arrangement (1).

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Arrangement and vehicle

TECHNICAL AREA

This invention concerns an arrangement intended to be mounted at a vehicle that comprises a load-bearing part and driving wheels. The invention concerns also a vehicle comprising such an arrangement.

BACKGROUND

Vehicles, machines, agricultural machines and forestry machines have long been used within forestry in order to automate many of the operations that are to be carried out on location in a forest. The vehicles have a weight that is not insignificant, independently of whether they are driven with the aid of wheels or tracks, which means that the forest, the support of the vehicle in the forest, the ground, over which the vehicle is driven and on which it stands, is affected. The ground is compressed by the weight of the vehicle and the damage to the ground may be permanent in the form of damage that does not recover without intervention. This damage to the ground may result in erosion, leakage of humus and nutrients, the unplanned formation of ditches, and compression of the pore system of the ground, all of which may have consequences. All such consequences affect the remaining forest, through, for example, lower resistance to storms due to roots that are torn off and/or thick roots that are shallow, to increased root rot as a consequence of root damage, and to loss of growth. Once the damage has taken place, all attempts to restore the ground are expensive, or totally impossible.

Repair of damage caused by driving is most often of a cosmetic nature. Up to half of the support capacity of the ground arises from the roots. The support capacity is, therefore, difficult to restore when the vegetation and root systems have been broken. Furthermore, repair by, for example, the use of an excavator means that the ground is excavated one more time. This increases further the risk for the undesired transport of slurry, humus, nutrients and heavy metals into lakes and watercourses. For these reasons, the damage caused by driving should be attempted to be prevented as far as possible.

In order to avoid damage to the ground and damage caused by driving, a great deal of time has been invested in planning appropriate routes, passages and collection points well in advance of a felling operation. This is not only time-consuming but also expensive.

The compression of the ground by the weight of the vehicle can lead also to the driving of the vehicle becoming more difficult.

SUMMARY OF THE INVENTION

One purpose of the present arrangement is to reduce the influence on the forest from a vehicle, on the support of the vehicle in the forest, on the ground, where the vehicle is driven or allowed to stand. This purpose is achieved with an arrangement comprising the technical features that are made clear by claim 1. This purpose is achieved also with a vehicle comprising such an arrangement according to claim 14.

DESCRIPTION OF DRAWINGS

Figure 1 shows a vehicle and an arrangement according to the invention.

Figure 2 shows also a vehicle and an arrangement according to the invention, seen from above.

Figure 3 shows a detailed drawing of an extra wheel comprised in an arrangement according to the invention.

Figure 4 shows an auxiliary motor comprised in an arrangement according to the invention.

Figure 5 shows a damping arrangement comprised in an arrangement according to the invention.

DESCRIPTION OF EMBODIMENTS

This invention concerns an arrangement 1 intended to be mounted at a vehicle 2 comprising a load-bearing part 3 and driving wheels 4, where the arrangement 1 comprises at least two extra wheels 5 that can be individually controlled where each extra wheel 5 is arranged at a shaft 6 and is arranged at the frame 7 of the vehicle in order to distribute the weight of the machine, the gross weight of the machine including its payload weight, over more areas of a support 8, the ground, and in this way improve the distribution of weight and reduce the pressure against the support 8, the ground from a vehicle 2. The extra wheels 5 give a direct support and a supplementary ability to distribute the weight, in addition to the normal vehicle wheels 4. The shaft 6 is fixed: it is non-rotatable and non-pivotable. See Figures 1-3.

The term “individually controlled extra wheels 5” is here used to denote that each extra wheel, independently of its location on the vehicle 2, can be controlled and adjusted and can follow the support 8, without being influenced by, and without influencing, other extra wheels and their locations. It is possible also that two extra wheels 5 be located on the same side of the vehicle 2, if this

is required in special terrain. It is possible also that more than two extra wheels 5 be mounted at a vehicle.

The individually controlled extra wheels 5 are subject to a driving force. The driving force on the wheels further facilitates the driving of the vehicle 2 on the support 8, and since the extra wheels 5 are driven and move relative to the support, the extra wheels 5 will be in motion and will not become as easily stuck in such material as is located on the support 8, such as, for example, vegetation.

The individually controlled extra wheels 5 may be hydraulically driven or electrically driven. It is appropriate that the arrangement 1 comprise an auxiliary motor 9 that drives the extra wheel 5. The motor 9 is driven by a hydraulic system comprising a pump 10. The pump 10 is driven by an additional source of energy 11, such as, for example, a diesel engine, electric motor or similar. See Figure 4.

The arrangement 1 comprises at least two arms 12 on which the extra wheels 5 are mounted. Each arm 12 is individually controlled and mounted in bearings, and can move independently of the motion of the other arm. Each arm 12 is mounted in bearings in a horizontal axis 12a that essentially coincides with the closest wheel 4a of the bogie and its wheel axle 4aa, in order to permit the extra wheel 5 to be lifted up and down without the axle separation between the closest wheel 4a of the bogie and the extra wheel 5 changing by any amount worthy of mention.

Each arm 12 comprises at least one arrangement 13 that damps the motions of the arm and that retains, presses, the extra wheel 5 onto the support 8. It is appropriate that the arrangement 13 comprise a damping arrangement 13a that in turn comprises a damped cylinder 13b. The cylinder 13b of the arm is a damped cylinder that retains, presses, the extra wheel 5 against the support 8 in order to ensure that the extra wheel 5 is in contact with the support 8 and in this way improve the distribution of weight and reduce the pressure exerted by the vehicle 2 onto the support 8, the ground. The damped cylinder 13b is controlled by a hydraulic unit 14 that is fed by a hydraulic pump 15 that obtains its energy from a selected source of energy 16, such as, for example, an electric motor, a diesel engine or other source of energy or source of power. The damping arrangement, the damping cylinder 13, comprises an accumulator 17 that offers a spring facility and that can store energy for a short period. See Figure 5.

The arrangement 1 comprises a track 18 that is placed around a set of bogie wheels 4 and the extra wheel 5 in order to protect against skidding and to distribute the weight, reducing the ground pressure. See Figure 1.

The arrangement comprises a tension arrangement 19 in the form of a spring-loaded arrangement, such as a cylinder under pressure or a coiled spring unit, in order to absorb motions along the length of the arm 12 such that the length of the track, and its tension, do not change when the arm 12 moves up and down. See Figure 3.

Two extra wheels 5 are arranged at the frame 7 of the vehicle, one extra wheel 5 on each side of the vehicle 2, one extra wheel 5 at one of the two bogie wheels 4 in the forwards and/or backwards direction of the vehicle 2 one on each side of the vehicle 2. Alternatively, four extra wheels 5 are arranged at the frame 7 of the vehicle, two extra wheel 5 on each side of the vehicle 2, one extra wheel 5 at each bogie wheel 4 in the forwards and backwards direction of the vehicle 2, in a configuration that is not shown in the drawings.

The invention concerns also a vehicle 2 comprising an arrangement 1 of the type that has been described above. The load-bearing part 3 of the vehicle comprises a conventional load-bearing frame. The load-bearing part may comprise also a separate displaceable load carrier. The driving bogie wheels 4 of the vehicle comprise a mechanically driven, a hydraulically driven, or an electrically driven bogie. See Figures 1-5.

The vehicle 2 is intended to be used within forestry or agriculture since it is within these fields of use that it is economically and biotopically interesting that damage to the ground is avoided or at least minimised. Other fields of use in which damage to the ground should be avoided or at least minimised may, of course, become relevant.

CLAIMS

1. An arrangement (1) intended to be mounted at a vehicle (2) intended for forestry, comprising a load-bearing part (3) and driving bogie wheels (4) where the arrangement (1) comprises at least two extra wheels (5) that can be individually controlled in the vertical direction where each extra wheel is arranged at a shaft (6) that is fixed and that is not rotatable, pivotable, and is arranged at the frame (7) of the vehicle in order to distribute the weight of the machine, the gross weight of the machine including its payload weight, over more areas of a support (8) and in this way improve the distribution of weight and reduce the pressure exerted against the support (8), characterised in that the individually controlled extra wheels (5) are subject to a driving force and mounted at at least two arms (12) arranged at the frame of the vehicle, that a track (18) is placed around each set of bogie wheels (4) and the extra wheel (5) in order to protect against skidding and to distribute the weight, reducing the ground pressure, and that a tension arrangement (19) in the form of a cylinder under pressure or a coiled spring unit is arranged at each arm in order to absorb motions in the length of the arm (12) such that the length of the track does not change when the arm (12) moves up and down.

2. The arrangement according to claim 1, comprising an auxiliary motor (9) that drives the extra wheel (5).

3. The arrangement according to claim 2, where the motor (9) is driven by a hydraulic system comprising a pump (10).

4. The arrangement according to claim 3, where the pump (10) is driven by a further source of energy (11).

5. The arrangement according to claim 1, where each arm (12) is individually controlled and mounted in bearings, and can move independently of the motion of the other arm.

6. The arrangement according to any one of the preceding claims, where each arm (12) is mounted in bearings in a horizontal axis (12a) that essentially coincides with a wheel axle (4aa) at the wheel (4a) at the bogie that is closest to the extra wheel, in order to permit the extra

wheel (5) to be lifted up and down without the axle separation between the closest wheel (4a) of the bogie and the extra wheel (5) changing by any amount worthy of mention.

7. The arrangement according to any one of the preceding claims, where each arm (12) comprises at least one arrangement (13) that damps the motions of the arm and that retains, presses, the extra wheel (5) against the support (8) in order to ensure that the extra wheel (5) is in contact with the support (8) and in this way improve the distribution of weight and reduce the pressure exerted against the support (8).

8. The arrangement according to claim 7, where the arrangement (13) comprises at least one damping arrangement (13a).

9. The arrangement according to any one of claims 7-8, where the damping arrangement (13) comprises at least one damped cylinder (13b).

10. The arrangement (1) according to claim 9, where the damped cylinder (13b) is controlled by a hydraulic unit (14) that is fed by a hydraulic pump (15) that obtains its energy from a selected source of energy (16).

11. The arrangement (1) according to any one of claims 7-10, comprising an accumulator (17) that offers a spring facility and that can store energy for a short period.

12. The arrangement according to any one of claims 1-11, where two extra wheels (5) are arranged at the frame (7) of the vehicle, one extra wheel (5) on each side of the vehicle (2), one extra wheel (5) at one of the two bogie wheels (4, 4a) in the forwards and/or backwards direction of the vehicle, one on each side of the vehicle.

13. The arrangement according to any one of claims 1-12, where four extra wheels (5) are arranged at the frame (7) of the vehicle, two extra wheels (5) on each side of the vehicle (2), one extra wheel (5) at each bogie wheel (4) in the forwards and backwards direction of the vehicle (2).

14. A vehicle (2) comprising an arrangement according to any one of claims 1-13.

15. The vehicle (2) according to claim 14, where the load-bearing part (3) comprises a conventional load-bearing frame.

16. The vehicle (2) according to claim 15, where the load-bearing part (3) comprises a separate displaceable load carrier.

17. The vehicle (2) according to any one of claims 14-16, where the driving wheels (4) comprise a mechanically driven bogie.

18. The vehicle (2) according to any one of claims 14-16, where the driving wheels (4) comprise a hydraulically driven bogie.

19. The vehicle (2) according to any one of claims 14-16, where the driving wheels comprise an electrically driven bogie.

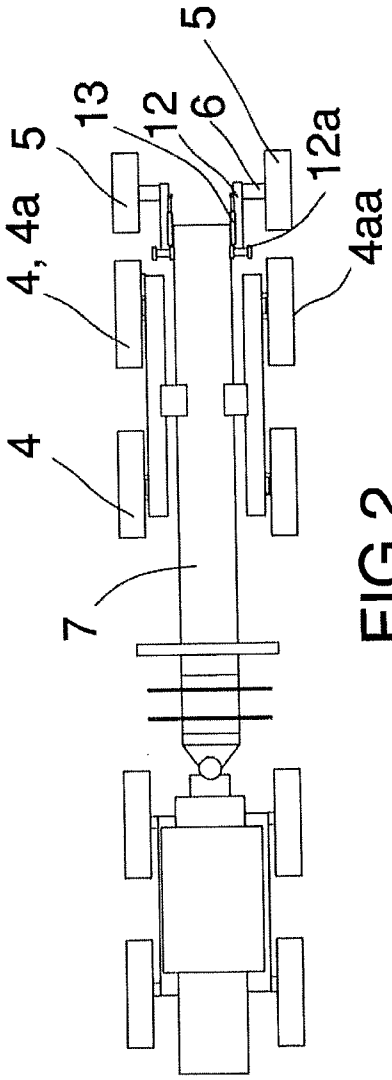


FIG.2

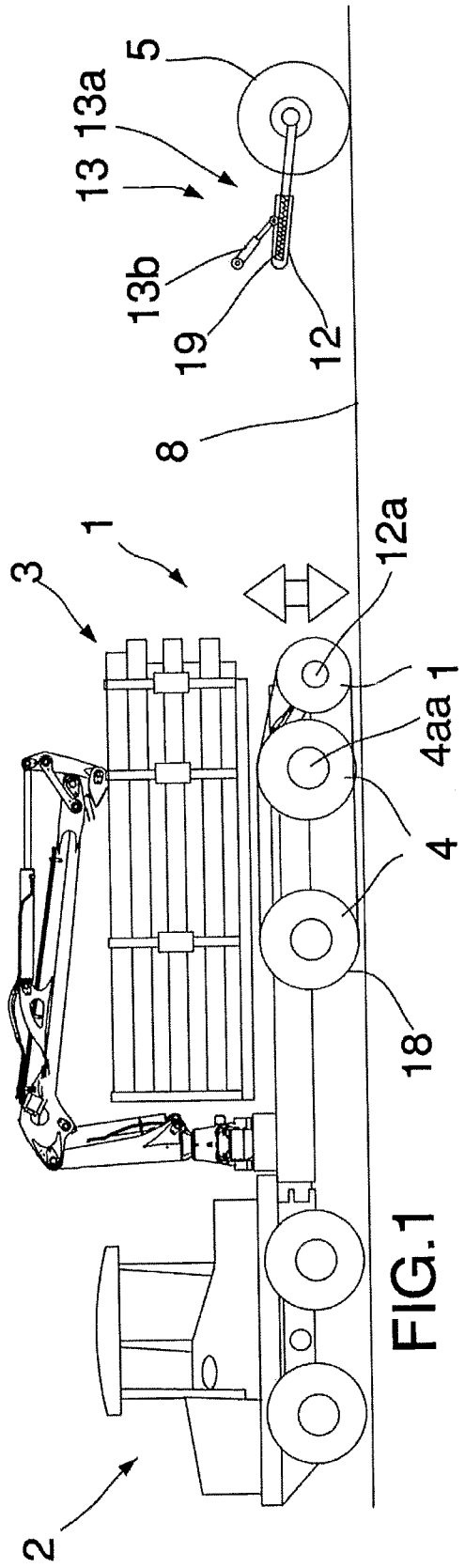


FIG.1

FIG.3

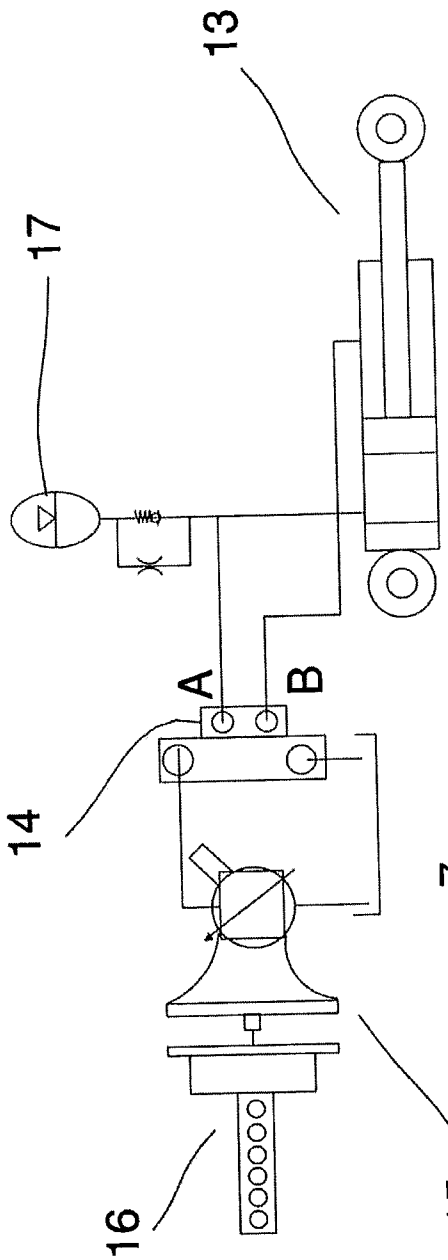
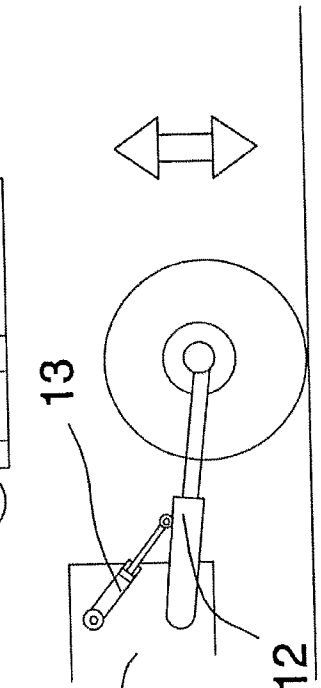


FIG.5



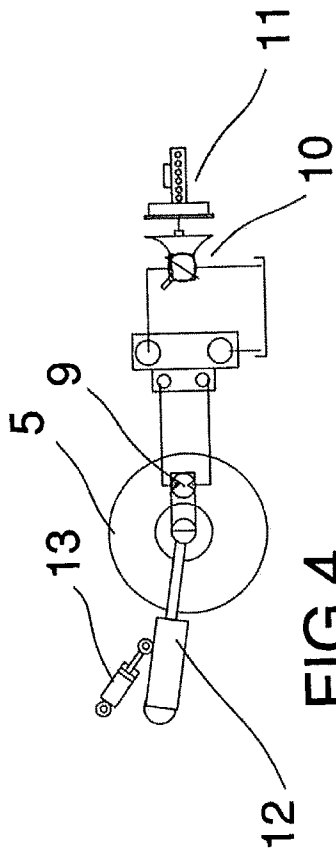


FIG.4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2016/050570

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B62D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4079798 A (FERRIS TOM), 21 March 1978 (1978-03-21); abstract; column 3, line 13 - line 17; column 3, line 56 - line 62; figures 2,3 --	1-19
A	US 4657099 A (BALTENSPERGER EDUARD), 14 April 1987 (1987-04-14); column 2, line 56 - line 61; figures --	1-19
A	WO 2013178882 A1 (PONSSE OYJ), 5 December 2013 (2013-12-05); abstract; figures 1,2b --	1-19
A	US 2974976 A (LYALL RALPH G), 14 March 1961 (1961-03-14); column 3, line 42 - line 74; figures --	1-19

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search	Date of mailing of the international search report
24-08-2016	31-08-2016
Name and mailing address of the ISA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Authorized officer Göran Carlström Telephone No. + 46 8 782 28 00

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Continuation of: second sheet

International Patent Classification (IPC)

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