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(54) Screed working apparatus

(57) A self-propelled screed working apparatus comprising a plurality of ground engaging wheels or tracks, propulsion means for moving the apparatus over a surface, screeding means for spreading and/or smoothing loose or plastic material, such as uncured concrete, and expansion joint creating means, wherein said screeding means comprises a first elongate beam mounted on the apparatus to extend transverse to the normal direction of movement of the apparatus.

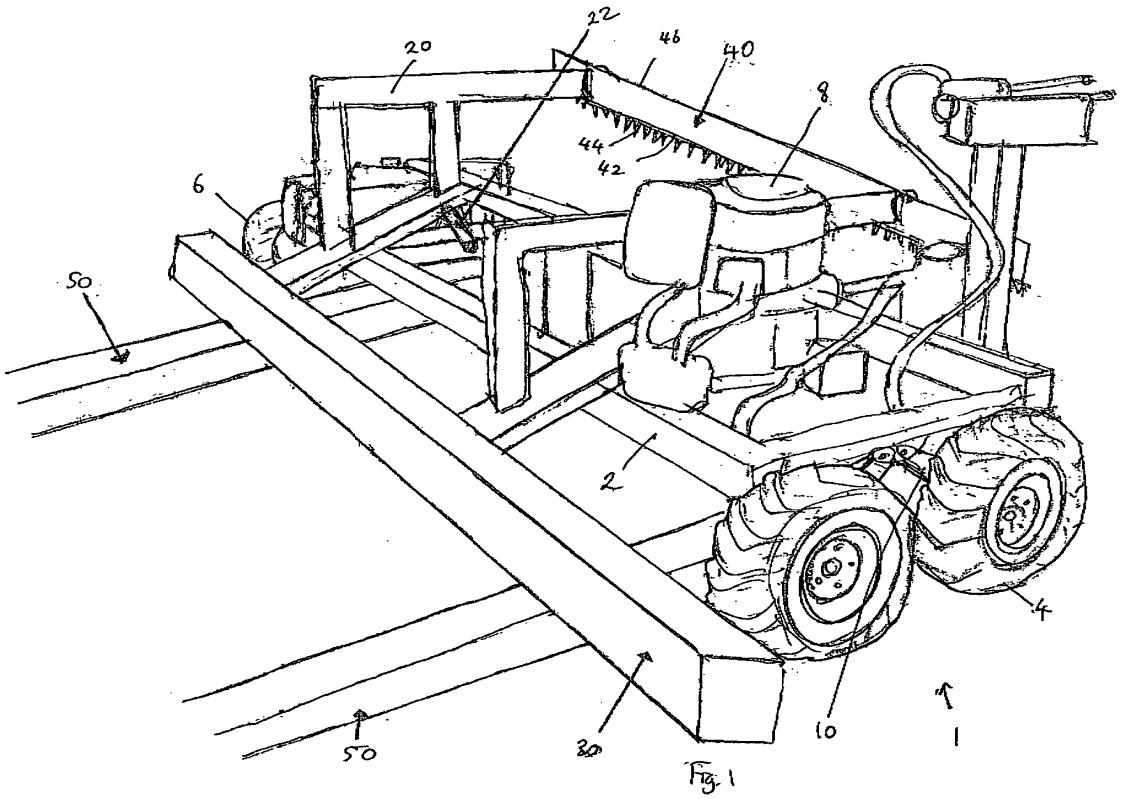

Fig. 1

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Description

[0001] This invention relates to a screed working apparatus and in particular to a screed working apparatus for levelling loose or plastic materials, such as sand, soil, gravel, tar or uncured concrete.

[0002] In the concrete industry, it is necessary to strike-off, smooth and level areas of concrete before curing. Such process if often referred to as "screeding". Numerous techniques and methods for screeding have been used in the past. These include passing an edge of a plank of wood across the top of the concrete, typically between guides or shuttering, as well as more sophisticated power screeds comprising an elongate vibrating blade or beam extending transversely on a wheeled chassis, typically driven by a small petrol engine mounted thereon for vibrating the beam and for driving the apparatus. The elongate beam is typically adapted to span the width of the strip of concrete to be levelled and typically rides on guides or rails on either side of the concrete strip.

[0003] It is often also necessary to rake the material before a screeding operation to remove excess material. It is often also required to form expansion joints at spaced locations, particularly in large concrete areas, typically by pushing a transverse blade or similar into the concrete to create an elongate gap in the concrete.

[0004] An object of the present invention is to provide a single apparatus that can enable one person to carry out a screeding operation and the creation of expansion joints in a large area of concrete.

[0005] According to the present invention there is provided a self-propelled screed working apparatus as claimed in claim 1.

[0006] In one embodiment, said screeding means comprises a first elongate beam mounted on a first end of the apparatus, more preferably on a forward end in the normal direction of travel of the apparatus. Preferably the first elongate beam is mounted on said first end of the apparatus in cantilever manner at the end of one or more lever arms extending from the apparatus perpendicular to said first elongate beam.

[0007] Preferably the first elongate beam defining the screeding means is provided with vibrating means for vibrating the first elongate beam. The elongate beam may be provided with, or at least a portion thereof may be replaced by, one or more rollers or roller sections or other means for rolling and/or forming a desired pattern on at least a portion of the surface over which the apparatus is traversed.

[0008] A raking means may be provided comprising a second elongate beam or member having teeth or serrations along at least one elongate side or edge thereof, said second elongate beam being mounted on the apparatus to extend transverse to the normal direction of travel of the apparatus, The first elongate beam comprising the screeding means may be detachable such that the first elongate beam may be replaced by the second elongate beam comprising the raking means or by an alternative interchangeable beam adapted for working a particular material. Alternatively the raking means may be mounted on a second end of the apparatus, opposite said first end, more preferably at a rear end of the apparatus in the normal direction of travel of the apparatus.

[0009] Preferably the expansion joint creating means comprises an elongate blade or member extending transverse to the normal direction of travel of the apparatus, said elongate blade being mounted on the apparatus to be moveable between a raised position, wherein the blade is located clear of a surface over which the apparatus travels, and a lowered position, wherein the blade is adapted to contact and enter said surface to form an expansion joint therein. The expansion joint creating means may be adapted to place a footing into the expansion joint formed thereby.

[0010] In one embodiment, the screeding means and expansion joint creating means may be mounted on a support frame pivotally mounted upon said apparatus about a central pivot axis extending transverse to the normal direction of travel of the apparatus, said first elongate beam defining said screeding means being mounted at a first distal end of said support frame at said first end of the apparatus and said second elongate beam defining said raking means and said expansion joint creating means being mounted at a second distal end of said support frame, on an opposite side of said central axis to said first distal end, at said second end of the apparatus. Alternatively both the screeding means and the expansion joint creating means may be mounted on a forward end of a support frame pivotally mounted on the apparatus about a pivot axis extending transverse to the normal direction of travel of the apparatus.

[0011] A first actuating means may be provided for pivoting the support frame about said central pivot axis. In one embodiment, said actuating means may be operative to pivot the support frame between a first position, wherein said first elongate beam defining said screeding means is in a lowered operative position to engage a surface over which the apparatus travels and wherein said second elongate beam defining said raking means and expansion joint creating means is in a raised inoperative position, and a second position, wherein said first elongate beam defining said screeding means is in a raised inoperative position and said second elongate beam defining said raking and expansion joint creating means is in a lowered operative position to engage a surface over which the apparatus travels.

[0012] In one embodiment, a second actuating means may be provided for selectively rotating said second elongate beam about said axis of rotation thereof between a raking configuration, wherein said first elongate side or edge provided with said teeth or serrations faces downwardly, and an expansion joint creating configuration, wherein said second elongate side or edge faces downwardly.

[0013] Preferably said first actuating means and/or

said second actuating means comprise one or more hydraulic or pneumatic rams.

[0014] The apparatus may include a motor, such as an internal combustion engine or electric motor, for propelling said apparatus. Said motor may be drivingly connected to a pump or compressor for powering said/or first and second actuating means. Said motor may be adapted to vibrate said first elongate beam during a screeding operation.

[0015] Preferably said ground engaging wheels or tracks are mounted on either side of a chassis to be locatable on either side of an area of ground to be worked. Preferably a first portion of said chassis supporting one or more first ground engaging wheels or tracks on a first side of the chassis is extendable with respect to a second portion of the chassis supporting one or more second wheels or tracks on a second side of the chassis, such that the spacing between said one or more first wheels or tracks and said one or more second wheels or tracks can be varied, whereby the distance between the first and second wheels or tracks can be adjusted such that the apparatus can be adapted to traverse areas of ground of different widths. In one embodiment, the distance between said one or more first wheels or tracks and said one or more second wheels or tracks is adjustable between 2 metres and 6 metres, more preferably between 2.5 metres and 5,5 metres.

[0016] Preferably at least two wheels are provided on each of said first and second sides of the chassis. Preferably the ground engaging wheels are mounted on suspension means, such as floating axles, to enable the apparatus to traverse uneven or rough terrain.

[0017] Preferably the apparatus comprises a least one steerable wheel. Alternatively, the apparatus may be steerable by selectively braking one or more of the wheels or tracks on a respective side of the apparatus (i.e. skid steering).

[0018] Preferably the apparatus includes at least one seat for carrying an operator thereon. Alternatively, the apparatus may be operated remotely, via wired or wireless remote control means.

[0019] A height control means may be provided on the screeding means for determining and/or controlling the height of the first elongate beam. Such height control means may include a laser device for determining the height of the first elongate beam.

[0020] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of a screed working apparatus according to a first embodiment of the present invention;

Fig. 2 is a front view of a screed working apparatus according to a further embodiment of the present invention;

Fig. 3 is a plan view of the apparatus of Fig. 2; and

Fig. 4 is a side view of the apparatus of Fig. 2.

[0021] As illustrated in Fig. 1, a screed working apparatus 1 according to a first embodiment of the present invention comprises an elongate chassis 2 having a pair of ground engaging wheels 4,6 at each end region of the chassis 2 defining each side of the apparatus 1. A motor 8, such as a petrol or diesel engine, is mounted on the chassis 2 for driving at least one of the wheels 4,6, more preferably drivingly connected to each wheel. Alternatively the wheels may be driven by an electric motor. At least one wheel 4,6 on each side of the apparatus 1 may be steerable. All four wheels may be steerable to provide greater manoeuvrability. Alternatively, the apparatus may be steerable by selectively braking the wheels (or tracks) on each side of the apparatus 1 in a skid steer manner.

[0022] Each wheel 4,6 is mounted on a suspension arm 10 to be fully floating to enable the apparatus to traverse rough or uneven terrain. In an alternative embodiment (not shown) tracked wheels may be provided on each side of the apparatus. Trailing rake means may be provided behind each set of wheels or tracks to rake over any tracks left by the wheels or tracks (as shown in the embodiment illustrated in Figures 2 to 4).

[0023] In the embodiment shown in Figure 1, a support frame 20 is pivotally mounted on the chassis 2, said support frame supporting a screeding means, in the form of an elongate beam 30, at a front end of the apparatus, and a raking means, in the form of an elongate blade 40, at a rear end of the apparatus.

[0024] The elongate beam 30 and/or the elongate blade 40 may be detachably mounted upon the support frame 20 such that a number of different interchangeable beams and/or blades can be provided that can be selectively attached to the apparatus to allow the apparatus to work a number of different materials. For example, one beam may be provided for working concrete, a second beam may be provided for working tar (the second beam having heating means, such as burner nozzles, provided thereon) and a third beam may be provided having a raking edge for raking and/or levelling soil.

[0025] The support frame 20 is pivotally mounted on the chassis 2 to tilt about a central pivot axis extending transverse to the normal direction of travel of the apparatus to be pivotally moveable about said central pivot axis by means of hydraulic rams 22, between a first position, wherein the elongate beam 30 is brought into an operative configuration to be in contact with a surface over which the apparatus traverses, said elongate blade 40 being held in a raised inoperative configuration, and a second position, wherein said elongate blade 40 is brought into an operative configuration to be in contact with said surface over which the apparatus traverses, said elongate beam 30 being held in a raised inoperative configuration.

[0026] The pivot axis of the support frame 20 acts as a fulcrum about which the support frame 20 tilts.

[0027] The elongate blade 40 may be mounted to be rotatable about an elongate axis thereof, for example by

means of a linear or rotary actuator, such as a double acting ram, between a first configuration, wherein a first edge 42 faces downwardly, said first edge 42 being provided with a plurality of teeth or serrations 44, to define a rake configuration, and a second configuration, wherein a second edge 46, defining a cutting blade, faces downwardly to define an expansion joint forming configuration wherein said cutting blade 46 can be pushed into the concrete surface by movement of the support frame 20 to form an expansion joint in the concrete. The blade 40 may be adapted to detachably support a plastic or wooden footing thereon such that the footing can be inserted into an expansion joint as the expansion joint is created by the blade 40. Releasable fastening means, such as clips, may be provided on the blade for temporarily securing the footing to the blade 40.

[0028] The elongate beam 30 defining the screeding means is preferably provided with or connected to a vibration generating means for vibrating the beam 30. The vibration generating means may comprise the motor 8 and/or an eccentric rotor.

[0029] A seat and/or cab may be provided on the chassis 2 to enable an operator to ride on the apparatus 1. Alternatively, the apparatus may be operated by wireless or wired remote control.

[0030] In use, the apparatus 1 is positioned over an area of ground to be levelled or screeded, with the wheels 4,6 of the chassis 2 on either side of a pair of timber guides 50, such that the chassis 2 extends over the area to be screeded. Concrete is poured into the space between the timber guides 50 and may be first raked by tilting the support frame 20 to bring the elongate blade 40 into its lowered operative position with the blade 40 rotated to its rake configuration, with the toothed or serrated edge 42 facing downwardly, and traversing the apparatus over the concrete to rake off excess material.

[0031] Next the support frame 20 can be tilted to raise the elongate blade 40 and lower the elongate beam 30 of the screeding means to its lowered operative position whereby the vibrating beam 30 can be traversed over the surface of the concrete, with the beam 30 in contact with the timber guides 50, to compact and level the concrete.

[0032] If desired, an expansion joint can be created in the concrete by stopping the apparatus 1 and rotating the elongate blade 40 so that the cutting edge 46 faces downwardly and tilting the support frame 20 to move the blade 40 into contact with and into the concrete at a desired location.

[0033] To enable the apparatus 1 to be adapted for use on concrete areas of different widths, the chassis is preferably adapted to telescopically extendable whereby the spacing between the wheels 4,6 on either end of the chassis can be adjusted to vary the width or track between the wheels 4,6. Typically the track between the wheels 4,6, may be adjustable between around 2.5 metres and around 5.5 metres. Hydraulic rams may be provided for varying the width between the wheels 4,6. Lifting jacks may be provided for lifting the wheels 4,6 clear of the ground to permit the width between the wheels to be adjusted.

[0034] Additional transport wheels may be provided on the apparatus adapted to be moved between a raised or retracted position and a ground engaging position to lift the main wheels 4,6 out of contact with the ground, the transport wheels being oriented or orientable transverse to the main wheels 4,6 such that the apparatus can be towed in a direction parallel to the elongate beam 40 for transportation between sites. The transport wheels may be mounted on the lifting jacks.

[0035] To avoid the need for timber guides, height determining means may be provided for determining and controlling the height of the elongate beam 30 when in its lowered operative position. For example, laser means may be provided on at least one end of the beam for determining the height of the beam 30. Similar height determining means may be associated with the elongate blade 40 on the opposite end of the apparatus.

[0036] A second embodiment of the present invention is illustrated in Figures 2 to 4. The second embodiment is similar to the first and therefore identical reference numerals will be used for similar features, although the rear mounted rake has been omitted and an expansion joint creating blade 40 is reciprocally mounted adjacent and parallel to the elongate beam 30 of the screeding means on the front of the chassis 2.

[0037] As with the first embodiment, the second embodiment of the invention illustrated in Figures 2 to 4 comprises an apparatus 1 comprising an elongate chassis 2 having pairs of ground engaging wheels 4,6 at each end region of the chassis 2 defining each side of the apparatus 1. A motor 8, such as a petrol or diesel engine, is mounted on the chassis 2 for driving at least one of the wheels 4,6, more preferably drivingly connected to each wheel. The motor includes a pump for pressurising a hydraulic tank 9 for driving the various rams and actuators of the apparatus 1. Alternatively the wheels may be driven by an electric motor. Again, at least one or both wheels 4,6 on each side of the apparatus 1 may be steerable. All four wheels may be steerable to provide greater manoeuvrability. Alternatively, the apparatus may be steerable by selectively braking the wheels (or tracks) on each side of the apparatus 1 in a skid steer manner.

[0038] Detachable track filling rakes 34,36 are mounted on the apparatus 1 behind each set of wheels for smoothing over any tracks left by the wheels.

[0039] The screeding beam 30 is detachably mounted on support arms 20 pivotally mounted on the chassis 2 to allow the screeding beam to be raised and lowered by means of suitable hydraulic rams or other linear actuators 22. A number of interchangeable beams 30 may be provided, each being selectively attachable to the support arms 22 to adapt the apparatus for levelling or screeding different materials. The beam 30 shown in Figures 2 to 4 is suitable for levelling tar, being provided with a plurality of burner nozzles 32 on a forward side of the beam, each

nozzle 32 being connected to a gas supply mounted on the apparatus 1 to allow heat to be applied to the surface directly in front of the beam 30. An alternative beam 30 may be provided for screeding concrete, said alternative beam not being provided with such nozzles which would otherwise become clogged with concrete. A further beam 30 may be provided defining a rake means for raking and levelling soil.

[0040] An expansion joint creating blade 40 is mounted on the support arms 20 parallel to, adjacent and behind the elongate beam 30, the blade 40 being mounted to the support arms 22 or chassis 2 via linear actuators, such as double acting hydraulic rams 42, for driving the blade into and out of the surface to create an expansion joint therein. The upper edge of the blade may comprise a laterally extending lip for supporting an upper end of a footing against the blade, fastening clips (not shown) being provided for securing a footing to one side of the side of the blade 40, such that the blade can be used to insert a footing into wet concrete at the same time as an expansion joint is created. Once the footing has been inserted, the clips can be released and the blade 40 retracted to withdraw the blade from the concrete while leaving the footing in place in the expansion joint.

[0041] As with the first embodiment, to enable the apparatus 1 to be adapted for use on concrete areas of different widths, the chassis 2 comprises telescopic members 3 adapted to be telescopically extendable whereby the spacing between the wheels 4,6 on either end of the chassis can be adjusted to vary the width or track between the wheels 4,6. Typically the track between the wheels 4,6, may be adjustable between around 2.5 metres and around 5.5 metres. Hydraulic rams may be provided for varying the width between the wheels 4,6. Lifting jacks 6 are provided for lifting the wheels 4,6 clear of the ground to permit the width between the wheels to be adjusted.

[0042] An operator's seat 60 is mounted on the apparatus and hand 62 and foot 64 controls are provided to allow an operator to control the apparatus 1.

[0043] The invention is not limited to the embodiments described herein but can be amended or modified without departing from the scope of the present invention. For example, while in the first embodiment the screeding means and the raking means/expansion joint creating means are mounted on opposite ends of a common tilting support frame, it is envisaged that they may be independently mounted on respective independently tilting support frames. Furthermore, it is envisaged that the raking means and/or the expansion joint creating means may be provided on one side of the elongate beam defining the screeding means, said elongate beam being rotatable about an elongate axis thereof to move the raking means and/or the expansion joint creating means between operative and inoperative configurations.

[0044] Ground engaging rollers may be provided on the apparatus for forming a textured or patterned surface on the material over which the apparatus is traversed. Such rollers may be mounted on the elongate beam 30 or may be provided on a separate interchangeable beam adapted to be mounted in place of the existing screeding beam 30.

Claims

1. A self-propelled screed working apparatus comprising a plurality of ground engaging wheels or tracks, propulsion means for moving the apparatus over a surface, screeding means for spreading and/or smoothing loose or plastic material, such as uncured concrete, and expansion joint creating means, wherein said screeding means comprises a first elongate beam mounted on the apparatus to extend transverse to the normal direction of movement of the apparatus.

2. An apparatus as claimed in claim 1, wherein said screeding means is mounted on a first end of the apparatus, more preferably on a forward end in the normal direction of travel of the apparatus, in cantilever manner at the end of one or more lever arms extending from the apparatus substantially perpendicular to said first elongate beam.

3. An apparatus as claimed in any preceding claim, wherein the first elongate beam defining the screeding means is provided with vibrating means for vibrating the first elongate beam.

4. An apparatus as claimed in any preceding claim, wherein the first elongate beam is provided with outlets connected to a source of a heated fluid or, such as steam, or to a combustible gas, for heating a surface over which the apparatus moves to allow the apparatus to be used for laying tar.

5. An apparatus as claimed in any preceding claim, wherein said first elongate beam is detachably mounted upon the apparatus whereby the screeding means can be selected from a plurality of different interchangeable beams, each beam being adapted for spreading and/or smoothing or otherwise working a specific material, such that the apparatus can be adapted for working a plurality of different materials.

6. An apparatus as claimed in claim 5, wherein said screeding means can be selected from one or more of a first beam for screeding concrete, a second beam having gas nozzles for laying tar and a third beam comprising a raking edge for raking soil and a fourth beam provided with one or more rollers for rolling a surface and/or for creating a desired pattern or surface finish.

7. An apparatus as claimed in any preceding claim,

wherein the expansion joint creating means comprises an elongate blade or member extending transverse to the normal direction of travel of the apparatus, said elongate blade being mounted on the apparatus to be moveable between a raised position, wherein the blade is located clear of a surface over which the apparatus travels, and a lowered position, wherein the blade is adapted to contact and enter said surface to form an expansion joint therein.

8. An apparatus as claimed in claim 7, wherein said expansion joint creating means is adapted to insert a footing beam into the expansion joint.

9. An apparatus as claimed in any preceding claim, further comprising a motor, such as an internal combustion engine or electric motor, for propelling said apparatus and/or for powering a compressor for driving one or more lifting means and/or for vibrating said screeding means.

10. An apparatus as claimed in any preceding claim, wherein the width of the apparatus is adjustable by varying the distance between the ground engaging wheels or tracks on either side of the apparatus.

11. An apparatus as claimed in claim 10, wherein lifting means are provided for lifting the ground engaging wheels or tracks out of contact with the surface to allow the distance between the ground engaging wheels or tracks to be adjusted.

12. An apparatus as claimed in any preceding claim, wherein a height control means is provided on the screeding means for determining and/or controlling the height of the first elongate beam.

13. An apparatus as claimed in claim 12, wherein said height control means comprises a laser device for determining the height of the first elongate beam.

14. An apparatus as claimed in any preceding claim, wherein said first elongate beam may be provided with, or at least a portion of the beam may be replaced by, one or more rollers or roller sections or other means for rolling and/or forming a desired pattern on at least a portion of the surface over which the apparatus is traversed.

15. An apparatus as claimed in any preceding claim, wherein transport wheels are provided rotatable about an axis extending substantially perpendicular to the rotational axis of the ground engaging wheels or tracks, said transport wheel being moveable between a retracted position, wherein the transport wheels are out of contact with the ground, and an operative transport position, wherein the apparatus is at least partially supported on the transport wheels to allow the apparatus to be moved in a direction substantially parallel to the first elongate beam.

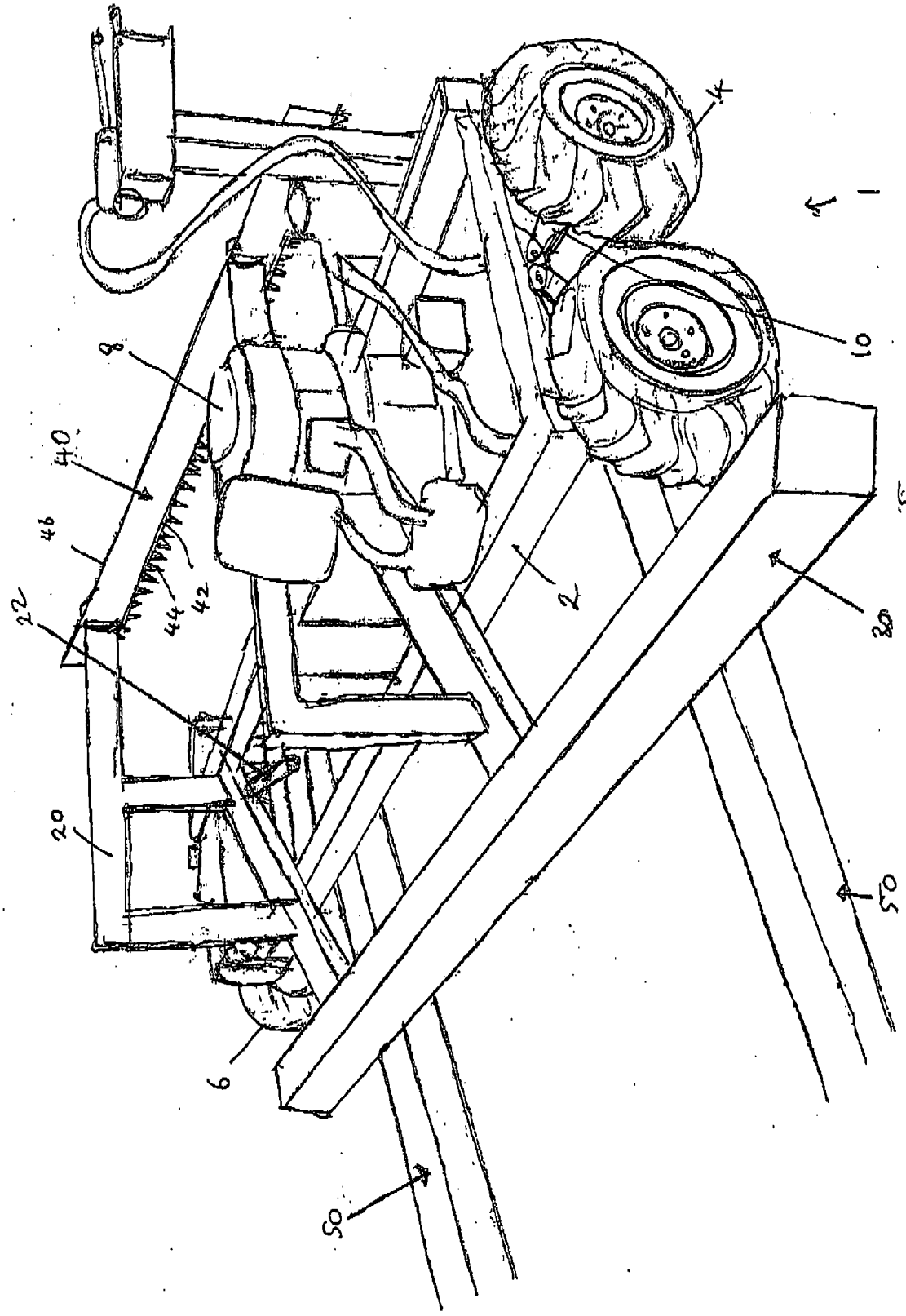

Fig. 1

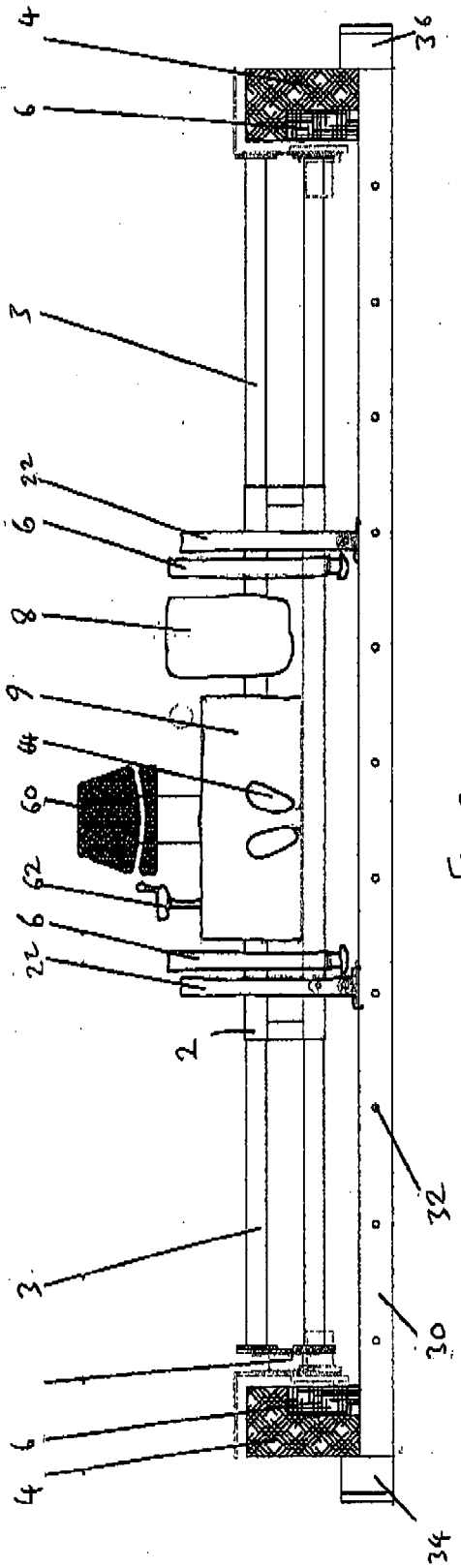
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Fig. 2

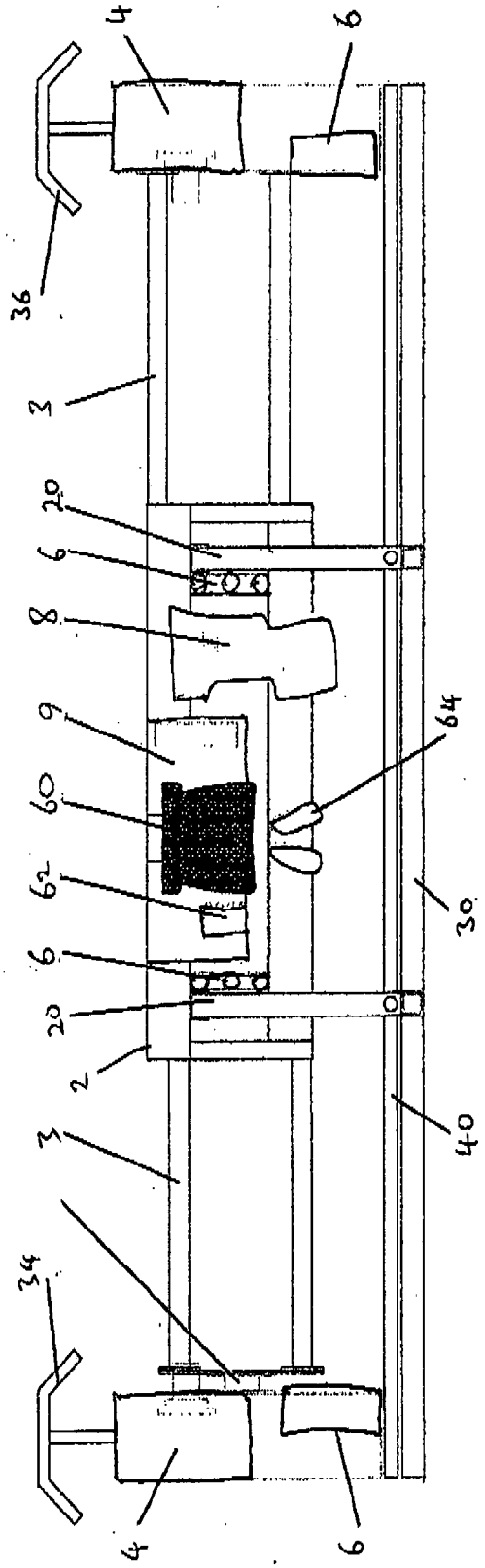
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Fig. 3

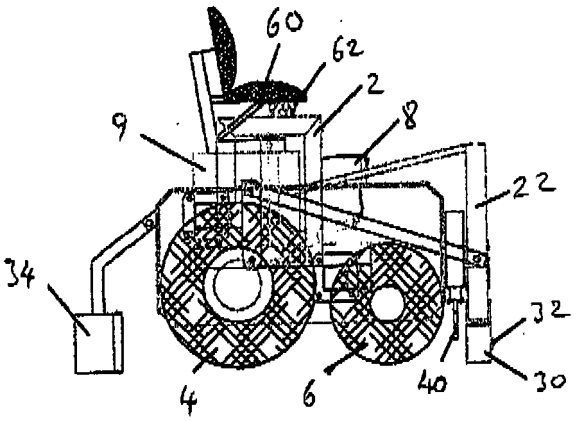

Fig. 4