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(54) **COMPACT ARTICULATED LOADER**

(57) An articulated loader (10) with a frame having a front segment (20) and a rear segment (30), which front segment is connected via a pivoting connection (40) to the rear segment so that the articulated loader is steerable by pivoting the segments relative to each other, wherein the front segment comprises two front wheels (21) which are respectively driven by two hydraulic motors (22); wherein the rear segment has a tiltable sub-frame (50) which is tiltable about a lying axis extending in the longitudinal direction of the articulated loader, which tiltable sub-frame comprises two rear wheels (51) which are respectively driven by two further hydraulic motors (52); wherein the front segment further comprises a lifting arm (60) to which an implement (70) is couplable, wherein the lifting arm and the implement are movable using a first and a second hydraulic cylinder (80, 90), wherein the lifting arm intersects in a lowermost position a rotation axis of the front wheels.

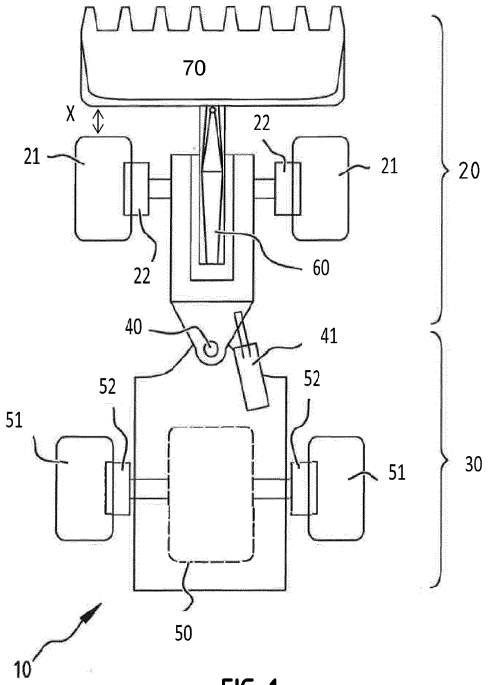

FIG. 1

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Description

[0001] The invention relates to a work vehicle, more specifically an articulated loader.

[0002] Articulated loaders are utilized worldwide, typically for the purpose of moving large quantities of material such as soil, debris, pallets or building materials such as paving bricks. Articulated loaders exist in a variety of sizes. Large articulated loaders, as used in for instance the mining industry, typically have an operating weight greater than 5000 kg.

[0003] Small articulated loaders, also referred to as compact articulated loaders, are utilized increasingly often depending on the type of work, for instance for constructing a terrace, garden or driveway on worksites with smaller dimensions or limited manoeuvrability. Such an articulated loader has a frame with a front and a rear segment with respectively a first set of wheels and a second set of wheels. The front segment and the rear segment are mutually coupled via a tipping system. The tipping system allows the front and the rear segment to rotate relative to each other about an upward directed axis. This rotating movement allows for steering of the articulated loader. In order to compensate for unevenness in the ground surface, the tipping system is further configured to allow the front segment and the rear segment to tilt. The tilting of the segments relative to each other means that the segments rotate relative to each other about a lying axis extending in the longitudinal direction of the vehicle. A drawback of an articulated loader with this tipping system is that when the front is heavily loaded and this is combined with a braking manoeuvre, the rear wheels come off the ground. In the case of an articulated loader with such a tipping system, the whole rear segment would therefore keep tilting in one direction. This results in an extremely unsafe situation and feeling for the driver.

[0004] It is an object of the invention to provide an articulated loader with a more compact construction, which is moreover safe in use.

[0005] The invention provides for this purpose an articulated loader with a frame having a front segment and a rear segment, which front segment is connected via a pivoting connection to the rear segment so that the articulated loader is steerable by pivoting the segments relative to each other. The front segment comprises two front wheels which are respectively driven by two hydraulic motors. The rear segment has a tiltable sub-frame which is tiltable about a lying axis extending in the longitudinal direction of the articulated loader, which tiltable sub-frame comprises two rear wheels which are respectively driven by two further hydraulic motors. The front segment further comprises a lifting arm to which an implement is couplable, wherein the lifting arm and the implement are movable using a first and a second hydraulic cylinder, wherein the lifting arm intersects in a lowermost position a rotation axis of the front wheels.

[0006] Providing a tiltable frame has multiple advantages. The front segment and the rear segment are mutually connected via a pivoting connection, while the rear segment has a tiltable frame. The tiltable sub-frame ensures that all wheels keep touching the ground when the ground surface is uneven. This allows the pivoting connection to take a one-dimensional or single-action form. In other words, the pivoting connection need no longer be provided with a tipping system. In this way said pivoting connection can be realized more robustly. A further advantage of the one-dimensional pivoting connection is that the rear segment will always remain straight relative to the front segment, even in the event of sudden accelerations and/or braking manoeuvres. This makes the articulated loader safer because unexpected tilting of the rear segment is avoided, which in turn creates a sense of safety for the driver. The single-action pivoting connection in combination with the tiltable frame makes it possible to realize safer and faster transfer and loading of large quantities of material with the articulated loader. In this way the articulated loader is thus not only more reliable but also more productive, since work can take place at higher speeds and with increased acceleration and deceleration without this being detrimental to the sense of safety for the driver. A further advantage of the articulated loader is based on the insight that a space can be created between the two front wheels in that the front segment has two front wheels which are each driven by a hydraulic motor. This created space is used to allow the lifting arm to rest in a lowermost position at least partially between the front wheels. The dimension of the articulated loader, as seen in a longitudinal direction thereof, is limited in this way. In other words, the articulated loader is extremely compact. Hydraulic motors are further extremely compact, and hydraulic motors are particularly considerably more compact than electric motors of similar power. Hydraulic motors are also much better able to withstand the rough and dirty conditions in which the articulated loaders are utilized.

[0007] The pivoting connection is preferably formed such that the front and the rear segment can rotate about only one rotation axis. This allows the pivoting connection to be configured as a single-action hinge. More specifically, a single-action pivoting connection is understood to mean that the pivoting connection only allows a rotating movement about a substantially vertically oriented axis. The single-action pivoting connection prevents a rotating movement in the other orientation directions, for example a rotating movement about a horizontally oriented axis as in known tipping systems.

[0008] The lifting arm preferably comprises a force transmission structure which is constructed as a Z-kinematic.

[0009] The force transmission structure further preferably has a lifting arm base with a proximal outer end and a distal outer end, wherein the lifting arm base is connected via a pivoting connection to the front segment at the position of the proximal outer end, and wherein the lifting arm base comprises at the position of the distal

outer end a pivotable connecting piece to which the implement is coupleable, wherein the first cylinder is connected pivotally between the front segment and the lifting arm base so that the first cylinder can rotate the lifting arm base around the pivoting connection during operation. Connecting the first cylinder pivotally to the front segment on one side and to the lifting arm base on the other makes the lifting arm rotatable around the pivoting connection. The first cylinder is here preferably provided under the lifting arm. This results in an upward and downward movement of the lifting arm. The upward movement, particularly in a loaded state of the lifting arm, requires a great deal of force. This force is exerted in optimal manner by providing the cylinder as above. The cylinder has a housing in which a piston, which is connected at the position of a piston rod side to a piston rod, is reciprocally movable. By pumping a hydraulic fluid under pressure into the housing on a first and/or second side of the piston, the piston and the piston rod will move linearly. The force which can be generated is calculated by multiplying the surface area of the piston of the cylinder by the operating pressure of the fluid. The force which is generated depends on the side where the pressure in the cylinder is increased. This is because the surface area of the piston on the rod side is smaller. The piston rod is there connected to the surface of the piston. The area of the piston surface on which the hydraulic fluid can press is smaller since, for force calculation, surface area is therefore the size of the surface area of the piston minus the surface area of the rod. The advantage of providing the cylinder as stated above is that an upward movement is realized with the maximum force possible with the cylinder. This is because the cylinder always pushes on the greatest piston surface area, whereby maximum force of the cylinder is available.

[0010] The second cylinder is further preferably connected pivotally between the lifting arm base and the connecting piece via a lever. This makes it possible to further increase the force generated by the second cylinder and to translate the linear movement of the cylinder into a movement of the connecting piece.

[0011] The lever further preferably comprises a first articulation and a second articulation which are connected to each other for mutual pivoting, which first articulation is connected pivotally to the lifting arm base in a central zone, wherein the proximal outer end of the first articulation is connected pivotally to the second cylinder and wherein a distal outer end of the second articulation is connected to the connecting piece so that the second cylinder realizes a pivoting movement with the connecting piece during operation. The advantages described in respect of the first cylinder apply to the second cylinder, *mutatis mutandis.* More specifically, the second cylinder is configured such that the maximum possible amount of force is always available to the cylinder. The first articulation and second articulation increase this force further so that a so-called breakout force is maximal. Depending on the implement, the breakout force is directed upward or downward. When the implement is for instance a loading shovel, the breakout force is the amount of force which can be exerted at the position of a point of the loading shovel, which is connected to the connecting piece, by the pivoting movement of the connecting piece for lifting the matter in the loading shovel.

[0012] A proximal end of the respective hydraulic cylinders is preferably arranged at substantially the same distance, as seen in a horizontal direction of the articulated loader, from the front wheels. A length dimension of the articulated loader is further limited to maximum extent in this way. In other words, the articulated loader is extremely compact.

[0013] The front segment is preferably U-shaped and an opening of the U-shaped front segment is preferably directed forward, as seen in a forward direction of travel of the articulated loader. This allows the lifting arm to rest in the front segment. In this way the outer dimension of the articulated loader is smaller, and a centre of gravity of the articulated loader is lowered. This results in improved stability and safety during use of the articulated loader.

[0014] A distance between the distal outer end of the lifting arm and a wheel surface of the front wheels is preferably smaller than 50 cm, preferably smaller than 30 cm.

[0015] The tiltable sub-frame preferably weighs at least 150 kg, more preferably at least 200 kg, still more preferably at least 300 kg. This improves the stability of the articulated loader.

[0016] An unladen weight of the articulated loader is preferably a maximum of 6 tons, preferably a maximum of 4 tons, preferably a maximum of 2 tons. The unladen weight of the articulated loader is defined as the weight of the articulated loader in unloaded state and in operational mode, without implement.

[0017] The rear segment is preferably provided with a driver's cab.

[0018] According to the invention, the rear segment will always remain straight relative to the front segment, which is what creates a sense of safety for the driver. It is no longer necessary here to build the cab more toward the rear on the rear segment, which would make the vehicle less compact.

[0019] The invention will now be further described on the basis of an exemplary embodiment shown in the drawing.

[0020] In the drawing:

figure 1 is a schematic representation of an articulated loader according to an embodiment;
figures 2A and 2B are schematic representations of a rear segment of the articulated loader in a rest position and in a tilted position;
figure 3 is a schematic representation of a lifting arm of the articulated shovel according to a preferred embodiment.

[0021] The following detailed description relates to de-

termined specific embodiments. The teachings hereof can however be applied in different ways. In the drawings the same or similar elements are designated with the same reference numerals.

[0022] The present invention will be described with reference to specific embodiments. The invention is however not limited thereto, but solely by the claims.

[0023] As used here, the singular forms "a" and "the" comprise both the singular and plural references, unless clearly indicated otherwise by the context.

[0024] The terms "comprising", "comprises" and "composed of' as used here are synonymous with "including". The terms "comprising", "comprises" and "composed of' when referring to stated components, elements or method steps also comprise embodiments which "consist of' the components, elements or method steps.

[0025] The terms first, second, third and so on are further used in the description and in the claims to distinguish between similar elements and not necessarily to describe a sequential or chronological order, unless this is specified. It will be apparent that the thus used terms are mutually interchangeable under appropriate circumstances and that the embodiments of the invention described here can operate in an order other than described or illustrated here.

[0026] Reference in this specification to "one embodiment", "an embodiment", "some aspects", "an aspect" or "one aspect" means that a determined feature, structure or characteristic described with reference to the embodiment or aspect is included in at least one embodiment of the present invention. The manifestations of the sentences "in one embodiment", "in an embodiment", "some aspects", "an aspect" or "one aspect" in different places in this specification thus do not necessarily all refer to the same embodiment or aspects. As will be apparent to a skilled person in this field, the specific features, structures or characteristics can further be combined in any suitable manner in one or more embodiments or aspects. Although some embodiments or aspects described here comprise some but no other features which are included in other embodiments or aspects, combinations of features of different embodiments or aspects are further intended to fall within the context of the invention and to form different embodiments or aspects, as would be apparent to the skilled person. In the appended claims all features of the claimed embodiments or aspects can for instance be used in any combination.

[0027] In the context of this application an unladen weight is defined as the weight of an articulated loader in unloaded state and in operational mode, without implement.

[0028] Figure 1 shows a schematic representation of an articulated loader 10 according to an embodiment.

[0029] The articulated loader 10 has a frame with a front segment 20 and a rear segment 30. The front segment 20 is provided with two front wheels 21. The front wheels 21 are provided on either side of the front segment 20, as seen in a longitudinal direction of articulated loader 10. The wheels 21 in front segment 20 are connected fixedly to the chassis of that segment. The front wheels 21 are rotatingly driveable by respective hydraulic motors 22. In other words, each of the front wheels 21 is individually rotatingly driveable by its own hydraulic motor 22. Hydraulic motors 22 are driven by supply of a hydraulic power in the form of a hydraulic fluid volume flow. The hydraulic fluid is converted under pressure into a mechanical power in the hydraulic motor so that a rotating movement is realized. The rotating movement can drive the front wheels rotatingly. The hydraulic motors 22 are characterized by a high torque in combination with a relatively low rotation speed. Hydraulic motors are further extremely compact, and hydraulic motors are particularly considerably more compact than electric motors of similar power. Hydraulic motors are also much better able to withstand the rough and dirty conditions in which the articulated loaders are utilized.

[0030] The front segment 20 and the rear segment 30 are mutually connected via a pivoting connection 40. The pivoting connection 40 allows a rotation between front segment 20 and rear segment 30. The articulated loader 10 is steerable by the pivoting of the segments 20, 30 relative to each other. Pivoting connection 40 is preferably formed such that front segment 20 and rear segment 30 can rotate about only one rotation axis. The freedom of movement of the segments relative to each other is thus limited. This allows pivoting connection 40 to take a one-dimensional or single-action form. More specifically, a single-action pivoting connection is understood to mean that the pivoting connection 40 only allows a rotating movement about a substantially vertically oriented axis. The single-action pivoting connection 40 prevents a rotating movement in the other orientation directions, i.e. a tilting movement as in known articulated systems. Such a single-action pivoting connection therefore has the advantage that the segments cannot tilt relative to each other. This increases safety and, especially, the feeling of safety of the articulated loader during use thereof.

[0031] The articulated loader 10 is steerable primarily by hinging or, in other words, pivoting the segments 20, 30 relative to each other around the axis. A steering cylinder 41 is typically provided for this purpose. The steering cylinder 41 determines the angle between the segments when the segments are pivoted. The pivoting of the segments relative to each other determines a direction of travel. More specifically, the direction of travel of the front segment is determined by the angle between the segments. The rear segment then follows the front segment. The advantage of such a construction is that the wheel rotation speed of the different wheels remains substantially the same. In other words, the different wheels can turn at substantially the same speed. This is different when all wheels are provided fixedly on the same chassis. In such a situation the right-hand wheels are forcibly driven faster than the left-hand wheels or vice

versa in order to force turning of the vehicle. The wheels wear more quickly in such a situation, which is disadvantageous.

[0032] The rear segment 30 has a tiltable sub-frame 50 which is tiltable about a lying axis extending in the longitudinal direction of articulated loader 10. The tiltable sub-frame 50 comprises two rear wheels 51. The two rear wheels 51 are respectively driven by two further hydraulic motors 52. A tilting movement of the tiltable sub-frame 50 about the lying axis is preferably a damped tilting movement, for which purpose a damping mechanism can be provided. The tiltable sub-frame 50 ensures that when the ground surface is uneven, all wheels keep touching the ground. This allows the pivoting connection to take a one-dimensional or single-action form. The single-action pivoting connection 40 avoids unexpected tilting of rear segment 30 relative to front segment 20. A feeling of safety is created for the driver in this way. The single-action pivoting connection 40 in combination with the tiltable frame 50 furthermore allows transfer and loading of large quantities of material to be realized more safely and rapidly with the articulated loader 10. Not only is the articulated loader thus more reliable in this way, it is also more productive since work can be carried out at higher speeds and with increased acceleration and deceleration without this endangering the safety of the driver. The tiltable sub-frame 50 will be discussed at length with reference to figures 2A and 2B.

[0033] Front segment 20 further comprises a lifting arm 60 to which an implement 70 can be coupled. Examples of an implement 70 are a shovel, overtop tipping skip, pallet fork, bale fork, manure fork or lifting arm for big bags. The lifting arm 60 and the implement 70 are movable using a first and a second hydraulic cylinder 90, 80 (see figure 3). The lifting arm 60 will be discussed at length below with reference to figure 3.

[0034] In a lowermost position the lifting arm 60 intersects a rotation axis of the front wheels 21. Because the front segment 20 has two front wheels 21 which are each driven by a hydraulic motor 22, a space is created between the two front wheels 21. This created space is used to allow lifting arm 60 to rest in a lowermost position at least partially between the front wheels. On the one hand, the dimension of the articulated loader 10, as seen in a longitudinal direction thereof, is limited in this way. In other words, articulated loader 10 is extremely compact. On the other hand, a centre of gravity of the articulated loader is also low in this way. The low centre of gravity improves the road handling characteristics of the articulated loader, which creates a sense of safety in use for a user.

[0035] According to a preferred embodiment, the front segment 20 is U-shaped and an opening of the U-shaped front segment 20 is directed forward, as seen in a forward direction of travel of articulated loader 10. This allows the lifting arm 60 to rest in the front segment. In this way the outer dimension of articulated loader 10 is smaller and a centre of gravity of the articulated loader is lowered. This results in improved stability and safety during use of articulated loader 10.

[0036] Figure 1 further shows that a distance X between the distal outer end of lifting arm 60 and a wheel surface of the front wheels is smaller than 50 cm, preferably smaller than 30 cm, at least in a lowermost position of the lifting arm. This reduces the influence exerted on the implement by a moment of a load. Such moment can cause the whole articulated loader to tilt forward, creating a dangerous situation for the driver and bystanders. Articulated loader 10 is safer during acceleration and deceleration because the chance of tilting forward decreases.

[0037] Although not illustrated, in an embodiment the rear segment is preferably provided with a driver's cab. Providing a driver's cab is advantageous because it allows the user to work comfortably in all weather conditions. In known articulated loaders driver's cabs are only possible by positioning the driver's cab toward the rear on the rear frame, since a front wall of the driver's cab would otherwise collide with the front segment due to the tilting system, resulting in damage to the driver's cab. Such an articulated loader is furthermore larger and therefore less compact. According to an embodiment, the invention conversely provides a pivoting connection 40 and tiltable sub-frame 50, wherein the front segment 20 and the rear segment 30 are primarily only rotatable about one rotation axis which is oriented substantially upright or even vertically. Front segment 20 and rear segment 30 are therefore unable to tilt relative to each other about a lying axis oriented at right angles relative to the pivoting connection 40.

[0038] Figures 2A and 2B show a schematic view of the rear segment 30, as seen in a plane perpendicularly of a lying axis extending in a longitudinal direction of articulated loader 10.

[0039] Figures 2A and 2B more specifically show that rear segment 30 comprises a tiltable sub-frame 50. The tiltable sub-frame 50 is tiltable about a lying axis 31 extending in the longitudinal direction of articulated loader 10. As described in relation to figure 1, the tiltable sub-frame 50 comprises two rear wheels 51 which are respectively driven by two further hydraulic motors 52. The tiltable sub-frame 50 makes it possible to compensate for unevenness in the ground surface, wherein the front and rear segment 20, 30 together form a whole which pivots in only one rotation direction. The tilting of the tiltable sub-frame 50 means that the tiltable sub-frame rotates relative to the rear segment 30 about the lying axis 31 of the articulated loader, as seen in a longitudinal direction thereof. Because the rear wheels are rotatingly driveable independently of each other by a hydraulic motor (see figure 1), the tiltable sub-frame can be manufactured in relatively simple manner, a coupling or gearbox need for instance not be provided. On one hand, the sub-frame allows for provision of additional weight low in the frame so that the stability of the articulated loader increases and the safety therefore improves. Tiltable sub-

frame 50 preferably weighs at least 150 kg, more preferably at least 200 kg, still more preferably at least 300 kg. It is noted that in the context of the application articulated loaders are deemed small articulated loaders. To this end an unladen weight of the articulated loader 10 is preferably a maximum of 6 tons, more preferably a maximum of 4 tons, preferably a maximum of 2 tons.

[0040] Figure 3 shows a schematic view of a lifting arm 60 according to a preferred embodiment.

[0041] Figure 3 shows that the lifting arm 60 comprises a force transmission structure which is constructed as a Z-kinematic. Z-kinematic is named for the shape of the force transmission structure.

[0042] The force transmission structure preferably has a lifting arm base 61 with a proximal outer end 61p and a distal outer end 61d. The proximal outer end 61p lies close to he rear segment. The distal outer end 61d lies opposite the proximal outer end, typically beyond a front peripheral edge of the front segment. Lifting arm base 61 is a component of lifting arm 60. Lifting arm base 61 is connected via a pivoting connection 23 to the front segment 20. The lifting arm base is connected via pivoting connection 23 to the front segment at the position of proximal outer end 61p. Pivoting connection 23 is typically positioned close to a peripheral edge of the front segment adjacently of the rear segment in order to maximally utilize a size, as seen in a longitudinal direction of the articulated loader, of the front segment. In this way a relatively large lifting arm can be provided relative to a relatively small articulated loader.

[0043] Lifting arm base 61 comprises at the position of distal outer end 61d a pivotable connecting piece 62 to which implement 70 is couplable. The way in which implements are couplable to a connecting piece 62 is known and is thus not explained further. As described with reference to figure 1, the lifting arm and the implement are movable using a first and a second hydraulic cylinder 80, 90. The first cylinder 80 is preferably connected pivotally between front segment 20 and lifting arm base 61 so that first cylinder 80 can rotate lifting arm base 61 around pivoting connection 23 during operation. Connecting the first cylinder 80 pivotally to the front segment 20 on one side and to lifting arm base 61 on the other makes lifting arm 60 rotatable around pivoting connection 23. This results in an upward and downward movement of the implement. The upward movement, particularly in a loaded state of the implement, requires a great deal of force. This force is exerted in optimal manner by providing the cylinder 80 as above.

[0044] The second cylinder 90 is preferably connected pivotally between lifting arm base 61 and connecting piece 62 via a lever 63, 64. An operating principle of the hydraulic cylinders 80, 90 will be briefly explained below. The cylinder 80, 90 has a housing in which a piston, which is connected at the position of a piston rod side to a piston rod, is reciprocally movable. By pumping a hydraulic fluid under pressure into the housing on a first and/or second side of the piston, the piston and the piston rod will move linearly. The force which can be generated is calculated by multiplying the surface area of the piston of the cylinder by the operating pressure of the fluid. The force which is generated depends on the side where the pressure in the cylinder is increased. This is because the surface area of the piston on the rod side is smaller. The piston rod is connected on a rod side to the surface of the piston. The area of the piston surface on which the hydraulic fluid can press is smaller since, for force calculation, surface area is therefore the size of the surface area of the piston minus the surface area of the rod. The advantage of providing the cylinder 80 as stated above is that an upward movement with lifting arm 60 is realized with the maximum force possible with cylinder 80. This is because cylinder 80 always pushes on the greatest piston surface area, whereby maximum force of the cylinder is available. Second cylinder 90 functions similarly to first cylinder 80.

[0045] Figure 3 further shows that the lever comprises a first articulation 63 and a second articulation 64. The first and second articulation 63, 64 are connected to each other for mutual pivoting. More specifically, the first and second articulation are mutually pivotable about a lying axis.

[0046] The first articulation is connected pivotally to the lifting arm base 61 in a central zone. The central zone is situated between a proximal and distal outer end 63p, 63d of the first articulation 63. The proximal outer end 63p of first articulation 63 is connected pivotally to second cylinder 90. As a distal outer end of second articulation 64 is connected to the connecting piece so that second cylinder 90 realizes a pivoting movement with the connecting piece during operation. More specifically, second cylinder 90 pushes against first articulation 63 at the position of proximal outer end 63p so that it rotates pivotably around the pivoting connection at the position of the central zone. According to the preferred embodiment shown in figure 3, first articulation 63 rotates in clockwise direction when second cylinder 90 extends. Distal outer end 63d, which is connected pivotally to the second articulation, rotates in the same direction as the proximal outer end 63p. In other words, the first articulation 63 translates the linear movement into a pivoting movement.

[0047] The second articulation 64 is connected pivotally to a distal outer end 63d of first articulation 63 on one side and connected pivotally to the connecting piece 62 on the other side, at the position of a distal outer end 64d thereof. The pivoting movement of first articulation 63 results in a combined translating and rotating movement of second articulation 64, and further in a rotation of the connecting piece with implement 70. The co-action between the first articulation and second articulation 63, 64 increases a breakout force. In figure 3 the implement 70 is a loading shovel. The direction of the breakout force is illustrated using the arrow. The breakout force is the amount of force which can be exerted at the position of a point of a implement connected to connecting piece 62 by the upward pivoting movement of the connecting piece. The first cylinder 80 and second cylinder 90 are

thus utilized such that maximum force they can produce is utilized optimally.

[0048] Although not shown in figure 3, a proximal end of the respective hydraulic cylinders 80, 90 is arranged at substantially the same distance from the front wheels 21, as seen in a horizontal direction of the articulated loader. A length dimension of the articulated loader is further limited to maximum extent in this way. In other words, the articulated loader is extremely compact.

[0049] The skilled person will appreciate on the basis of the above description that the invention can be embodied in different ways and on the basis of different principles. The invention is not limited here to the above described embodiments. The above described embodiments and the figures are purely illustrative and serve only to increase understanding of the invention. The invention is not therefore limited to the embodiments described herein, but is defined in the claims.

Claims

1. An articulated loader (10) with a frame having a front segment (20) and a rear segment (30), which front segment (20) is connected via a pivoting connection (40) to the rear segment (30) so that the articulated loader (10) is steerable by pivoting the segments (20; 30) relative to each other, wherein the front segment (20) comprises two front wheels (21) which are respectively driven by two hydraulic motors (22); wherein the rear segment (30) has a tiltable sub-frame (50) which is tiltable about a lying axis extending in the longitudinal direction of the articulated loader (10), which tiltable sub-frame (50) comprises two rear wheels (51) which are respectively driven by two further hydraulic motors (52); wherein the front segment (20) further comprises a lifting arm (60) to which an implement (70) is couplable, wherein the lifting arm and the implement are movable using a first and a second hydraulic cylinder (80, 90), wherein the lifting arm (60) intersects in a lowermost position a rotation axis of the front wheels (21).

2. The articulated loader according to the foregoing claim, wherein the pivoting connection (40) is formed such that the front and the rear segment can rotate about only one rotation axis.

3. The articulated loader (10) according to any one of the foregoing claims, wherein the lifting arm (60) comprises a force transmission structure which is constructed as a Z-kinematic.

4. The articulated loader (10) according to the foregoing claim, wherein the force transmission structure has a lifting arm base (61) with a proximal outer end (61p) and a distal outer end (61d), wherein the lifting arm base (61) is connected via a pivoting connection (23) to the front segment (20) at the position of the proximal outer end (61p), and wherein the lifting arm base (61) comprises at the position of the distal outer end (61d) a pivotable connecting piece (62) to which the implement (70) is coupleable, wherein the first cylinder (80) is connected pivotally between the front segment (20) and the lifting arm base (61) so that the first cylinder can rotate the lifting arm base around the pivoting connection (23) during operation.

5. The articulated loader according to the foregoing claim, wherein the second cylinder (90) is connected pivotally between the lifting arm base (61) and the connecting piece (62) via a lever (63, 64).

6. The articulated loader according to the foregoing claim, wherein the lever comprises a first articulation (63) and a second articulation (64) which are connected to each other for mutual pivoting, which first articulation (63) is connected pivotally to the lifting arm base (61) in a central zone, wherein the proximal outer end (63p) of the first articulation (63) is connected pivotally to the second cylinder (90) and wherein a distal outer end of the second articulation (64) is connected to the connecting piece.

7. The articulated loader according to any one of the foregoing claims, wherein a proximal end of the respective hydraulic cylinders (80, 90) is preferably arranged at substantially the same distance, as seen in a horizontal direction of the articulated loader, from the front wheels (21).

8. The articulated loader according to any one of the foregoing claims, wherein the front segment is U-shaped and wherein an opening of the U-shaped front segment is directed forward, as seen in a forward direction of travel of the articulated loader.

9. The articulated loader (10) according to any one of the foregoing claims, wherein a distance between the distal outer end (61d) of the lifting arm and a wheel surface of the front wheels is smaller than 50 cm, preferably smaller than 30 cm.

10. The articulated loader (10) according to the foregoing claim, wherein the tiltable sub-frame weighs at least 150 kg, more preferably at least 200 kg, still more preferably at least 300 kg.

11. The articulated loader (10) according to any one of the foregoing claims, wherein an unladen weight of the articulated loader is a maximum of 6 tons, preferably a maximum of 4 tons, preferably a maximum of 2 tons.

12. The articulated loader (10) according to any one of

the foregoing claims, wherein the rear segment is provided with a driver's cab.

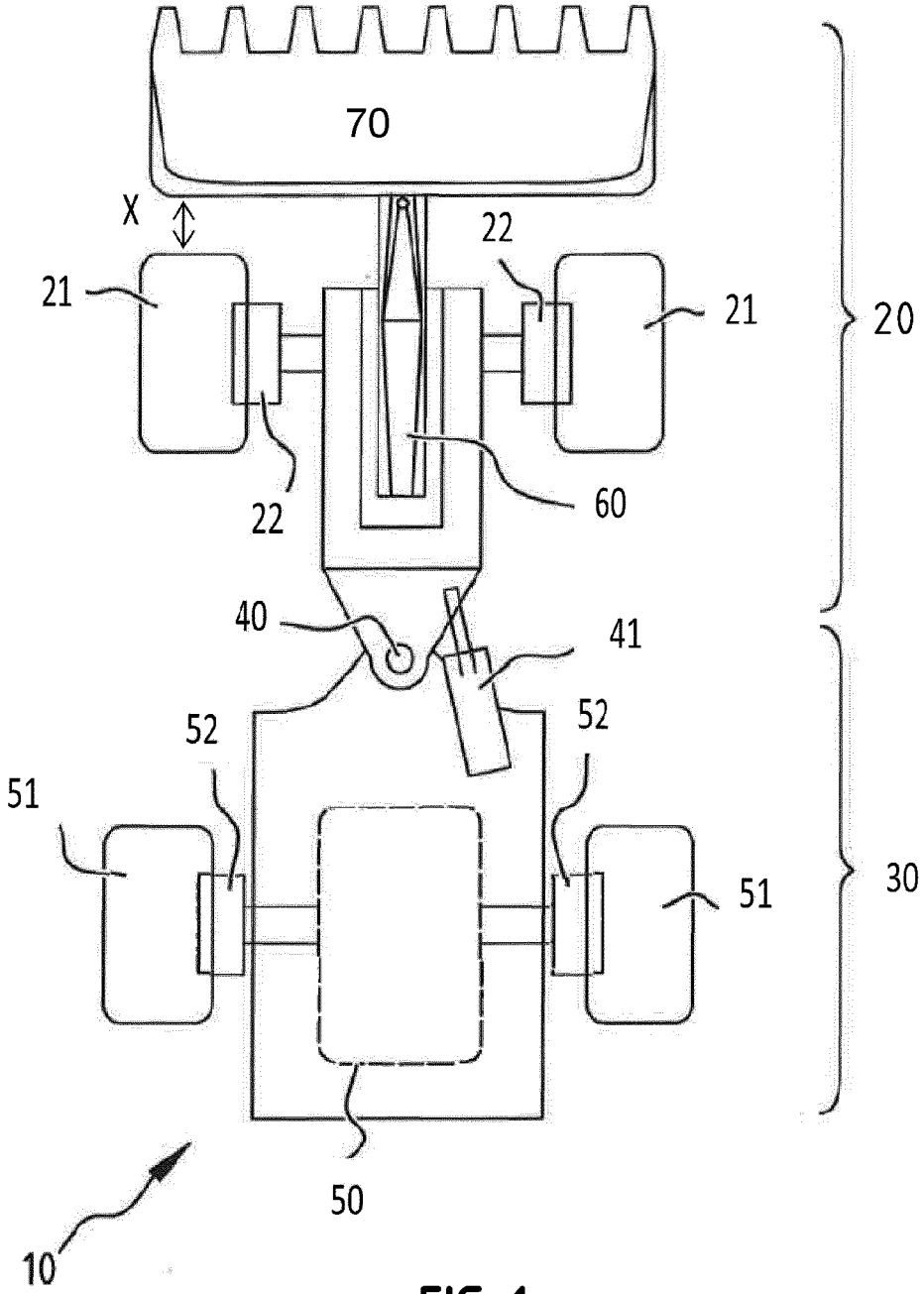

FIG. 1

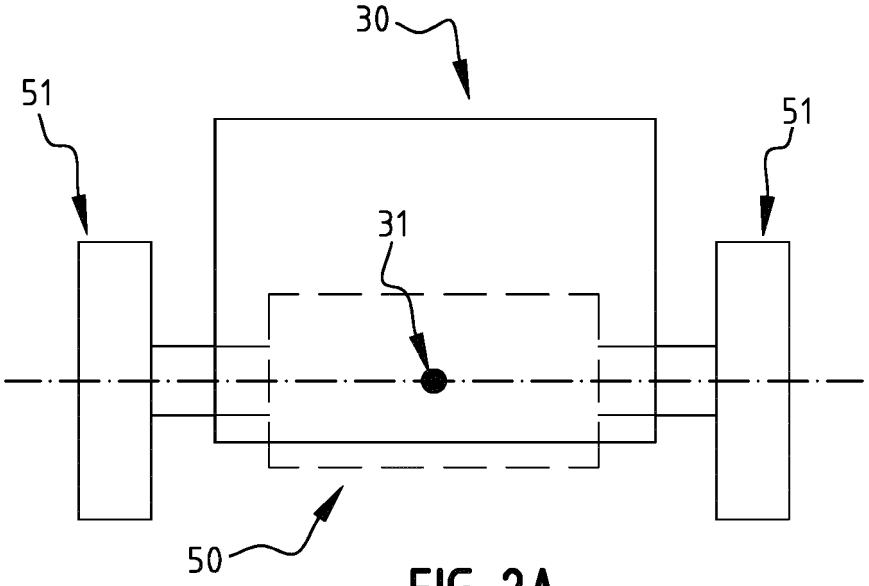

FIG. 2A

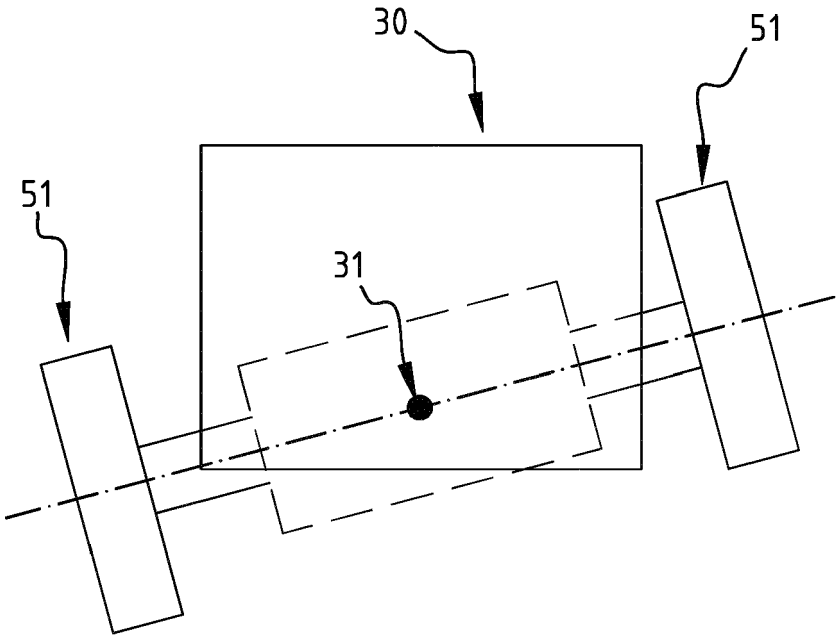

FIG. 2B

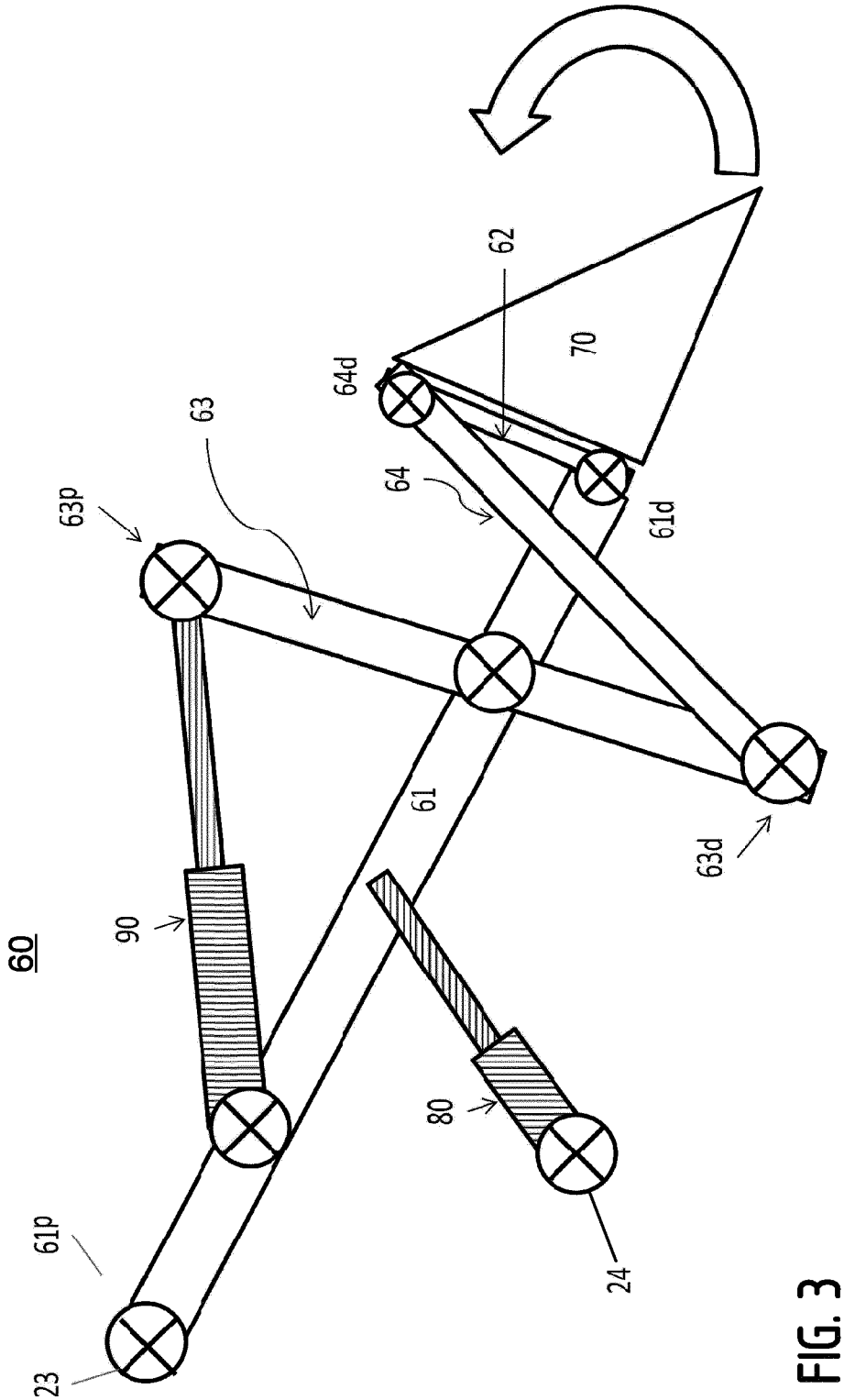

FIG. 3