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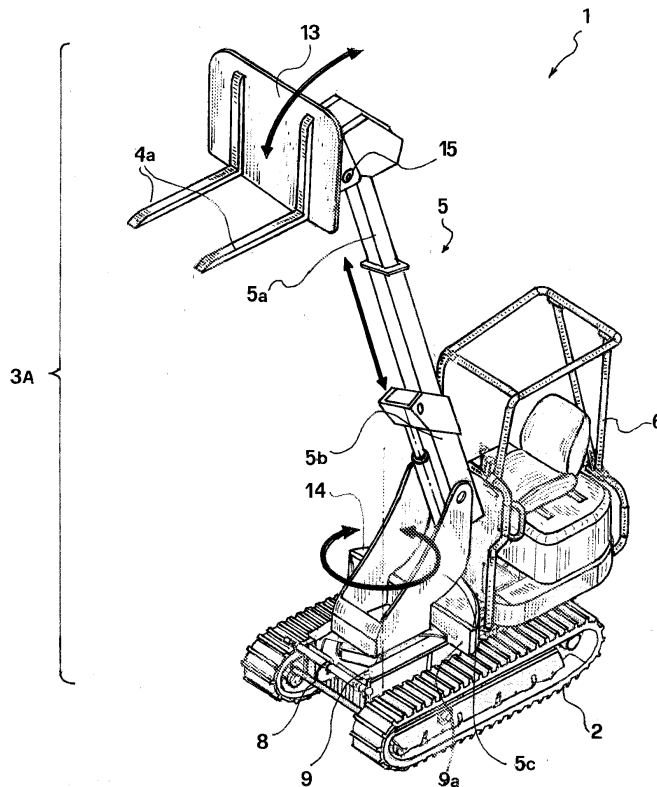
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(54) **Self-propelled industrial vehicle**

(57) A self-propelled industrial vehicle, provided with tools for allowing the vehicle to perform the operation assigned thereto, allows to load material also laterally to

the ride path and comprises a self-propelled chassis (8), on which a hopper support plate (9) is placed and drive means (10, 11), placed between the chassis and the support plate, apt to rotate the support plate.



**FIG.4**

**Description**

**[0001]** The present invention is related to an industrial vehicle, of the self-propelled type, provided with tools useful for carrying out the operation foreseen for it.

**[0002]** Examples of industrial vehicle falling within this definition are, for instance, a dumper provided with a mechanical bucket and a hopper, a fork lifter, an excavator, an articulated crane, a lifting platform and so on.

**[0003]** Several embodiments of vehicles as depicted above are known, usually comprising a self-propelled chassis, e.g. crawler-mounted, and various kind of tools mounted above the chassis.

**[0004]** By way of example, a self-loading dumper as previously defined is provided with a loading bucket, mounted on articulated arms, and a hopper, and the main feature thereof is its capacity to move an load the hopper with its own bucket.

**[0005]** For this reason, this kind of machine, widely used in the field of earthwork, is highly considered for its flexibility in operation. Therefore, several self-loading dumpers exist, with different sizes, suitable for different purposes.

**[0006]** However, the limit in the use of the self loading dumper lies in its capacity of loading only in an area localized in front of the hopper according to the direction of travel. Therefore, for loading material which is not placed just on its track, the dumper is forced to move itself, to be placed in a loading position, through even complicated maneuvering, possibly on a rough and slope grounds.

**[0007]** The same problem may be encountered also in other typology of vehicle.

**[0008]** With reference to lifters, they are generally provided with forks, hooks, blades apt to work in front of the vehicle, which has the capacity to rotate as a whole and to follow a curved track.

**[0009]** Such a configuration allows an eased use in storing areas and depots, where the loads are arranged in an ordered manner, with corridors and spaces allowing the lifter to move so as to place itself with said loads in a frontal position for the lifting thereof.

**[0010]** However, when the spaces are narrower, more complex systems are used, e.g. travelling cranes, provided that the vehicle cannot rotate in a narrow space to lifter and to transport the load.

**[0011]** These inconveniences are more felt when the vehicle, for practical reasons, are crawled-mounted instead of wheel-mounted, and with the operator positioned on board.

**[0012]** The technical problems underlying the present invention is to provide a self-propelled vehicle allowing to obviate to the drawbacks mentioned with reference to the prior art.

**[0013]** Such a problems is solved by a self-propelled vehicle as above specified, comprising:

- a self-propelled chassis, on which a tool support

plate is placed; and

- drive means, placed between the chassis and the support plate, apt to rotate the support plate.

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**[0014]** The main advantage of the self-propelled vehicle according to the present invention lies in allowing the rotation of the whole rotating plate which can support the operative tools, separating such a rotation from the whole vehicle.

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**[0015]** The present invention will be hereby described according to a preferred exemplificative embodiment thereof, given by way of a non-limiting example, with reference to the annexed figures, wherein:

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- figure 1A shows a partial exploded perspective view of a self-propelled vehicle according to the invention, in particular a self-loading dumper;

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- figure 1B shows a further perspective view of the vehicle of figure 1A;

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- figure 2 shows a side orthographic view of the vehicle of the preceding two figures;

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- figure 3 shows a perspective view of the vehicle of the preceding figures, in a complete assembly;

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- figure 4 shows a perspective view of a second vehicle example, in particular a self-propelled lifter;

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- figure 5 shows a side orthographic view of the lifter of figure 4;

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- figure 6 shows a plan view of the lifter of figures 4 and 5, in different operative positions;

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- figure 7 shows a side orthographic view of a telescopic arm excavator according to the present invention;

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- figure 8 shows a side orthographic view of a lifting platform according to the present invention; and

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- figure 9 shows a side orthographic view of a crane according to the present invention.

**[0016]** With reference to figures 1A, 1B, 2 and 3, a self-loading dumper, shown with the reference number 1, will be described in the following, as an example of self-propelled vehicle according to the invention.

**[0017]** It is mounted on crawlers 2 and it is provided with a hopper 3 and a front bucket 4 mounted on a pair of arms 5.

**[0018]** Moreover, it is meant to be controlled by an operator placed in an operating cab 6 by means of controls 7.

**[0019]** Crawlers 2 support a self-propelled chassis 8,

onto which the cab 6 is provided, and comprising a motor and all the controls of hopper and bucket.

**[0020]** Frontally, opposite the cab 6, the chassis 8 supports a support plate 9 entirely resting above the chassis 8. The plate 9 is horizontally disposed and it is constrained to the cab 6.

**[0021]** Underneath it, the dumper 1 comprises drive means, placed between the chassis 8 and the support plate 9, apt to rotate the support plate 9. In particular, said drive means comprises a fifth wheel 10 fixed to the plate 9 by means of crown-disposed bolts. The fifth wheel 10 is rotated by means of a motor-driven pinion gear 11.

**[0022]** The plate 9 receives said hopper 3, and the respective controls thereon, so that the hopper 3 can be rotated relative to chassis 8 and crawlers, opposite to the operator.

**[0023]** In the present exemplificative embodiment, the plate 9 is provided with supporting projections 12 at the side edges thereof, supporting the articulated arms 5 and the controls thereof, respectively. Accordingly, arms 5 and loading bucket 4 can rotate together with the hopper 3, thus always remaining in an optimal position for the material loading.

**[0024]** Anyhow, it is intended that the arms could be directly articulated to the hopper 3 or, alternatively, to the chassis 2.

**[0025]** In the present exemplificative embodiment, the arms 5 are optimally placed for being controlled in a position in which they provide the dumper a balanced configuration, even when the hopper 3 is rotated.

**[0026]** As in the present example, they could be telescopically extensible.

**[0027]** The fifth wheel 10 rotation axis A is substantially centered on the plate 9, in a vertical position.

**[0028]** It is intended that the shape of the hopper and of the bucket could be varied as preferred, in order to satisfy any operative requirement.

**[0029]** With reference to figures from 4 to 6, in the following it will be described a second example of self-propelled vehicle according to the invention, in particular a crawlers-mounted self-propelled lifter 1.

**[0030]** In the following, components common to both examples will be shown with the same reference numbers.

**[0031]** Crawlers 2 support a self-propelled chassis 8, onto which the cab 6 is provided, and comprising a motor and all the controls of device for grasping, lifting, and/or moving loads 3A, provided on the chassis 8 opposite the cab 6.

**[0032]** Such device 3A comprises a telescopically extensible arm 5, formed by two parts 5a and 5b, articulated at the base to a support plate 9 in correspondence of a hinge structure 5c.

**[0033]** On its distal end, the arm 5 has a pair of forks 4a associated to a stopping bulkhead 13.

**[0034]** The forks 4a are of the type apt to lift standard pallets. Nevertheless, the device for grasping, lifting, and/or moving loads 3 could comprise any other loading

implement.

**[0035]** In order to simplify loading and unloading, forks 4a and bulkhead 13 are articulated at the telescopic arm 5 distal end, and they can be controlled in their rotation above an horizontal axis, i.e. a hinge 15 onto which suitable actuators are mounted (not shown).

**[0036]** Underneath the plate 9, the lifter 1 comprises drive means, apt to rotate the support plate 9. In particular, said drive means comprises a fifth wheel 10 fixed to the plate 9 by means of crown-disposed bolts. The fifth wheel 10 is rotated by a motor-driven pinion gear 11.

**[0037]** The plate 9 receives said lifting device 3 and the respective controls thereon, so that the hopper 3 could be rotated relative to chassis 8 and crawlers, opposite to the operator.

**[0038]** The rotation axis A of the fifth wheel 10 is substantially centered to the plate 9, in a vertical position.

**[0039]** In order to avoid the device for grasping, lifting, and/or moving loads to unbalance the self-propelled lifter, in particular when the arm 4 is extended and when it is rotated relative to the frontal position, the plate 9 has an extension 9a placed according to a configuration opposed to the direction in to which the arm 4 projects. It comprises a mobile compensator 14 that is translated according to the position of the arm 5, fork 4a and of the load lifted therefrom.

**[0040]** To this regard, the compensator 14 could be extensible.

**[0041]** In this way, the lifter 1 will not be allowed to tilt due to the laterally lifted weight.

**[0042]** It is intended that shape of the device for grasping, lifting, and/or moving loads could be varied as preferred in order to satisfy any operative requirement.

**[0043]** With reference to figure 7, the vehicle, analogous to the preceding ones, comprises a lifting device 3a, the lifting member thereof being formed by a bucket 4b articulated to a telescopically arm 5 distal end.

**[0044]** The bucket 4b can thus be operated in its rotation above an horizontal axis, i.e. a hinge 15 in correspondence of which suitable actuators (not shown) are mounted, for simplifying the loading of the material to be displaced.

**[0045]** According to an analogous embodiment, the vehicle of figure 8 is provided with a telescopic arm supporting a lifting platform 4c, also articulated to the arm 5 distal so that it can be always maintained horizontal.

**[0046]** The platform 4c can be formed by a safety cage.

**[0047]** With reference to figure 9, a self-propelled vehicle analogous to the preceding ones, comprises, at the telescopically arm 5 distal end, a hoist 4d provided with a hook 16 connected to a cable 17 end. The hoist 4d could be obviously also replaced by a winch or by any other lifting member.

**[0048]** In each described examples, the operating cab 6 is disposed on the chassis 8 and not on the rotating plate 9. Nevertheless, according to a modification of the invention, the cab 6 could be disposed above the plate 9 and together rotated, so that the operator is always

directed towards the implemented mounted on the vehicle.

**[0049]** In this case, the compensator could be mounted at the back of the operating cab, and could be extensible rearwards, with an improved efficiency thanks to the rocker arm accordingly defined.

**[0050]** The distance of the balance weight at the vehicle center could be manually modified by means of an automatic servomechanism, for enhancing balancing momentum.

**[0051]** Moreover, it is intended that, in case, any of above described vehicle could be provided with stabilizing feet. Moreover, they can be provided with an universal quick coupling for a quick changing of implement at the arm.

**[0052]** Furthermore, the crawler mounted vehicle could be of the fixed track-gauge type, variable track-gauge type or variable and/or enlarged track-gauge type.

**[0053]** To the above-described self-propelled vehicle a person skilled in the art, in order to satisfy further and contingent needs, could effect several further modifications and variants, all however encompassed in the protective scope of the present invention, as defined by the appended claims.

## Claims

1. A self-propelled vehicle (1), comprising:

- \* a self-propelled chassis (8), on which a tool (3, 4; 4a; 4b; 4c; 4d) support plate (9) is placed; and
- \* drive means (10, 11), placed between the chassis (8) and the support plate (9), apt to rotate the support plate (9).

2. The self-propelled vehicle (1) according to claim 1, wherein the support plate (9) is placed in a front position.

3. The self-propelled vehicle (1) according to claim 1 or 2, wherein the support plate (9) is horizontally disposed, entirely above the chassis (8).

4. The self-propelled vehicle (1) according to any of the preceding claim, wherein the drive means comprises a fifth wheel (10) fixed to the support plate (9), and rotated by a motor-driven pinion gear (11).

5. The self-propelled vehicle (1) according to claim 4, wherein the drive means (10, 11) defines a rotation axis (A) placed substantially at the support plate (9) center, in a vertical position.

6. The self-propelled vehicle (1) according to any of the preceding claim, wherein the support plate (9) has respective supporting projections (12) for one or more tools (4; 4a; 4b; 4c; 4d) arms (5), at the side

edges thereof.

7. The self-propelled vehicle (1) according to claim 6, comprising an extensible arm (5), articulated at the base to a support plate (9), in correspondence of a hinge structure (5c).

8. The self-propelled vehicle (1) according to claim 6, wherein said arm or arms (5) are telescopic.

9. The self-propelled vehicle (1) according to claim 8, comprising a loading implement (4a; 4b; 4c; 4d) articulated at said extensible arm (5) distal end.

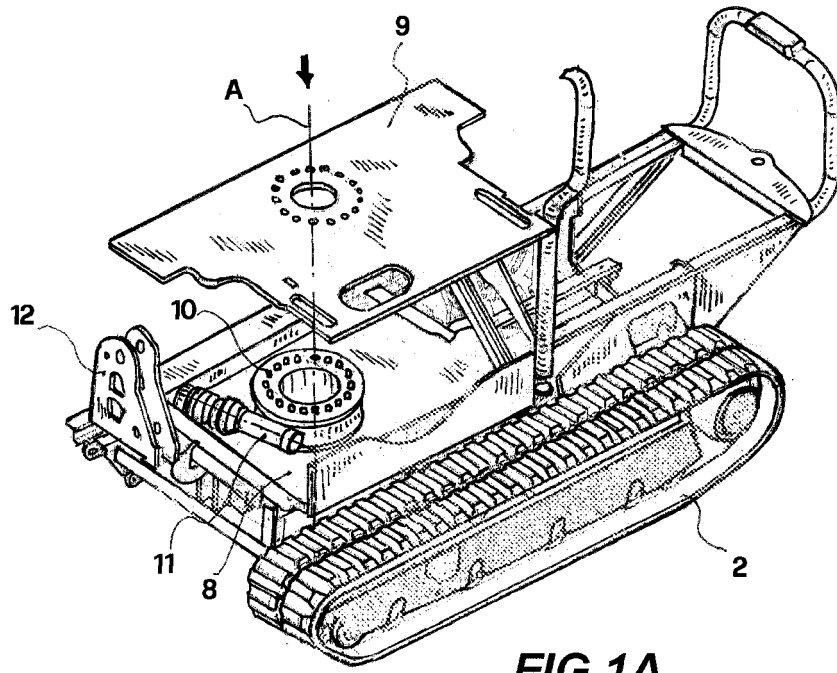
10. The self-propelled vehicle (1) according to any of the preceding claim, wherein the support plate (9) supports mobile compensator (14) for compensating the weight of the load weighting on said arm or arms (5).

11. The self-propelled vehicle (1) according to any of the preceding claim, wherein the chassis (8) is provided with crawlers (2).

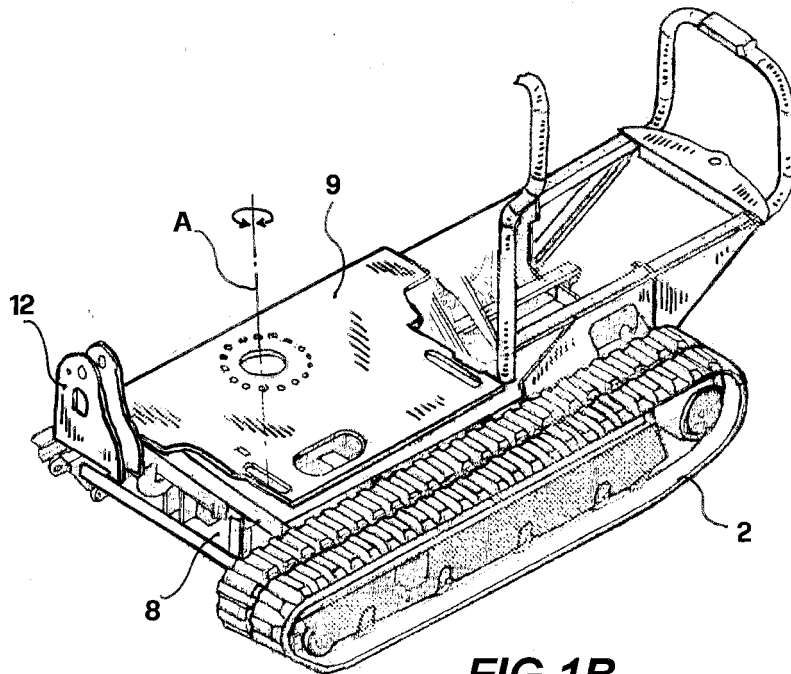
12. The self-propelled vehicle (1) according to any of the preceding claim, wherein the chassis (8) supports a cab (6), frontally and opposite to which, the chassis (8) supports said support plate (9) unconstrained from the cab (6).

13. The self-propelled vehicle (1) according to any of claims 1 to 11, wherein said support plate (9) supports an operating cab (6) for an operator.

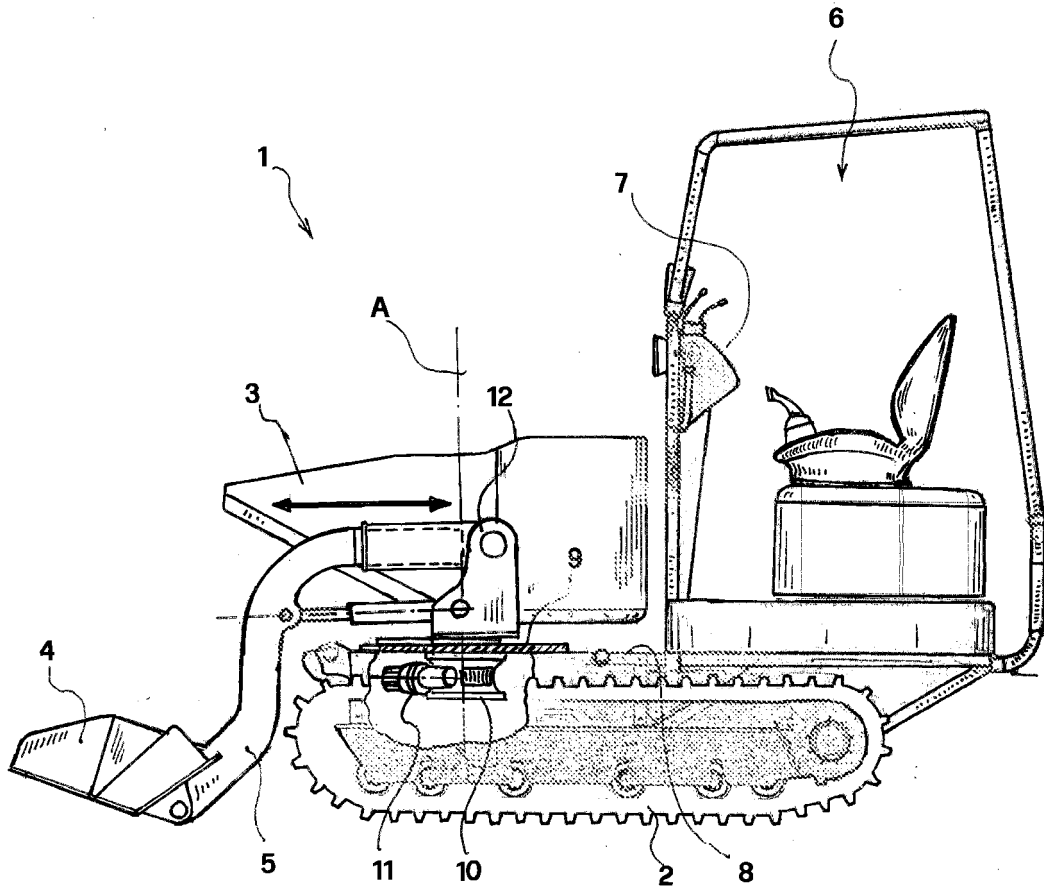
14. The self-propelled vehicle (1) according to claims 11 and 13, wherein the compensator (14) is extensible at the back of the operating cab.



**FIG. 1A**



**FIG. 1B**



**FIG.2**

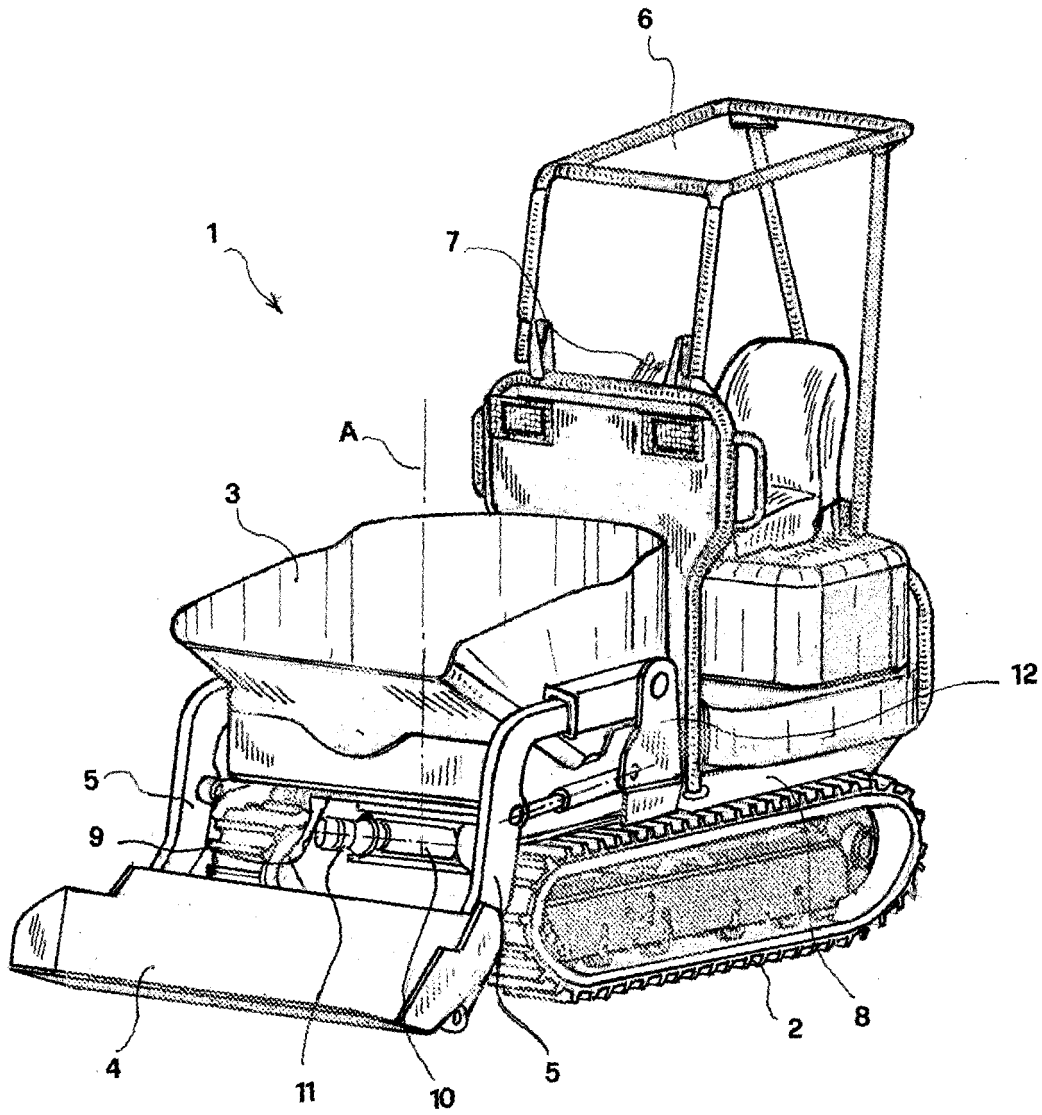


FIG.3

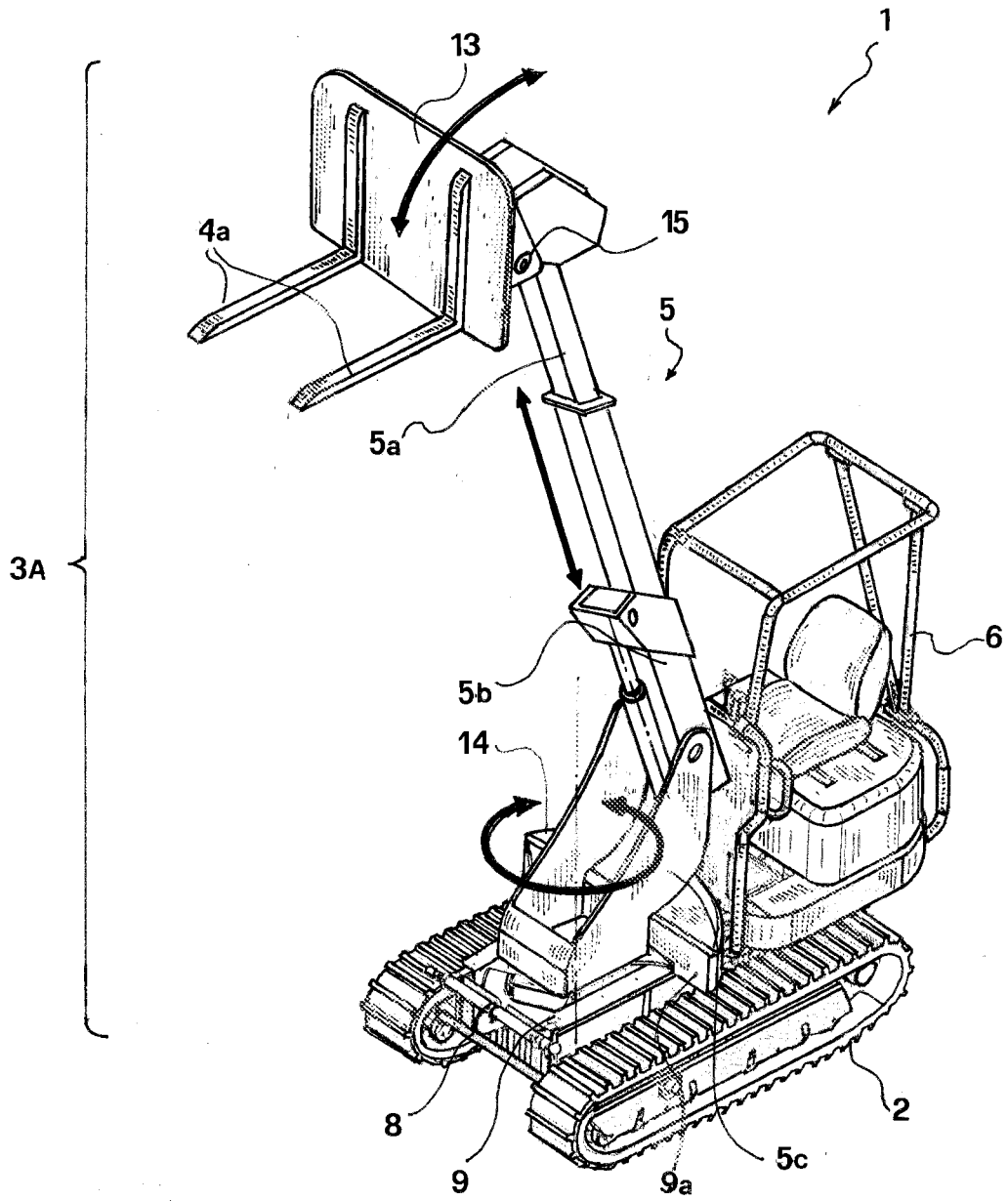


FIG. 4

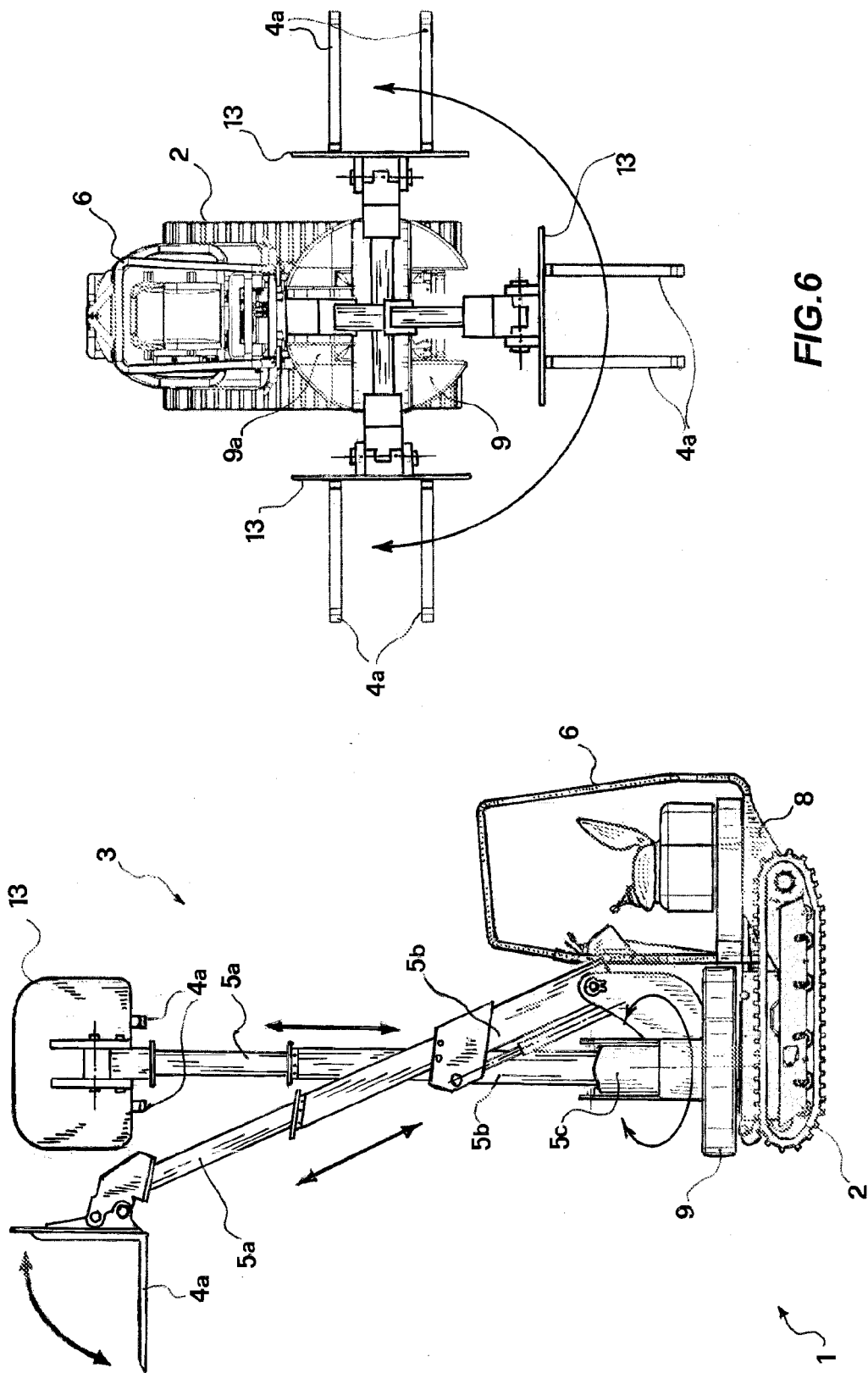


FIG.6

FIG.5

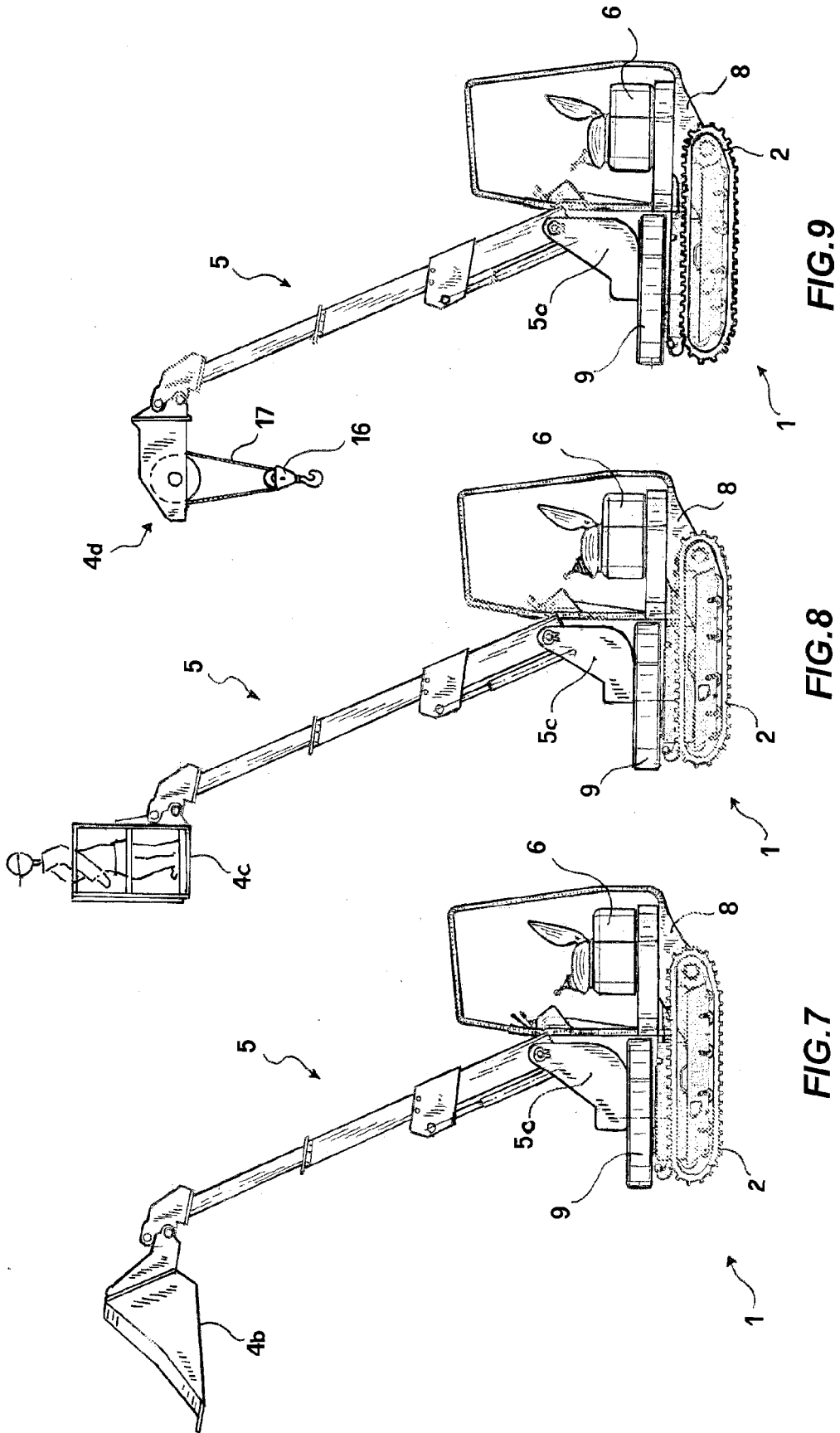


FIG. 9

FIG. 8

FIG. 7



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Application Number  
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Place of search <b>Munich</b>		Date of completion of the search <b>10 June 2009</b>	Examiner <b>Blondeau, Alain</b>
<b>CATEGORY OF CITED DOCUMENTS</b> 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	

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