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### (54) **A MOBILE FLOOR GRINDING VEHICLE**

VERFAHRBARE BODENSCHLEIFMASCHINE

VEHICULE MOBILE DE MEULAGE DE SURFACE

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## Description

The present invention relates to vehicles for grinding floors to a predetermined contour, for example, in order to produce a substantially perfect flat surface on a concrete floor.

## BACKGROUND OF THE INVENTION

The achievement of a perfect flat surface on a concrete floor is particularly important in large industrial buildings such as warehouses, where flatness is required to enable forklift trucks to pass safely and efficiently over the floor, remaining perfectly level even when heavily loaded. It is also often necessary to provide an accurately flat floor on which to attach heavy machine tools. In addition, where goods are to be stacked, the floor must be substantially perfectly level to avoid any danger of a stack toppling.

At the present time, the required flatness has typically been produced by manual techniques which, while producing the results desired, nevertheless are laborious, labour intensive and time consuming and, therefore, costly.

As far as levelling machines are concerned FR-A-2 270 380 discloses such a device for use in road construction including a levelling tool, the height of which is controlled in relation to the supporting surface by means responsive to signals emanating from sensors which detect deviations above and below a reference plane defined by a laser beam. The levelling tool is typically in the form of a single blade mounted to the machine body at each respective end of the blade by means of adjustable jacks. Consequently, in operation the device serves to level an area the width of the blade, driven by means of the forward motion of the machine.

## SUMMARY OF THE INVENTION

It is an object of the invention to overcome the disadvantages of the prior art and to provide a mechanised means for grinding floors to a predetermined contour.

According to the invention there is provided a mobile floor grinding vehicle comprising a vehicle body movable in a predetermined direction of travel over a floor, characterised by a pair of grinding tools supported by the body and placed at a spacing between them on either side of a central longitudinal axis of the body, means for varying the spacing between the tools, drive means for driving the grinding tools to grind the floor to a desired contour, and control means for controlling the grinding depth of each grinding tool with respect to the floor in response to predetermined signals representative of said desired contour.

Preferably two support arms each carrying a grinding tool are mounted at either side of the vehicle body so as to swing outwardly with respect thereto in order to provide an adjustable transverse spacing between the grinding tools.

Alternatively, each grinding tool may be mounted on a transverse beam, preferably provided with lengthwise adjustability, again so that the transverse position of the grinding tools can be accurately set.

The vehicle is preferably self-propelled, for example by means of electric, hydraulic or diesel traction motors. Electrical power may be obtained from batteries carried by the vehicle.

The control means may be responsive to a signal representing a single predetermined datum level. A typical example is a horizontal laser beam from a fixed external source, detected by a sensor on the vehicle which transmits appropriate signals to the control means to regulate the height of the grinding tools in relation to the datum level.

Alternatively, and preferably in addition, the vehicle includes a computer which is pre-programmable to control the control means in accordance with a predetermined pattern, eg, in accordance with data representing the initial contours of the floor and its desired final contours. In the latter case, the vehicle is self-propelled, and the computer is linked to the propulsion means of the vehicle so as to control the vertical position of the grinding heads in such a way as to compensate for variations in the initial contours and thereby grind the floor to the required degree of flatness.

## BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention will now be described, by way of example only and with reference to the accompanying drawings, in which;

Fig 1 is a diagram illustrating, in notional elevation, principal component parts of the vehicle in a first embodiment;

Fig 2 is a general outside view of the same vehicle;

Fig 3 shows its propulsion and steering means;

Fig 4 shows, greatly simplified, main structural elements of the same vehicle;

Fig 5 shows how grinding heads are mounted on the vehicle of Figs 1 to 4;

Fig 6 is a simplified cross sectional elevation through a grinding head;

Fig 7 is an outside elevation of a small part of the grinding head as seen from the left-hand side of Fig 6;

Figs 8 and 9 are diagrammatic views, in plan and elevation respectively, showing parts of a mobile floor grinding vehicle in a second embodiment;

Fig 10 is a plan view in diagrammatic form of a mobile floor grinding vehicle according to a still further embodiment of the invention;

Fig 11 shows, in diagrammatic form, an elevation view of the vehicle of Fig 10; and

Fig 12 is a section through the grinding head of the embodiment shown in Figs 10 and 11.

#### PREFERRED EMBODIMENTS OF THE INVENTION

Referring to Fig 1, a mobile floor grinding vehicle comprises a body indicated in phantom lines at 1, carried by wheels 2 on which it is movable over a floor 3. At least one rigid, transverse support beam 4 is supported rigidly by the body 1 and is movable vertically in the latter as indicated by the arrow 5. This movement is effected by any suitable means, for example a hydraulic piston and cylinder actuator 6.

The beam 4 defines a vertical plane 7, and is mounted for limited rotation on the body 1 about a horizontal transverse axis 8 in the plane 7. This rotation is effected by any suitable means, for example by gravity or by a rotary actuator, which is indicated at 9 and which is controlled by a level sensor 10 in such a way as to maintain the plane 7 of the beam 4 vertical at all times. The reason for this will be apparent later.

A grinding head 11 is secured rigidly to the beam 4 so that its attitude and vertical position faithfully follow those of the beam 4. The head 11 includes a casing 12 to which a drive motor 13 is securely fastened.

A rotary floor grinding wheel 14, of any suitable type, within the casing 12, is driven through a shaft 15 by the motor 13, its axis of rotation 16 being contained in or parallel to the plane 7.

The vehicle includes control means for the vertical movement of the beam 4 in response to predetermined input signals to control the vertical position of the grinding wheel 14 as the vehicle is propelled over the floor 3, by any suitable propulsion means 17 driving a pair of the wheels 2.

The control means comprise a hydraulic control unit 18 which controls the actuator 6. The vehicle has two different systems for supplying the above-mentioned input signals to the control unit 18. The first of these comprises a laser beam sensor 19 which detects a horizontal beam 20 transmitted from a laser fixed in a suitable position up to, for example, about 300 metres from the vehicle.

The beam 20 defines a predetermined datum level, and given that the floor 3 is initially undulating, then as the vehicle travels over the floor the horizontal level of the beam 20 with respect to the sensor 19 will vary. This variation produces, in any known manner, a varying input signal to the unit 18 which operates the actuator 6 in such a way that the head 11, and therefore the grinding wheel 14, remains at a constant vertical distance from the laser beam 20.

The other system for energising the unit 18 essentially comprises a computer 21, which is linked with the propulsion means 17 so as to provide input signals to the unit 18 that vary in accordance with the initial contours of the floor, preprogrammed into the computer. This pre-programming can be carried out in any known manner, for example by the use of the plotting device known as a PROFILERGRAPH. The signals supplied by the computer 21 represent an analogue of the contours plotted by this device, the computer detecting the progress of the vehicle as it retraces the path previously followed by the plotting device.

The embodiment shown in Figs 2 to 7 has two grinding heads 11, one on either side of the vehicle and carried by a telescopic, rigid, transverse beams 22 which incorporates the two corresponding beams 4, adjustable for transverse spacing so as to position the grinding wheels 14 at any desired track width. Associated with each head 11 is a separate sensor 19 and associated means for controlling the vertical position of the grinding wheels 14, eg control unit 18 (in this case a hydraulic piston), and actuator 6.

The body 1 includes a chassis 23 supported on the wheels 2, the front pair of which are idle and steerable by a conventional steering linkage 24, while the rear wheels 2 are driven by independent electric motors 17. The chassis 23 carries a cockpit 25 for the operator, with electric batteries, for supplying power to the motors 17 and the control equipment, being mounted behind the cockpit. The level sensor 10 is mounted on top of the telescopic beam 22. The latter is supported rigidly, by means not shown, on a rigid longitudinal main support beam 26 of the chassis. It should be noted that the track width between the two rear wheels is in this example narrow enough to keep them out of the path of the grinding wheels 14.

The hydraulic motor 13 of each grinding head 30 may be in line with the grinding wheel axis 9, or offset from it so as to drive the grinding wheel through a belt drive 27, Fig 5. Each grinding head casing 12 contains a vacuum dust removal head 28, mounted behind the grinding wheel 14, the direction of travel being indicated at 29 in Fig 6. A rubber dust skirt 30 extends around the bottom casing 12 in contact with the floor, being carried on studs 31 fixed to the casing 12, and freely movable up and down by means of slots 32 by which it is supported on the studs 31.

The embodiment just described is arranged to grind a pair of parallel tracks, accurately levelled, in a floor. There may, however, be any number of grinding heads, and they may be so arranged that they together grind the floor over the whole width of the vehicle, so that an entire floor surface can eventually be levelled. It will be understood that the grinding heads can take any suitable form. As shown, each grinding wheel 16 has diamond grinding rings 33, the casing 12 being effectively sealed and having, besides the features mentioned above, an inlet 34 for water under pressure. In Fig 6, the piston of the asso-

ciated actuator 6 is indicated at 35, being securely bolted to the top of the casing 12.

It will be understood that as the vehicle pitches longitudinally or tilts sideways as its wheels 2 pass over the undulating floor surface, the sensor 10 maintains the grinding wheel axes 16 vertical at all times.

Referring now to Figs 8 and 9, the vehicle of which some parts are shown here differs from that described above mainly in that, instead of being carried by the transverse telescopic beam, each grinding head 11 is carried on the free end of a corresponding rigid support arm 36, which is supported on the vehicle chassis 23, by means of a pivot having a pivotal axis 37. The pivotal axes 37 of the arms 36 lie on a common transverse axis 38 with respect to the longitudinal axis 39 of the chassis 23.

Pivoting of each arm 36 is controlled by a cylinder-type actuator 40 mounted transversely on the chassis 23.

Fig 8 shows one support arm 36 and head 11 on each side of the chassis 23, illustrated both in their parked position with the beam parallel with the chassis, and in a swung out position. The head 11 is operative in all beam positions.

The chassis 23 may be arranged with further grinding heads 11, each with its own support arm 36 and actuator 40, mounted in front of and/or behind those shown. Any support arm 36 can be arranged to swing inwards as well as (or instead of) outwards. Each support arm 36 can be arranged to carry more than one head 11. The equipment carried by each support arm 36, to raise and lower the grinding heads 11 is generally the same in construction and operation as that carried by a support beam 4 in Figs 1 to 7, eg cylinder actuator 6 operating to reciprocate the head 11 in response to signals received from the control unit 18.

The embodiment of Figs 8 and 9, by contrast with the previous embodiment, has front traction wheels 41 as the driving wheels, with the rear wheels 2 being steerable by a conventional steering mechanism, not shown. A liquid petroleum gas (LPG) combustion engine, not shown, supplies hydraulic power to hydraulic traction motors 42 driving the wheels 41, and also to the control equipment of the grinding heads 11. It will, however, be understood that, in any embodiment, either the front or the rear wheels may be steerable; and that in any embodiment traction may be electric or hydraulic.

A further embodiment of the invention is shown in Figs 10 to 12. In this embodiment, those component parts which are the same as in previous embodiments will have the same reference numbers.

This further embodiment comprises a chassis 43 formed of two rigidly spaced beams 44 provided with front driving wheels 45 and steerable trailing wheels 46. The front wheels 45 are mounted on a drive axle 47 rotatably mounted between the rigid beams 44 of the chassis 43. The drive wheels 45 are more closely spaced with respect to the central axis A of the chassis 43 than the

rear wheels 46 and less than the track width to be ground by the grinding wheels 14 of the grinding heads 11.

The rear wheels 46 are provided to steer the vehicle and to this end are rotatably mounted on stub axles 48 projecting from the chassis beams 44.

A connecting rod 49 is pivotally mounted between two pivoting arms 50, 51, both of which are pivotally mounted to a pivot 52 on the stub axles 48. The arm 51 extends to the other side of its associated stub axle 48 and is connected to the piston rod 53 of a piston 54 pivotally mounted at 55 to a rigid strut 56 fixed between the two beams 44. As will be appreciated hydraulic actuation of the piston 54 through the steering mechanism of the vehicle, not shown in detail, causes the wheels 46 to pivot on the stub axles 48 thus enabling the vehicle to be steered over the ground.

Power to drive the vehicle is supplied to the front wheels 47 by means of a hydraulic motor 56 acting on drive gear 57 coupled to the wheels 45 through a drive coupling 58.

In this embodiment the support arms 36, see Fig 10, are pivotally mounted on rigid support pieces 59 which project from the chassis beams 44. In this way the support arms 36 are able to be brought into abutment with the beams 44 in their parked position as shown in dotted outline in Fig 10.

The support arms 36 are pivotally movable between the said parked position and a maximum swung-out position as shown in full outline in Fig 10. As in the Figs 8 and 9 embodiment, the pivotal axes of the arms 36 on the support pieces 59 lie on a common transverse axis 38 with respect to the longitudinal axis A of the chassis 43.

Actuation of the support arms 36 is effected by means of a hydraulic piston 60 mounted on the chassis 43 such that the rod 62 thereof operates along the longitudinal central axes of the chassis 43. The piston 60 acts on two control arms 61 of equal length pivotally mounted at one end of each thereof to the end of the rod 62 of the piston 60 and at the other ends respectively to the rigid support arms 36 at equal distances from the respective pivot points on the support pieces 59.

By means of this symmetrical arrangement, the arms 36 may be moved outwardly upon actuation of the piston 60 by equal amounts at the same rate of travel such that the grinding heads 11 may be positioned to effect a grinding operation at equal distances from the longitudinal central axis A of the chassis 43.

As with the Figs 8 and 9 embodiment, the grinding heads 11, see Fig 12, are formed of a box structure having an inner box part 63 carrying the grinding wheel 14 and connected to the rod 64 of a piston 65 the cylinder of which is attached to an outer box part 66 of the box structure, and within which the inner box part 63 is able to reciprocate upon actuation of the piston 65.

The top of the piston rod 64 carries the laser responsive receiver 19, adjustably mounted thereon, signals from which caused by variations of movement with respect to laser beam 20 are used to actuate the piston

65 through a control unit of the type 18 described with reference to Figs 1 to 7.

Each grinding wheel 14, see Fig 12, is mounted to a drive plate 67 connected to a drive shaft 68. The drive shaft 68 revolves in a bearing 70 attached to a bottom wall 69 of the inner box part 63 and is driven by means of a drive motor 71.

With reference now to Fig 11, the vehicle is provided with a forward cockpit area 72 having a drivers seat 73 suitable positioned therein. A steering wheel 74 is provided in the cockpit 72 hydraulically coupled to the piston 54 operating the rear wheels 46 by suitable means, not shown, for steering the vehicle.

The vehicle is provided with a power pack in the form of a diesel engine 75 coupled to a hydraulic pump 76 which powers the hydraulics of the system through a controllable valving arrangement, not shown, such as the hydraulic motor 56, and pistons 54, 60 and 65, and thus travel of the vehicle, steering, position of support arms 36, and height adjustment of the grinding heads 11 respectively. All these operations may be effected from the cockpit 72 using control equipment of conventional design and familiar to one skilled in the art. The speed of the vehicle is controlled by accelerator pedal 77, coupled to the engine 75.

To the rear of the vehicle is mounted a diesel fuel tank 78 and a hydraulic oil storage tank 79.

To maintain the grinding area clear of ground dust and other debris, clean water is fed from an external source (not shown) to a water reservoir 80 above the grinding wheels 14, see Fig 12. The clean water is delivered to the grinding area as required via water outlets 81. Dirty water and debris may be withdrawn from the grinding area to a dirty water collection tank (not shown) by means of a line connector 82. The dirty water collection tank is caused to function using a vacuum unit 83 mounted adjacent to the engine 75 and operated thereby. The action of removing dirty water from the grinding area is assisted by means of a rubber squeegee device 84 arranged around the grinding head, shown more particularly in Fig 12.

## Claims

1. A mobile floor grinding vehicle comprising a vehicle body (1) movable in a predetermined direction of travel over a floor (3), characterised by a pair of grinding tools (11) supported by the body and placed at a spacing between them on either side of a central longitudinal axis of the body (1), means for varying the spacing between the tools, drive means (13) for driving the grinding tools to grind the floor (3) to a desired contour, and control means (18, 6) for controlling the grinding depth of each grinding tool with respect to the floor in response to predetermined signals representative of said desired contour.
2. A vehicle as claimed in claim 1 wherein a rigid support arm (36) is pivotally mounted to each side of

said vehicle body (1), a said grinding tool (11) being mounted at the free end of each said pivotal arms (36), and means (40/60, 61, 62) coupled to the support arms for operating the support arms (36) to position the grinding tools (11) in respective grinding positions on the floor (3), so that a pair of parallel tracks may be formed in the floor (3) by said grinding tools (11) to a said desired contour.

3. A vehicle as claimed in claim 2 wherein said operating means (40/60, 61, 62) includes an actuating mechanism (60, 61, 62) mounted between said support arms (36) for separating said arms (36) at an equal rate such that the grinding tools (11) may be positioned at equal distances to either side of said central longitudinal axis of the vehicle (1).
4. A vehicle as claimed in claim 3 wherein said actuating mechanism (60, 61, 62) comprises a pair of connecting rods (61) of equal length pivotally connected together at one end of each thereof and each to a respective one of said support arms (36) at an equal distance from the pivot points of the support arms (36) which pivot points lie on a common transverse axis with respect to said central longitudinal axis of the vehicle (1), and means (60, 62) mounted on said vehicle body (1) for moving the pivotally connected ends of said rods (61) along said central longitudinal axis of said vehicle (1).
5. A vehicle as claimed in claim 4 wherein said moving means (60, 62) is a hydraulically operable piston (60, 62).
6. A vehicle as claimed in any one of claims 2 to 5 wherein a said grinding tool (11) is mounted for reciprocating movement in a housing (63) at the end of each of said pivotal arms (36) whereby in response to said predetermined signals the grinding tools (11) may be maintained at a grinding depth corresponding to a said desired contour to be ground in the floor (3).
7. A vehicle as claimed in claim 1 wherein each grinding tool (11) is mounted on a transverse beam (4, 22) mounted for reciprocating movement on the vehicle body (1) by said control means (18) so as to vary the position of the grinding tools (11) with respect to the floor (3) to be ground.
8. A vehicle as claimed in claim 7 wherein said transverse beam (4, 22) is telescopic thereby to vary the transverse distance or spacing between the grinding tools (11) mounted thereon.
9. A vehicle as claimed in claim 8 wherein said transverse beam (4, 22) is mounted for limited rotatable movement about a horizontal axis, and level sensor means (10) attached to the beam (4, 22) whereby to

maintain the beam (4, 22) at a desired rotational position.

10. A vehicle as claimed in any preceding claim wherein said predetermined signals are provided by an on-board computer (21) pre-programmed with data representing the initial contour of the floor (3) at any position thereon and said desired contour thereat, said predetermined signals varying in response to variations between said initial contour and said desired contour as the grinding tools (11) move over the floor (3) to control said grinding depth. 5
11. A vehicle as claimed in claim 6 wherein a laser beam responsive sensor (19) is connected to each said grinding tool (11) for movement therewith, and means (6) for adjusting the grinding position of each said grinding tool (11) to said grinding depth in response to signals from said sensor (19) representative of a datum level provided by a laser beam (20) directed onto a said sensor (19) from a chosen position remote from the vehicle (1). 10 15 20
12. A vehicle as claimed in claim 11 wherein said adjustment means (6) is a hydraulically operable piston (6) for each grinding tool (11), the rod of which piston (6) is connected to a respective grinding tool (11) and carries a said laser beam responsive sensor (19) thereon. 25 30
13. A vehicle as claimed in claim 9 wherein one or more laser beam responsive sensors (19) are mounted on said transverse beam (4, 22), said control means (18, 6) adjusting the position of said transverse beam (4, 22) and thus each said grinding tool (11) to said grinding depth in response to signals from said sensor (19) representative of a datum level provided by a laser beam (20) directed onto a said sensor (19) from a chosen position remote from the vehicle (1). 35 40

#### Patentansprüche

1. Ein mobiles Bodenschleiffahrzeug, bestehend aus einem Fahrzeugkörper (1), welcher in einer vorgegebenen Bewegungsrichtung über einen Boden (3) bewegbar ist, **gekennzeichnet** durch ein Paar von Schleifwerkzeugen (11), die am Fahrzeugkörper im Abstand voneinander an jeweils einer Seite einer zentralen Längsachse des Fahrzeugkörpers (1) vorgesehen sind, durch Mittel zum Verändern des Abstandes zwischen den Werkzeugen, durch Antriebsmittel (13) zum Antreiben der Schleifwerkzeuge zum Schleifen des Bodens in einer gewünschten Kontur, und durch Steuermittel (18, 6) zum Steuern der Schleiftiefe jedes Schleifwerkzeuges in Bezug auf den Boden, und zwar in Abhängigkeit zu vorgegebenen Signalen, die die erwähnte gewünschte Kontur repräsentieren. 45 50 55
2. Ein Fahrzeug nach Anspruch 1, dadurch gekennzeichnet, daß ein starrer Tragarm (36) schwenkbar an jeder Seite des Fahrzeugkörpers (1) vorgesehen ist, daß ein erwähntes Schleifwerkzeug (11) am freien Ende jedes der erwähnten Schwenkarme (36) vorgesehen ist, und daß Mittel (40/60, 61, 62) mit den Tragarmen verbunden sind, um diese Tragarme (36) zu bewegen und die Schleifwerkzeuge (11) in den jeweiligen Schleifstellungen am Boden (3) so zu positionieren, daß ein Paar von parallelen Bahnen oder Spuren in dem Boden (3) durch die Schleifwerkzeuge geformt werden können, und zwar mit der erwünschten Kontur.
3. Ein Fahrzeug nach Anspruch 2, dadurch gekennzeichnet, daß die erwähnten Betätigungsmittel (40/60, 61, 62) einen Betätigungsmechanismus aufweisen, der zwischen den Tragarmen (36) vorgesehen ist, um die Arme (36) gleichmäßig voneinander zu entfernen, und zwar derart, daß die Schleifwerkzeuge (11) in gleichen Abständen von jeder Seite der erwähnten zentralen Längsachse des Fahrzeugs (1) positioniert werden können.
4. Ein Fahrzeug nach Anspruch 3, dadurch gekennzeichnet, daß der Betätigungsmechanismus (60, 61, 62) ein Paar von Verbindungs-Stangen oder -Lenkern (61) gleicher Länge aufweist, die an einem Ende gelenkig miteinander verbunden sind und von denen jeder jeweils an einem Tragarm (36) angelenkt ist, und zwar jeweils im gleichen Abstand von den Gelenkpunkten der Tragarme (36), wobei die Gelenkpunkte auf einer gemeinsamen Querachse bezogen auf die zentrale Längsachse des Fahrzeugs liegen, und daß Stell- oder Bewegungsmittel (60, 62) am Fahrzeugkörper (1) vorgesehen sind, um die gelenkig miteinander verbundenen Enden der Lenker (61) entlang der zentralen Längsachse des Fahrzeugs (1) zubewegen.
5. Ein Fahrzeug nach Anspruch 4, dadurch gekennzeichnet, daß die Bewegungsmittel (60, 62) von einem hydraulisch bewegbaren Kolben (60, 62) gebildet sind.
6. Ein Fahrzeug nach einem der Ansprüche 2 - 5, dadurch gekennzeichnet, daß ein Schleifwerkzeug (11) für eine hin- und hergehende Bewegung in einem Gehäuse (63) an dem Ende jedes Schwenkarmes (36) vorgesehen ist, wobei in Abhängigkeit von den vorgegebenen Signalen die Schleifwerkzeuge (11) auf einer Schleiftiefe gehalten werden können, die der gewünschten Kontur entspricht, die in dem Boden (3) eingebracht werden soll.
7. Ein Fahrzeug nach Anspruch 1, dadurch gekennzeichnet, daß jedes Schleifwerkzeug (11) an einem Querbalken (4, 22) befestigt ist, welcher am Fahrzeugkörper (1) für eine hin- und hergehende Bewe-

gung vorgesehen ist, und zwar gesteuert durch die Steuermittel (18), um so die Position der Schleifwerkzeuge (11) bezogen auf den zu bearbeitenden Boden (3) zu verändern.

8. Ein Fahrzeug nach Anspruch 7, dadurch gekennzeichnet, daß der Querarm (4, 22) teleskopartig ausgeführt ist, um so den Abstand oder Querabstand zwischen den daran befestigten Schleifwerkzeugen zu ändern.

9. Ein Fahrzeug nach Anspruch 8, dadurch gekennzeichnet, daß der erwähnte Querarm (4, 22) für eine beschränkte Rotationsbewegung um eine horizontale Achse ausgebildet ist, und daß Niveau-Sensormittel (10) am Arm (4, 22) vorgesehen sind, um den Arm (4, 22) in einer gewünschten Stellung oder Drehstellung zu halten.

10. Ein Fahrzeug nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die vorbestimmten Signale von einem Bord-Computer (21) geliefert werden, der mit Daten vorprogrammiert ist, die die Ursprungskontur des Bodens an jeder Stelle dieses Bodens sowie die dort gewünschte Kontur repräsentieren, und daß die vorgegebenen Signale sich in Abhängigkeit von Änderungen zwischen der Ursprungskontur und der erwähnten gewünschten Kontur ändern, und zwar wenn sich die Schleifwerkzeuge (11) über den Boden bewegen, um so die Schleiftiefe zu steuern.

11. Ein Fahrzeug nach Anspruch 6, dadurch gekennzeichnet, daß ein auf einen Laserstrahl ansprechender Sensor (11) an jedem Schleifwerkzeug vorgesehen ist, und zwar für eine Bewegung mit diesem Schleifwerkzeug, und daß Mittel (6) vorgesehen sind, um die Schleifposition jedes Schleifwerkzeugs (11) auf die Schleiftiefe einzustellen, und zwar in Abhängigkeit von Signalen von den Sensoren (19) entsprechend einem Niveau, welches durch einen Laserstrahl (20) vorgegeben ist, welcher von einer gewählten Position entfernt vom Fahrzeug (1) auf den Sensor (19) gerichtet ist.

12. Ein Fahrzeug nach Anspruch 11, dadurch gekennzeichnet, daß die Einstellmittel (6) jeweils von einem hydraulisch betätigbaren Kolben (6) für jedes Schleifwerkzeug (11) gebildet sind, wobei die Kolbenstange des Kolbens (6) mit dem jeweiligen Schleifwerkzeug (11) verbunden ist und den erwähnten, auf den Laserstrahl ansprechenden Sensor (19) trägt.

13. Ein Fahrzeug nach Anspruch 9, dadurch gekennzeichnet, daß einer oder mehrere, auf einen Laserstrahl ansprechende Sensoren (19) an dem erwähnten Querarm (4, 22) vorgesehen sind, und daß die erwähnten Steuermittel (18, 6) die Position

der Querarme (4, 22) und damit auch jedes Schleifwerkzeug auf die Schleiftiefe in Abhängigkeit der Signale des jeweiligen Sensors (19) einem gegebenen Niveau entsprechend einstellen, welches durch einen Laserstrahl (20) bestimmt ist, der auf den erwähnten Sensor (19) von einer gewählten Position entfernt vom Fahrzeug (1) gerichtet ist.

## Revendications

1. Véhicule mobile à décaper les sols comprenant une carrosserie de véhicule (1) mobile dans une direction prédéterminée de déplacement sur un sol (3), caractérisé par une paire d'outils de décapage (11) supportés par la carrosserie et espacés entre eux de chaque côté d'un axe central longitudinal de la carrosserie (1), des moyens pour faire varier l'écartement entre les outils, des moyens d'entraînement (13) pour entraîner les outils de décapage et décaper le sol (3) suivant un contour désiré, et des moyens de commande (18, 6) pour commander la profondeur de décapage de chaque outil de décapage par rapport au sol en réponse à des signaux prédéterminés représentatifs dudit contour souhaité.
2. Véhicule selon la revendication 1, dans lequel un bras support rigide (36) est monté pivotant de chaque côté de ladite carrosserie de véhicule (1), un tel outil de décapage (11) étant monté à l'extrémité libre de chacun desdits bras pivotants (36), et des moyens (40/60, 61, 62) sont couplés aux bras supports pour actionner les bras supports (36) et positionner les outils de décapage (11) dans des positions de décapage respectives sur le sol (3) de manière où une paire de pistes parallèles puissent être formées dans le sol (3) par lesdits outils de décapage (11) selon un tel contour souhaité.
3. Véhicule selon la revendication 2, dans lequel desdits moyens actionneurs (40/60, 61, 62) comprennent un mécanisme actionneur (60, 61, 62) monté entre lesdits bras supports (36) pour séparer lesdits bras (36) également de manière que les outils de décapage (11) puissent être placés à des distances égales de chaque côté dudit axe central longitudinal du véhicule (1).
4. Véhicule selon la revendication 3, dans lequel ledit mécanisme actionneur (60, 61, 62) comprend une paire de bielles de connexion (61) de longueur égale connectées entre elles en pivotement à une de leurs extrémités et chacune étant connectée à un respectif desdits bras supports (36) à une distance égale des points de pivotement des bras supports (36), lesquels points de pivotement se situent sur un axe transversal commun perpendiculaire audit axe central longitudinal du véhicule (1) et des moyens (60, 62) montés sur ladite carrosserie de véhicule (1)

pour déplacer lesdites extrémités reliées en pivotement desdits bielles (61) le long dudit axe central longitudinal dudit véhicule (1).

5. Véhicule selon la revendication 4, dans lequel lesdits moyens de déplacement (60, 62) sont constitués par un piston hydraulique (60, 62). 5
6. Véhicule selon l'une quelconque des revendications 2 à 5, dans lequel ledit outil de décapage (11) est monté pour effectuer un mouvement alternatif dans un boîtier (63) à l'extrémité de chacun des bras pivotants (36), grâce à quoi, en réponse auxdits signaux prédéterminés, les outils de décapage (11) peuvent être maintenus à une profondeur de décapage correspondant à un tel contour souhaité à découper dans le sol (3). 10 15
7. Véhicule selon la revendication 1, dans lequel chaque outil de décapage (11) est monté sur une poutre transversale (4, 22) montée en mouvement alternatif sur la carrosserie de véhicule (1) par lesdits moyens de commande (18) de manière à faire varier la position des outils de décapage (11) par rapport au sol (3) à découper. 20 25
8. Véhicule selon la revendication 7, dans lequel ladite poutre transversale (4, 22) est télescopique, grâce à quoi, elle permet de varier la distance ou l'espacement transversal entre les outils de décapage (11) montés dessus. 30
9. Véhicule selon la revendication 8, dans lequel ladite poutre transversale (4, 22) est montée pour effectuer un mouvement rotatif limité autour d'un axe horizontal, et des moyens détecteurs de niveau (10) sont fixés à la poutre (4, 22) de façon à maintenir la poutre (4, 22) en une position de rotation souhaitée. 35
10. Véhicule selon l'une quelconque des revendications précédentes, dans lequel lesdits signaux prédéterminés sont délivrés par un ordinateur embarqué (21) préprogrammé par des données représentant le contour initial du sol (3) en une position quelconque de ce sol et dudit contour désiré, lesdits signaux prédéterminés variant en réponse à des variations entra ledit contour initial et ledit contour souhaité quand les outils de décapage (11) se déplacent sur le sol (3) pour commander ladite profondeur de décapage. 40 45 50
11. Véhicule selon la revendication 6, dans lequel un capteur répondant à un faisceau laser (19) est relié à chaque outil de décapage (11) pour se déplacer avec lui, et des moyens (6) sont prévus pour ajuster la position de décapage de chacun desdits outils de décapage (11) à ladite profondeur de décapage en réponse à des signaux délivrés par ledit capteur (19) caractéristiques d'un niveau donné obtenus d'un 55

faisceau laser (20) envoyé contre ledit capteur (19) depuis une position choisie éloignée du véhicule (1).

12. Véhicule selon la revendication 11, dans lequel lesdits moyens de réglage (6) sont constitués par un piston hydraulique (6) pour chaque outil de décapage (11), la tige de ce piston (6) étant connectée à un outil de décapage correspondant (11) et supportant un tel capteur (19) répondant au faisceau laser.
13. Véhicule selon la revendication 9, dans lequel un ou plusieurs des capteurs (19) sensibles au faisceau laser sont montés sur ladite poutre transversale (4, 22), lesdits moyens de commande (18, 6) ajustant la position de ladite poutre transversale (4, 22) et chaque outil de décapage (11) à ladite profondeur de décapage en réponse aux signaux délivrés par ledit capteur (19) qui sont représentatifs des niveaux de données établis par un faisceau laser (20) orienté vers ledit capteur (19) à partir d'une position choisie éloignée du véhicule (1).

FIG. 1

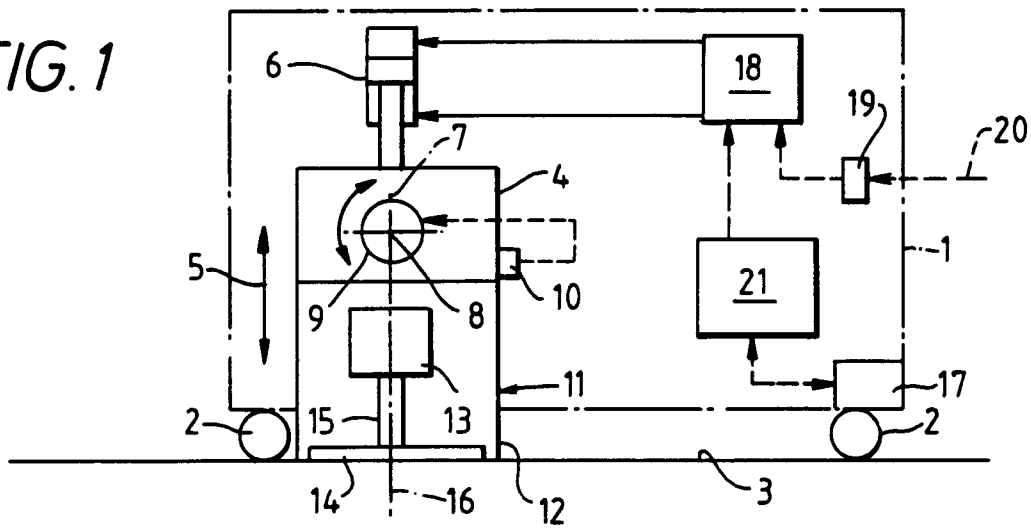


FIG. 2

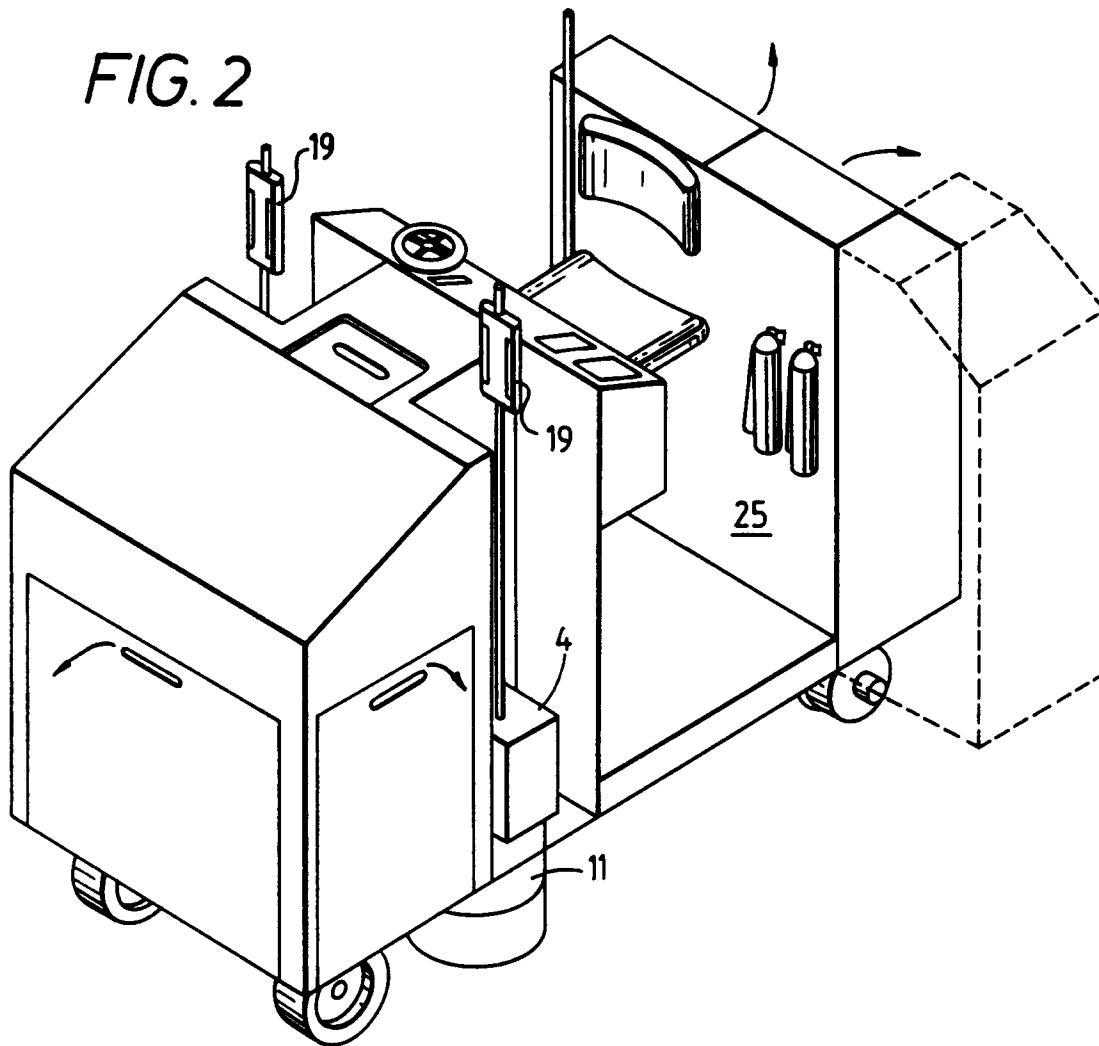
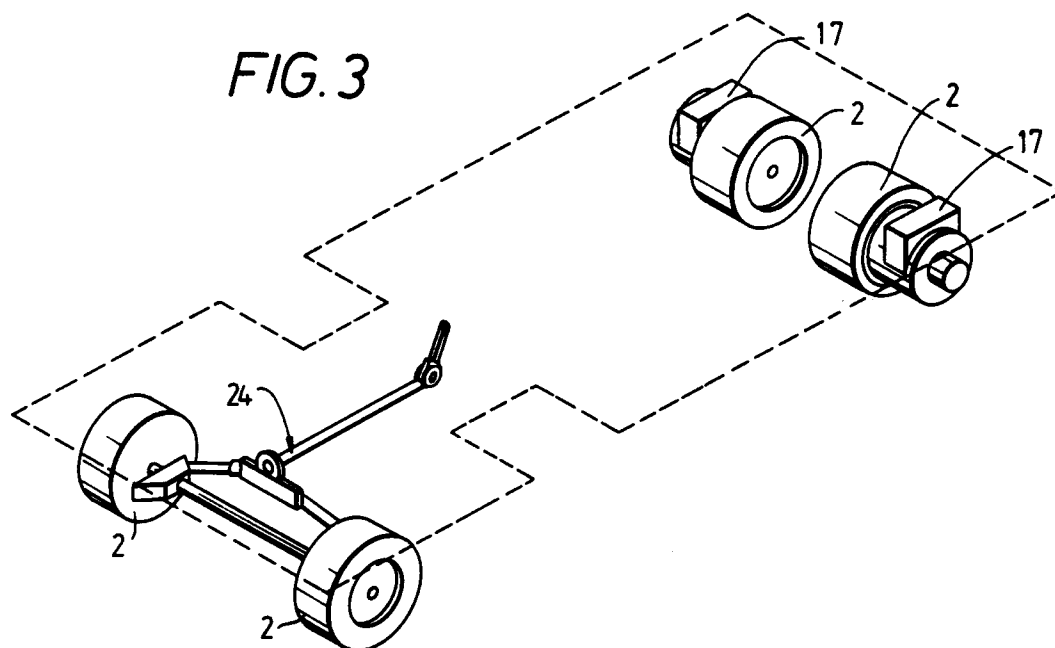


FIG. 3



**FIG. 4**

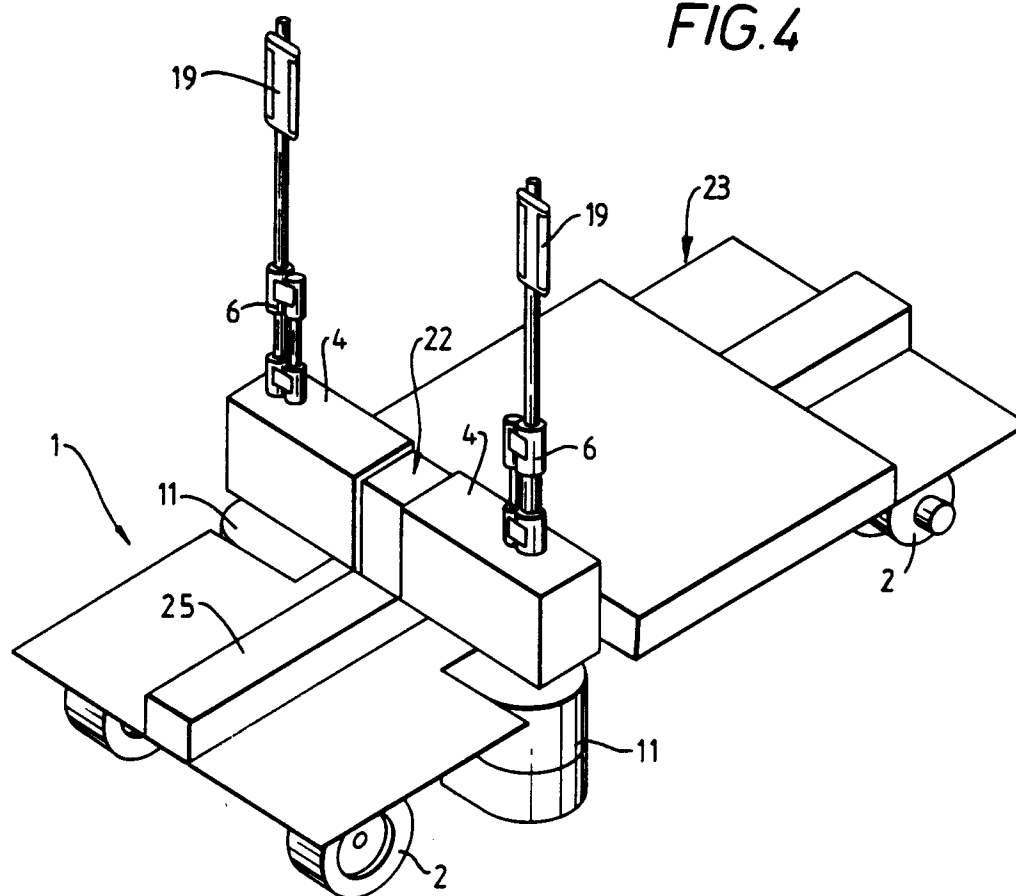


FIG.5

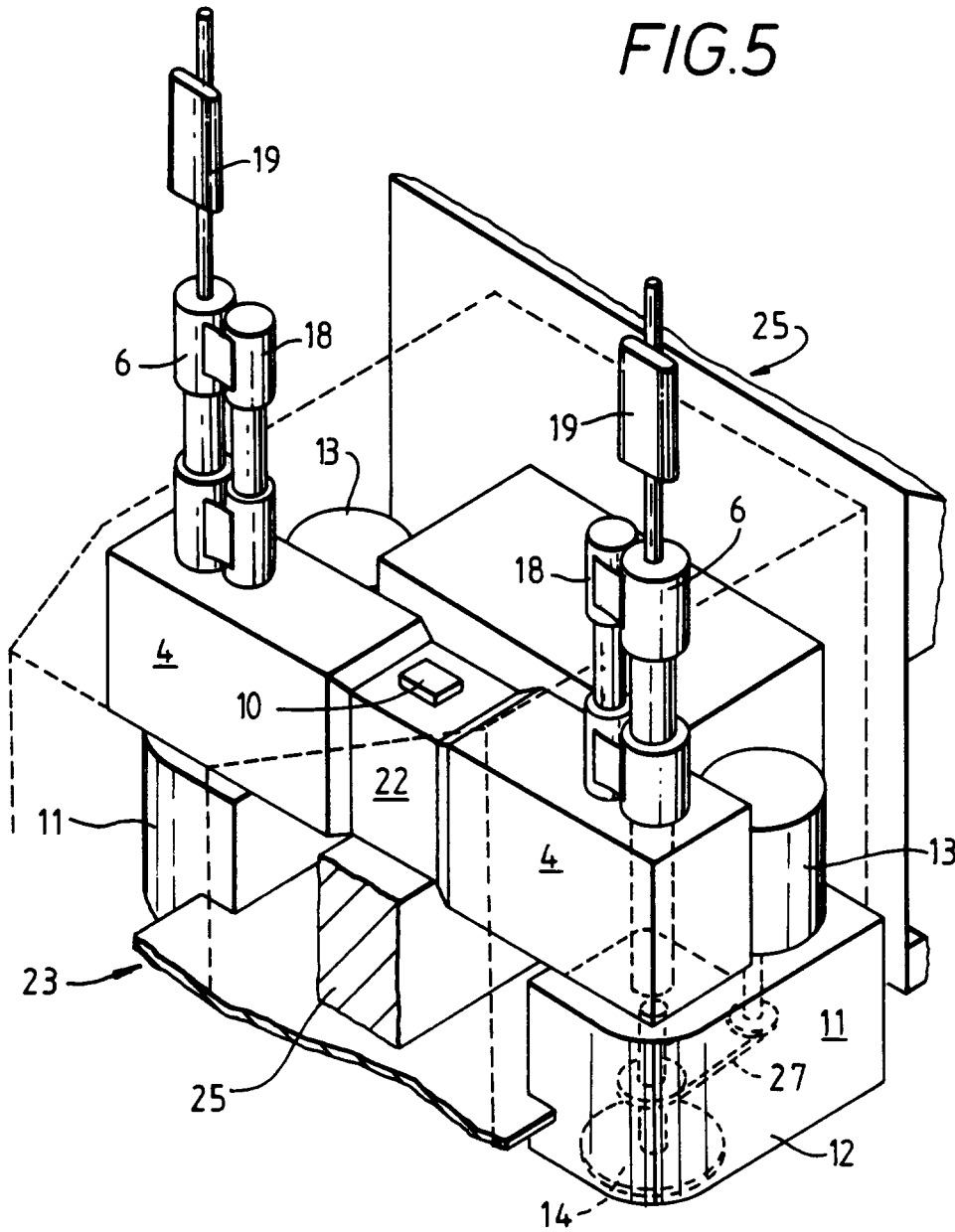


FIG.6

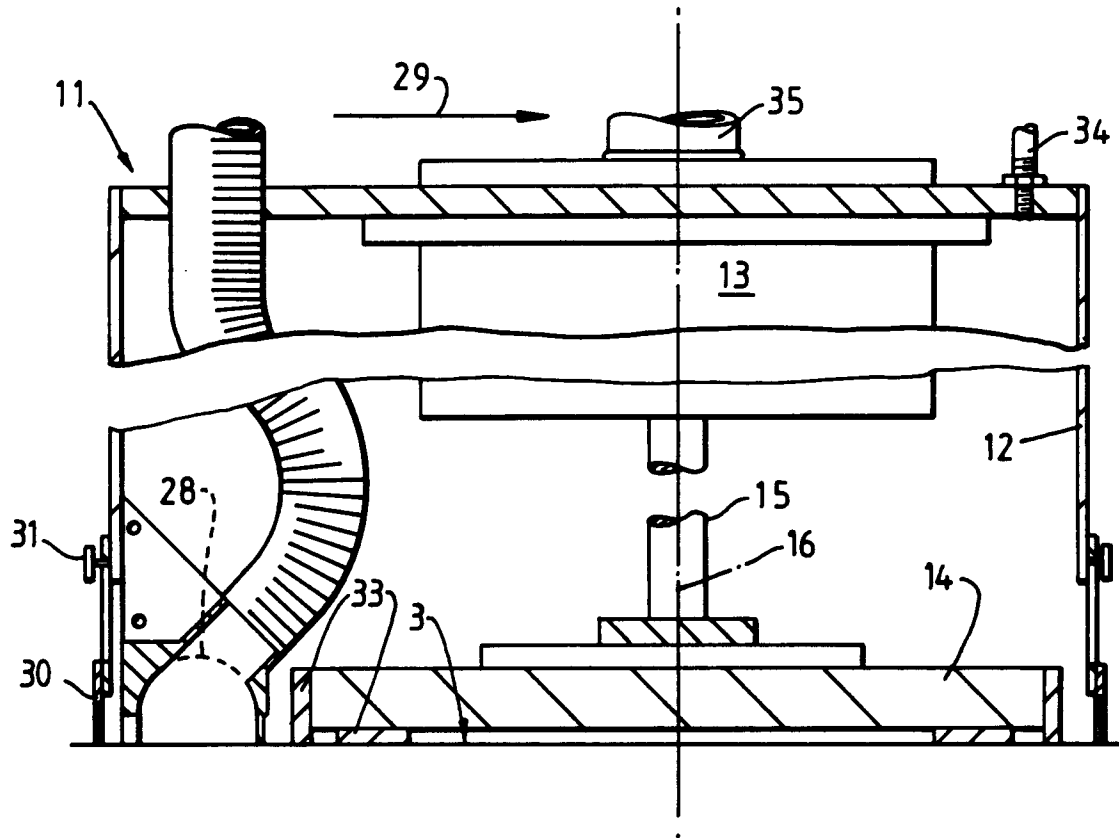


FIG.7

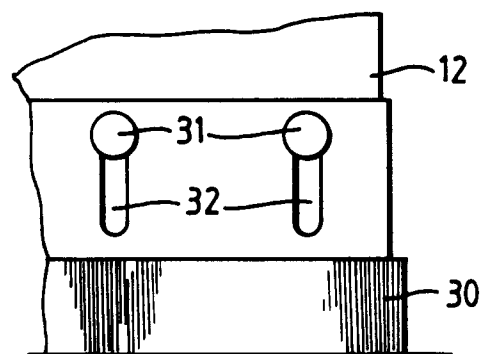


FIG.8

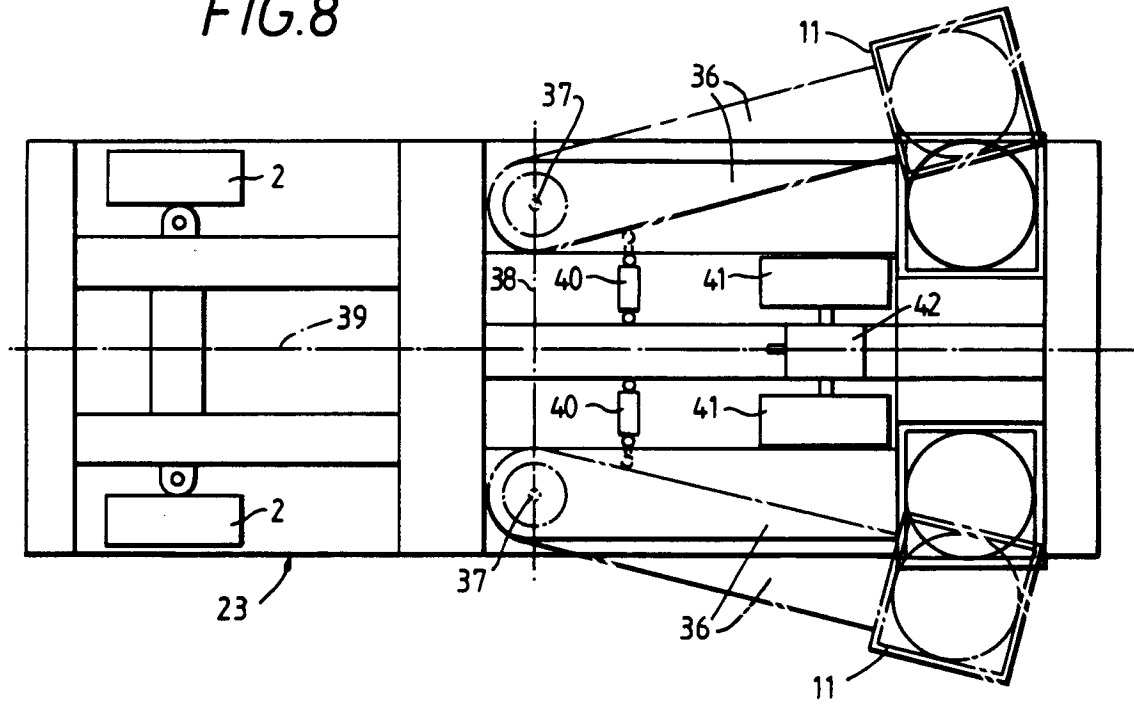


FIG.9

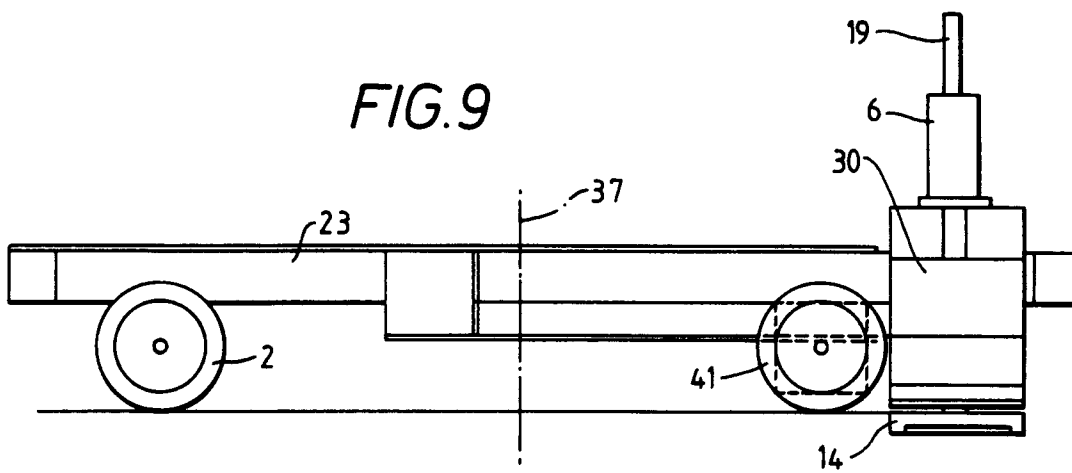
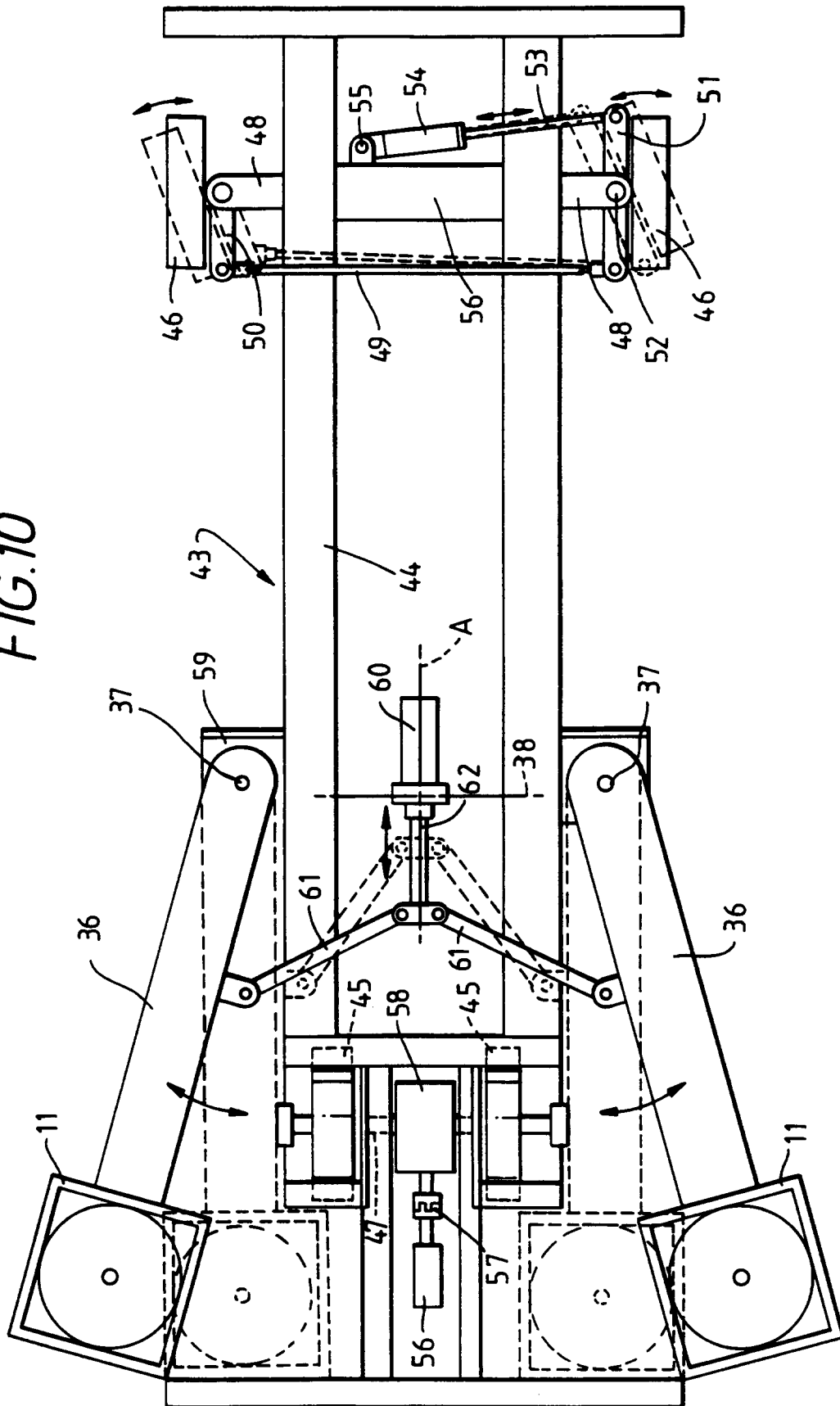


FIG.10



**FIG. 11**

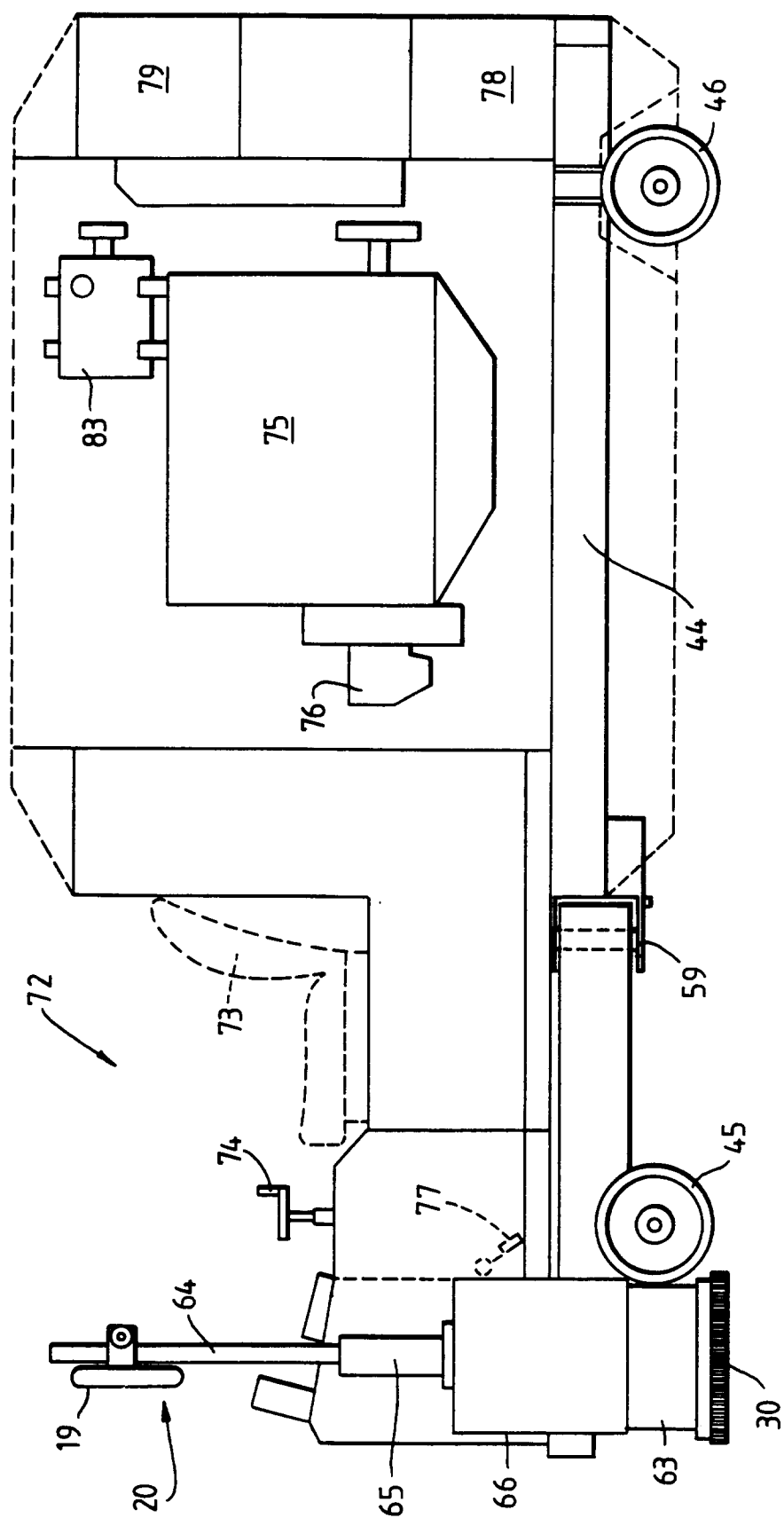


FIG. 12

