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(54) **HAND GUIDED FLOOR TREATMENT MACHINE**

HANDGEFÜHRTE BODENBEHANDLUNGSMASCHINE

MACHINE DE TRAITEMENT DE SOL GUIDÉE À LA MAIN

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Description

[0001] The present invention relates to the field of floor treatment machines for scrubbing, polishing, sanding or burnishing floors. In these machines one or more driven rotatable work heads (such as scrubbing brushes) are provided for agitating the floor surface. In particular the invention relates to a walk-behind machine provided with a handle for steering and guiding the machine as it travels over a floor surface.

[0002] It is well known in the field of scrubbing machines to provide a propulsive effect in machines which have a floor-facing disc-shaped work-head by rocking the machine left or right so that the brushes on one side are urged more intimately than the other side to as to provide forward or reverse traction (depending upon the brush direction of rotation).

[0003] EP-A-3031378 (i-mop GmbH) discloses a walk-behind wet floor scrubber having two side-by-side work heads, each comprising disc-shaped floor brushes. There is a trailing squeegee and associated suction drive and reservoir for collecting liquid from the floor surface. The suction drive is disposed on a handle portion of the machine, along with a clean water reservoir for feeding a cleaning-liquid dispenser. The handle has dual pivot axes permitting up/down handle movement as well as side-to-side, which aids in making the machine highly manoeuvrable on the floor surface. The brushes support the entire weight of the machine and contra-rotate with respect to one another. By angling the axes of rotation of the brushes slightly away from the vertical (to provide a brush anhedral or dihedral tilt), the bushes can be induced to provide forward propulsion whenever the machine is operational.

[0004] A problem with these machines is that they lack directional stability. This arises from the lack of guiding constraint provided by rotating work heads and by the dual pivoted handle which permits the user to make easy side-to-side sweeping movements along arcs, but is less suited to straight line movement of the machine methodically over a surface to be cleaned. If the respective brushes wear differentially, then the machine may develop a direction bias away from the intended machine direction of travel. To deal with these issues the present applicant's international patent application PCT/GB2019/051123 discloses a similar floor scrubbing machine which includes a central guide wheel which supports a handle portion and associated cleaning and wastewater reservoirs and any battery or energy storage device. The wheel takes some weight of the machine and may be directly steered by the handle portion acting on a wheel fork. The guide wheel prevents lateral or directional drift of the machine under propulsion and provides wheels steering of the machine. This provides excellent direction stability as well as the ability to turn in tight arcs by yawing of the machine around the guide wheel. A hand guided, walk-behind floor treatment machine is also already known from US-A-2021076894.

[0005] A problem with machines which rely upon propulsion by counter-rotating discs is that the amount of propulsive force is coupled to the rotational speed of the brushes, and thus is felt whenever the scrubbing action takes place. The machine can seem to runaway from the operator, and the user may need to drag the machine back to re-treat persistent dirty floor areas, which can be inconvenient and tiresome. There is a need to provide a floor scrubbing machine of the type described above in which the user is better able to control the progress of the machine during the floor treatment process, so as to permit that it is not necessarily coupled to the brushing action and is generally more flexible in operation and propulsive effect.

[0006] These aims and others are met by the present invention in its various aspects, as will be evident from the following description.

[0007] According to the present invention there is provided a hand guided, walk-behind floor treatment machine according to claim 1.

[0008] The motor traction drive may be provided with a motor controller which permits the drive to be activated or de-activated. The motor controller is preferably configured to permit motor traction drive control independent of the operation of the work head drive means.

[0009] The motor controller may be configured to provide traction drive speed control. The motor controller speed may be adapted to permit continuously variable speed control, or stepped speed control, or the adoption of discrete single speed settings. In a simple arrangement, a predetermined preferred speed may be provided as a setting. Several such pre-determined settings may be provided. These may be selected as suitable for particular floor types (wood, tile, concrete etc), or for treatment types (such as for polishing, light scrubbing, or heavy scrubbing), or to adapt for different brush stiffnesses. The motor controller may be configured to provide a reverse drive of the guide wheel means so that the machine may be propelled backwards.

[0010] The guide wheel means may comprise one or more wheels. The wheel means may comprise one or more rollers, one or more balls, or caterpillar tracks. In a preferred arrangement there may be a single guide wheel.

[0011] The guide wheel means may have a fixed transverse axis of rotation with respect to the base portion, so that the base portion turns correspondingly left or right as the wheel means is yaw steered.

[0012] In other arrangements the guide wheel means may comprise two wheels disposed side by side. The wheels may be mechanically connected to one another. For example, they may be coaxially disposed, preferably with a common axle. One wheel may be able to freewheel with respect to the other, or may be connected together so that rotation of one wheel causes rotation of the other wheel. In a preferred arrangement the two wheels may be connected by a differential transmission mechanism which permits rotation of one wheel at a different rate

or direction with respect to the other.

[0013] The motor traction drive may comprise an electric motor, preferably combined with a transmission. The transmission may comprise a chain, gear train, a transmission band or toothed drive belt, or combinations thereof.

[0014] The motor traction drive may be carried by the handle portion, or the base portion, or may be associated with and carried by the guide wheel. In a preferred arrangement there is a wheel hub drive incorporated into at least one wheel of the guide wheel means.

[0015] The motor traction drive will typically be an electric device, with power supplied by batteries or cells, or from electrical mains power supply.

[0016] A user interface may be provided which includes controls for actuation and operation of the motor traction drive. The interface is preferably disposed at an upper end region of the handle portion. The interface may be in the form of a panel.

[0017] The user interface may be provided with user-operable controls adapted to permit user-selective on/off actuation of the motor traction drive, and optionally user selective speed control of the motor traction drive. The controls may be adapted to permit selective operation so as to provide forward drive in the working direction or reverse drive in the opposite direction.

[0018] There may be two guide wheels and each may be independently drivable/rotatable by the traction drive so as to permit steering assistance, or yawing, by differential wheel rotation.

[0019] The lower region of the handle portion may be attached to the wheel means via the articulated joint and which permits up/down pivoting of the handle about the joint.

[0020] The articulated joint arrangement may also permit side-to-side pivoting of the handle about the joint. The up/down pivot of the articulated joint may be provided at a pivot coaxial with the wheel means axis of rotation. The side-to-side pivot of the articulated joint may be provided at a location vertically spaced apart from the up/down pivot. The articulated joint may comprise a yoke or fork which accommodates a wheel, roller or ball of the guide wheel means, which yoke pivots about the wheel rotation axis. The side-to-side pivot may be disposed on an upper bridging portion of the yoke.

[0021] The handle portion's articulated joint arrangement may be configured to permit fore/aft and side to side pivoting of the handle portion with respect to the base portion or guide wheel means. The joint arrangement may be configured to permit the transfer of steering torque applied by a user to the handle portion to the guide wheel means or base portion, thereby to permit yaw steering of the guide wheel means with the base portion left or right to vary the direction of travel.

[0022] One example of a suitable joint arrangement is a universal joint (or cardan joint). The cardan joint may be configured to act on the guide wheels means to yaw steer the guide wheel means along with the base portion.

[0023] The cardan joint may comprise a side-to-side pivot which comprises a U-section bracket rotated 90 degrees with respect to a yoke which receives a lower end of the handle portion.

[0024] Instead of the cardan joint, or another assembly of pivots, there may be provided a flexible strut member via which the handle portion is connected to the base portion or guide wheel means. The strut as a generally vertical disposition until the handle is pivoted away from the vertical by bending of the strut member. This permits the handle portion to pivot about the strut member forwards or backwards and left or right (from side to side). The strut member also permits transmission of torque from the handle portion to the guide wheel means or base portion, so as to steer the base portion and/or guide wheel means. The flexible strut member may comprise an elongate tubular member. The flexible tubular member may be as described in WO2020234904A1 (Moro & Moro).

[0025] In use the weight of the machine is typically supported partially by the guide wheel means and partially by the work head(s), and any other ancillary supports such as secondary rollers or wheels. Preferably the base unit is substantially entirely supported by the work head(s), and the guide wheels means supports the handle portion (and any associated attachments, such as control panel, cleaning liquid reservoir and dirty water tank). Any squeegee suction unit is usually self-supporting on rollers or wheels, but trails behind the work heads.

[0026] The handle portion may support a reservoir for floor cleaning liquid. The machine may be provided with a suction drive and an associated squeegee collection apparatus. This will usually be arranged to be trailed behind the work head(s) to collect and store used cleaning fluid lifted from the floor in a dirty water tank. The dirty water tank is supported by the handle portion.

[0027] When the handle portion is connected to the guide wheel, the guide wheel will take the weight of the handle portion and any supported items such as the cleaning liquid reservoir or the dirty water tank. This can prevent overloading of the work heads, whilst also ensuring that a good contact is made between the guide wheel and the floor.

[0028] The handle portion is preferably lockable in a substantially vertical parked orientation in which the pivoting of the handle portion with respect to the base portion is disabled. In this case the articulated joint arrangement can be selectively immobilised in the vertical parked orientation, such as by engagement of a tooth and detent feature.

[0029] The guide wheel means may be coupled to the base portion by a linkage arrangement which permits vertical travel of the base portion and associated work head or heads with respect to the guide wheel means.

[0030] The linkage arrangement provides may provide transverse constraint to limit or prevent yawing of the base portion with respect to the guide wheel means, so that when the guide wheel means is yawed the base

portion yaws with it, and vice versa.

[0031] The linkage arrangement may comprise a pitch pivotal connection between the base portion and the guide wheel means. Preferably the pitch pivotal connection is coaxial with the transverse axis of rotation of the guide wheel means. Said pitch pivotal connection permits the vertical travel of the base portion with respect to the wheel means.

[0032] Said one or more rotatable work head may support the base portion on the floor surface with the linkage arrangement permitting limited floating vertical travel of the work head(s) with respect to the guide wheel means.

[0033] The floor treatment machine may be configured so that the base portion and associated work head or heads are provided at a front region of the machine. The guide wheel means may be disposed aft of the work head or heads and base portion. The linkage arrangement may act between the guide wheel means and base portion, and is preferably disposed generally centrally with respect to the work head or heads.

[0034] Work head rotation on the floor preferably provides no net propulsive effect on the machine. In other words, the work heads are not tilted substantially from the vertical in a manner which can induce drift or propulsion over the floor surface. However, in alternative configurations, conventional brush propulsion by use of contra-rotating work heads and appropriate tilting of the work heads' rotational axes could be used to provide an alternative propulsion method, or supplementary propulsion effect.

[0035] The drive means preferably comprises one or more electric motors carried by the base portion and coupled to the work head or heads. A single motor can drive multiple work heads (via a suitable transmission of belts, gears or chains), or each motor can directly drive an associated work head.

[0036] In a preferred arrangement there are two generally disc-shaped work heads disposed side-by-side and oriented to rotate about respective parallel vertical axes of rotation.

[0037] The motors or transmission may be configured and/or controlled to cause the work heads to counter rotate with respect to one another, which provides a balanced cleaning effect.

[0038] A distal end of the handle portion may conveniently be provided with a transversely oriented handlebar for the user to grip with a hand on each side of the bar.

[0039] In a preferred aspect of the invention, the machine is a wet scrubbing machine. It may be provided with a cleaning fluid reservoir and cleaning fluid delivery outlet. A squeegee liquid collector is preferably provided which is coupled to the machine by a trailing linkage. The linkage may permit up/down travel of the squeegee collector with respect to the wheels means. The trailing linkage is preferably pivotably coupled to the wheel means co-axially with the transverse axis of the wheel means. The machine may be provided with a squeegee

suction drive and dirty liquid collection reservoir.

[0040] The handlebar may be provided with a speed control lever or twist grip and cleaning fluid dispensing actuator.

5 **[0041]** Following is a description by way of example only and with reference to the accompanying drawings of one mode for putting the present invention into effect.

[0042] In the drawings:

10 Figure 1 is a three quarter perspective view from above of a floor scrubber dryer that is an embodiment of the present invention.

15 Figure 2 is a side view of the floor scrubber dryer of Figure 1.

Figure 3 is a front perspective view of the floor scrubber dryer of Figures 2.

20 Figures 4a-4d are plan views of the floor scrubber dryer of Figures 1-3 in various use configurations.

25 Figure 5A is a perspective three quarter view of a guide wheel with hub-mounted drive used in the present invention.

Figure 5B is an end-on view of the guide wheel of figure 5A.

30 Figure 6 is a schematic diagram showing a user interface panel, motor controller and hub drive wheel in accordance with the present invention.

35 **[0043]** In Figure 1, a floor scrubber dryer machine in accordance with the present invention is shown generally as 10. The machine comprises an elongate rectangular section handle portion 12. The handle portion 12 comprises a top end region and a bottom end region. A handlebar 13 is transversely mounted via a bore at the top end region of the handle portion 12. A control unit (not shown) is also provided at the top end region which includes an off/on toggle switch, lever or trigger for the machine. During use the user walks behind the machine and guides it over the floor surface to be cleaned using the handlebar 13.

45 **[0044]** The bottom end region of the handle portion 12 is pivotally attached between upstanding ear portions of a U-section mounting bracket 14. The pivot is oriented fore-aft to enable side-to-side rotation of the handle portion relative to the bracket 14 about a pivot axis 15, as shown in the arrows A, A' of Figure 3. The axis 15 is substantially perpendicular to the length of the handle portion 12 and permits the handle to be swung transversely from side to side about the bottom end region.

50 **[0045]** The bracket 14 has a lower region which is configured as a fork or yoke 17 formed by two spaced apart downwardly extending cheek plates. A guide wheel 18 is located between the cheek plates and mounted for

rotation about an axle 19, as shown in Figure 2. The axle provides a pivot which permits the top end region of the handle portion to be pivoted forward/backwards, up/down through an arc V around the transverse axis 19A provided by the axle 19.

[0046] The wheel is shown isolated and in more detail in figures 5A and 5B. In figure 5A the wheel is shown generally as 18. There is a cylindrical solid rubber tyre 40 extending around the periphery of the wheel. Although not shown here, the tyre may be provided with a moulded tread pattern which assists gripping of floor surfaces when the machine is in use. A central region of the wheel is provided with a generally dish shaped housing 41 for an electric hub motor (not visible). The dish periphery is provided with a series of circumferentially spaced mounting rivets 42. A central bushing 43 is provided around the axle 19, so as to permit rotation of the wheel and hub around the fixed axle 19. The hub motor is of conventional construction so is not described in detail herein. A wide range of hub motors are commercially available.

[0047] On the opposite side of the guide wheel (see figure 5B) is another hub arrangement 44 which includes a bushing 45. The hub receives a wiring harness 46. The harness includes power cables which are connected to a rechargeable battery (not shown) carried by the machine. The hub also includes a sensor 47 which communicates with a speed controller (located in the upper handle portion (not visible) near the cross bar 13). The sensor detects rotation of the hub and wheel relative to the axle.

[0048] In figure 6 a schematic diagram shows a user interface panel 49 with a touch screen 48. The panel communicates with a motor controller 50 which includes a programmable data processing unit (not shown). The controller receives and communicates with the wiring harness 46 of the hub drive wheel, which along with power lines also includes a signal from the hub sensor 47. A battery 51 for powering the hub motor is connected to the controller. In an optional arrangement the controller also controls the work head motor(s) 26 which drive the scrubbing brushes 37. The primary controls are on/off and speed control. These can in accordance with the present invention be carried out independently of the traction drive or drive speed. Various functions are accessible to the user via the interface touch screen and are effected by transmission of appropriate signals to the data processing unit. So, the hub motor can be activated by pressing a start tab (so as to rotate the wheel 18). A stop tab kills the motor. The sensor 47 provides rate of rotation information and is used to provide feedback so as to maintain a desired rate of rotation. In practice the user interface panel would be carried at an upper region of the handle portion 12. The motor controller would be physically integrated into the interface panel housing so as to protect it from moisture and dirt released by the cleaning or scrubbing process.

[0049] Various touch tabs (not shown) may be provided to permit selection of modes corresponding to various combinations of the floor properties (wood, car-

pet, vinyl, tiles, paving slabs, concrete and corresponding work head brush attachments). The motor traction speed may be adjusted to preferred settings associated with the floor and brush responses. The panel and the controller can be configured to provide integrated control of the work head drive motors (one 26 indicated in figure 6), so as to adjust work head rotation speed in each mode, as well as the desired traction drive speeds. For example, a slow traction drive speed with high work head rotation speeds can be used for tough scrubbing jobs. Unlike work head-based propulsion systems, the work head rotation is not tied to an associated propulsive speed when using a wheeled traction drive. Speed increase and decrease tabs on the panel allow fine tuning of the traction speed by the user (if required). The incremental speed increase/decrease can be gradual or stepped.

[0050] In the present embodiment the wheel 18 is mounted to enable rotation about a single transverse axis and is otherwise fixed in position relative to the base of the machine. However, in other embodiments, the wheel 18 may be configured to lean either left or right into a turn as a user manoeuvres the machine 18 around the floor surface. This can improve the handling of the machine 10. The same leaning could apply to other wheel means such as rollers or balls.

[0051] A pair of elongate, forwardly extending, spaced apart mounting struts 21 are pivotally attached at rear end regions thereof to opposite respective sides the wheel axle 19 projecting from either side of the wheel 18. Front end regions of each strut are attached to a pair of up-standing, spaced apart generally triangular brackets 22 formed on a rectangular work base plate 23. The attachment is made via a pivot connection 24 having a transverse axis of rotation.

[0052] The base portion supports thereon two electric motors side by side which are a left scrubber electric motor 25 and a right scrubber electric motor 26. A left scrubber brush 27 and a right scrubber brush 28 are attached under the base portion 23 to depending respective rotors (not shown) of the electric motors. The left scrubber and right scrubber are mounted to the rotors using conventional means such as a hub or chuck (not shown).

[0053] Each scrubber brush 27, 28 comprises a disc shaped base portion 29, and an annular array of fibre brushes 30, fixed an underside of the base portion. The scrubber brushes are arranged to enable rotation in opposite directions and about parallel vertical axes as shown in Figure 1, which can provide forward or rearward propulsion

[0054] Pivotaly mounted to the rear of the wheel 18 is a squeegee collector 30, best seen in figure 2. The collector 30 comprises an elongate lenticular form collector arm 31. A forward collector blade 32 and a rear collector blade 33 are mounted below the collector arm 31 such that both the forward blade 32 and rear blade 33 are able to be in contact with a floor when the machine 10 is in normal use. The collector blades 32, 33 are made of an elastomeric

material, as is conventional. The squeegee interior (chamber 34) defined between the forward and rear blades is in fluid communication with a suction drive (not shown) which may be mounted on the handle 12 or the base portion 23 so as to entrain and draw-up wastewater that has passed through the scrubber brushes. Waste water drawn-up from the suction chamber 34 is stored in a tank (not shown). The suction drive and tank may be positioned above the scrubber mount 11, or on the handle portion 12, or at another convenient location on the machine 10.

[0055] A left rear wheel assembly 35 and a right rear wheel assembly 36 are both mounted to the collector arm 31 and projecting rearwardly and co-terminously. Each rear wheel assembly comprises a rear castor wheel. The squeegee collector is attached to the wheel axis 19 by a pair of transversely spaced apart rearwardly extending struts 38, so that the collector can pivot up/down around the wheel's axis. The squeegee collector can thus be folded up or down for storage. Furthermore, the collector can, when in use, follow floor undulations without losing suction as the machine move forwards.

[0056] Figures 4a-4d show various configurations of the handle portion 12, the base portion 23 and the wheel yoke 17. Figure 4a shows a configuration in which the handle portion 12 in the left-to-right position and at an angle with the floor surface. The configuration of Figure 4a is similar to that shown in Figure 1.

[0057] Figure 4b shows a configuration in which the handle portion 12 has been rotated such that the handlebar 13 has moved to the left. Figure 4b represents a configuration where a user is turning the machine 10 to the left.

[0058] Figure 4c shows a configuration in which the handle portion 12 is upright such that the handlebar 13 is parallel with the floor surface. The handle portion 12 has then been rotated such that the handlebar 13 has moved the left.

[0059] Figure 4d shows a configuration in which the handle portion 2 has been rotated such that the handlebar 13 is now positioned forwards of the scrubbers 27, 28.

[0060] In the foregoing description and the associated drawings, we have not shown certain features which will typically be present, but which are of little relevance to the core aspects of the invention. These include a cleaning liquid reservoir and dispenser, a suction drive for the squeegee collector, or a dirty water reservoir fed by the squeegee collector. These are well known to the person skilled in the art so are not described in detail herein. For polishing machines or burnishing machines and the like no such ancillary features may be necessary or are optional.

[0061] Machines in accordance with the present invention relate to the field of floor treatment machines for scrubbing, polishing, sanding or burnishing floors, and in particular machines in which one or more driven rotatable work heads (such as scrubbing brushes) are provided for agitating the floor surface. The disclosure pro-

vides a hand guided, walk-behind floor treatment machine comprising: a base portion provided with and supported by at least one rotatable work head for treating the floor, drive means for rotating the work head with respect to the base portion, guide wheel means for supporting the handle portion and/or base portion on the floor, the guide wheel means having a substantially transverse axis of rotation with respect to the base portion so as to permit machine travel over the floor in a working direction, a handle portion for steering or guiding the machine in the working direction of travel, a lower region of which handle portion is provided with an articulated joint arrangement which permits pivoting of the handle portion with respect to the base portion during machine operation, the handle portion lower region being connected to the guide wheel means or base portion so as to permit steering by manipulation of an upper region of the handle, wherein a motor traction drive is provided for driving the guide wheel means so as to permit self-propulsion of the machine over the floor and a motor controller for controlling the operation of the motor traction drive. The motor controller permits the traction drive to be activated or de-activated. The motor controller may be configured to permit motor traction drive control independent of the operation of the work head drive means. The motor controller is configured to provide traction drive speed control. The motor controller is adapted to permit continuously variable speed control, and/or stepped incremental speed control, and/or the adoption of one of a plurality of discrete single speed settings. The motor controller may be configured to provide a user-selectable reverse drive mode of the guide wheel means so that the machine may be propelled backwards.

Claims

1. A hand guided, walk-behind floor treatment machine comprising:

a base portion (23) provided with and supported by at least one rotatable work head (37) for treating the floor,
drive means (26) for rotating the work head with respect to the base portion,
guide wheel means (18) for supporting the handle portion and/or base portion on the floor, the guide wheel means having a substantially transverse axis of rotation with respect to the base portion so as to permit machine travel over the floor in a working direction,
a handle portion (12) for steering or guiding the machine in the working direction of travel, a lower region of which handle portion is provided with an articulated joint arrangement which permits pivoting of the handle portion with respect to the base portion during machine operation, the handle portion lower region being connected to

- the guide wheel means or base portion so as to permit steering by manipulation of an upper region of the handle,
 wherein a motor traction drive is provided for driving the guide wheel means so as to permit self-propulsion of the machine over the floor and a motor controller is provided for controlling the operation of the motor traction drive,
 wherein the articulated joint arrangement is adapted to permit fore/aft and side to side pivoting of the handle portion with respect to the base portion and wherein the joint arrangement also permits the transfer of steering torque applied by a user to the upper handle portion to the guide wheel means or base portion, thereby to permit yaw steering of the guide wheel means left or right.
2. A machine as claimed in claim 1 wherein the joint arrangement comprises a cardan joint configured to act on the guide wheels means to yaw steer the guide wheel means along with the base portion to which the guide wheel means is connected.
 3. A machine as claimed in claim 1 or 2 wherein the motor controller permits the traction drive to be activated or de-activated.
 4. A machine as claimed in any of claims 1 to 3 wherein the motor controller is configured to permit motor traction drive control independent of the operation of the work head drive means.
 5. A machine as claimed in any of the preceding claims wherein the motor controller is configured to provide traction drive speed control.
 6. A machine as claimed in any of the preceding claims wherein the motor controller is adapted to permit continuously variable speed control, and/or stepped incremental speed control, and/or the adoption of one of a plurality of discrete single speed settings.
 7. A machine as claimed in any of the preceding claims wherein the guide wheel means comprises one or more wheels, or two wheels disposed side-by-side.
 8. A machine as claimed in any of the preceding claims wherein the guide wheel means has a fixed transverse axis of rotation with respect to the machine base portion, so that the base portion turns correspondingly left or right as the wheel means is yaw steered.
 9. A machine as claimed in claim 8 wherein the wheels are mechanically connected to one another by a differential transmission mechanism which permits rotation of one wheel at a different rate or direction with respect to the other.
 10. A machine as claimed in any of the preceding claims wherein the motor traction drive comprises at least one electric motor combined with a transmission which comprises a chain, a gear train, a transmission band or a toothed drive belt or combinations thereof.
 11. A machine as claimed in any of the preceding claims wherein the motor traction drive is disposed on or in the guide wheel in the form of a wheel hub drive.
 12. A machine as claimed in any of the preceding claims wherein a user interface for the motor controller is provided which interface includes controls for operation of the motor traction drive, and wherein the user interface is provided with user-operable controls adapted to permit: user-selective on/off actuation of the motor traction drive, and optionally user selective speed control of the motor traction drive, and optionally selective operation to provide forward drive in the working direction or reverse drive in the opposite direction.
 13. A machine as claimed in any of the preceding claims wherein in use the weight of the machine is supported partially by the guide wheel means and partially by the work head(s).
 14. A machine as claimed in any of the preceding claims wherein the handle portion supports a reservoir for floor cleaning liquid.
 15. A machine as claimed in any of the preceding claims wherein the machine is provided with a suction drive and an associated squeegee collection apparatus which is arranged to be trailed behind the work head(s) to collect and store used cleaning fluid lifted from the floor in a dirty water tank.
 16. A machine as claimed in any preceding claim wherein the handle portion is lockable in a substantially vertical parked orientation in which the pivoting of the handle portion with respect to the base portion is disabled.
 17. A machine as claimed in any of the preceding claims wherein the base portion and associated work head or heads are provided at a front region of the machine, the guide wheel means is disposed between or aft of the work head or heads.
 18. A machine as claimed in any of the preceding claims wherein work head rotation on the floor provides substantially no net propulsive effect on the machine.
 19. A machine as claimed in any of the preceding ma-

chines wherein the drive means comprises one or more electric motors carried by the base portion and coupled to the work head or heads.

20. A machine as claimed in claim 19 wherein there are two generally disc-shaped work heads disposed side-by-side and oriented to rotate about respective parallel vertical axes of rotation.
21. A machine as claimed in claim 20 wherein the motor or motors are configured and/or controlled to cause the work heads to contra-rotate with respect to one another.

Patentansprüche

1. Handgeführte Bodenbehandlungsmaschine, die Folgendes umfasst:

einen Sockelteil (23), der mit mindestens einem drehbaren Arbeitskopf (37) zum Behandeln des Bodens versehen ist und davon getragen wird, ein Antriebsmittel (26) zum Drehen des Arbeitskopfes in Bezug auf den Sockelteil, ein Führungsradmittle (18) zum Tragen des Griffteils und/oder des Sockelteils am Boden, wobei das Führungsradmittle eine in Bezug auf den Sockelteil im Wesentlichen quer verlaufende Rotationsachse aufweist, so dass eine Bewegung der Maschine über den Boden in einer Arbeitsrichtung möglich ist, einen Griffteil (12) zum Steuern oder Führen der Maschine in der Arbeitsfahrtrichtung, wobei ein unterer Bereich des Griffteils mit einer Drehgelenkanordnung versehen ist, die bei Betrieb der Maschine ein Schwenken des Griffteils in Bezug auf den Sockelteil ermöglicht, wobei der untere Bereich des Griffteils mit dem Führungsradmittle oder dem Sockelteil verbunden ist, so dass ein Steuern durch Betätigen eines oberen Bereichs des Griffs möglich ist, wobei zum Antreiben des Führungsradmittels ein motorisierter Fahrtrieb vorgesehen ist, so dass ein Eigenantrieb der Maschine auf dem Boden möglich ist, und zum Steuern des Betriebs des motorisierten Fahrtriebs eine Motorsteuerung vorgesehen ist, wobei die Drehgelenkanordnung so ausgelegt ist, dass sie in Bezug auf den Sockelteil ein Schwenken des Griffteils nach vorn/hinten und von Seite zu Seite ermöglicht, und wobei die Gelenkanordnung auch die Übertragung eines von einem Benutzer auf den oberen Griffteil ausgeübten Steuermoments auf das Führungsradmittle oder den Sockelteil ermöglicht, wodurch eine Giersteuerung des Füh-

rungrsradmittels nach links oder rechts möglich ist.

2. Maschine nach Anspruch 1, wobei die Gelenkanordnung ein Kardangelenk umfasst, das so konfiguriert ist, dass es so auf das Führungsradmittle einwirkt, dass dieses zusammen mit dem Sockelteil, mit dem es verbunden ist, giergesteuert wird.
3. Maschine nach Anspruch 1 oder 2, wobei die Motorsteuerung ein Aktivieren oder Deaktivieren des Fahrtriebs ermöglicht.
4. Maschine nach einem der Ansprüche 1 bis 3, wobei die Motorsteuerung so konfiguriert ist, dass sie eine vom Betrieb der Arbeitskopfantriebsmittel unabhängige Steuerung des motorisierten Fahrtriebs ermöglicht.
5. Maschine nach einem der vorhergehenden Ansprüche, wobei die Motorsteuerung so konfiguriert ist, dass sie für eine Drehzahlregelung des Fahrtriebs sorgt.
6. Maschine nach einem der vorhergehenden Ansprüche, wobei die Motorsteuerung so ausgelegt ist, dass sie eine kontinuierlich stufenlose Drehzahlregelung und/oder eine stufenweise inkrementelle Drehzahlregelung und/oder die Übernahme einer von mehreren diskreten einzelnen Drehzahleinstellungen ermöglicht.
7. Maschine nach einem der vorhergehenden Ansprüche, wobei das Führungsradmittle ein oder mehrere Räder oder zwei nebeneinander angeordnete Räder umfasst.
8. Maschine nach einem der vorhergehenden Ansprüche, wobei das Führungsradmittle eine in Bezug auf den Sockelteil der Maschine feste, quer verlaufende Rotationsachse aufweist, so dass der Sockelteil entsprechend nach links oder rechts abschwengt, wenn das Radmittle giergesteuert wird.
9. Maschine nach Anspruch 8, wobei die Räder über einen Differentialgetriebemechanismus, der ein Drehen eines Rads mit einer von dem anderen abweichenden Geschwindigkeit oder Richtung ermöglicht, mechanisch miteinander verbunden sind.
10. Maschine nach einem der vorhergehenden Ansprüche, wobei der motorisierte Fahrtrieb mindestens einen Elektromotor in Kombination mit einem Getriebe umfasst, das eine Kette, ein Zahnradgetriebe, einen Transmissionsriemen oder einen Zahnriemen oder Kombinationen davon umfasst.
11. Maschine nach einem der vorhergehenden Ansprü-

che, wobei der motorisierte Fährantrieb in Form eines Radnabenantriebs an oder in dem Führungsrads angeordnet ist.

12. Maschine nach einem der vorhergehenden Ansprüche, wobei eine Benutzerschnittstelle für die Motorsteuerung vorgesehen ist, die Bedienelemente für den Betrieb des motorisierten Fährantriebs aufweist, und die Benutzerschnittstelle mit vom Benutzer bedienbaren Bedienelementen versehen ist, die so ausgelegt sind, dass sie Folgendes ermöglichen: vom Benutzer wählbares Ein-/Ausschalten des motorisierten Fährantriebs und wahlweise vom Benutzer wählbare Drehzahlregelung des motorisierten Fährantriebs und wahlweise selektive Betätigung zum Bereitstellen eines Vorwärtsantriebs in Arbeitsrichtung oder eines Rückwärtsantriebs in die entgegengesetzte Richtung. 5
13. Maschine nach einem der vorhergehenden Ansprüche, wobei das Gewicht der Maschine im Gebrauch teilweise von dem Führungsradsmittel und teilweise von dem Arbeitskopf/den Arbeitsköpfen getragen wird. 10
14. Maschine nach einem der vorhergehenden Ansprüche, wobei der Griffteil einen Behälter für Bodenreinigungsflüssigkeit trägt. 15
15. Maschine nach einem der vorhergehenden Ansprüche, wobei die Maschine mit einem Saugantrieb und einer zugehörigen Wischer-Auffangvorrichtung versehen ist, die so angeordnet ist, dass sie hinter dem Arbeitskopf/den Arbeitsköpfen her gezogen wird und so vom Boden abgezogenes, benutztes Reinigungsfluid in einem Schmutzwassertank auffängt und aufbewahrt. 20
16. Maschine nach einem der vorhergehenden Ansprüche, wobei der Griffteil in einer im Wesentlichen vertikalen Parkausrichtung arretierbar ist, in der kein Schwenken des Griffteils in Bezug auf den Sockelteil möglich ist. 25
17. Maschine nach einem der vorhergehenden Ansprüche, wobei der Sockelteil und der zugehörige Arbeitskopf oder die zugehörigen Arbeitsköpfe in einem vorderen Bereich der Maschine vorgesehen sind, wobei das Führungsradsmittel zwischen oder hinter dem Arbeitskopf oder den Arbeitsköpfen angeordnet ist. 30
18. Maschine nach einem der vorhergehenden Ansprüche, wobei das Drehen des Arbeitskopfs auf dem Boden im Wesentlichen keine Antriebswirkung auf die Maschine hat. 35
19. Maschine nach einer der vorhergehenden Ansprüche 40

che, wobei das Antriebsmittel einen oder mehrere Elektromotoren umfasst, die von dem Sockelteil mitgeführt werden und mit dem Arbeitskopf oder den Arbeitsköpfen gekoppelt sind.

20. Maschine nach Anspruch 19, wobei zwei allgemein scheibenförmige Arbeitsköpfe vorhanden sind, die nebeneinander angeordnet und so ausgerichtet sind, dass sie sich um jeweilige parallele vertikale Rotationsachsen drehen. 45
21. Maschine nach Anspruch 20, wobei der Motor oder die Motoren so konfiguriert sind und/oder gesteuert werden, dass sie bewirken, dass sich die Arbeitsköpfe gegenläufig zueinander drehen. 50

Revendications

1. Machine de traitement de sol poussée par derrière à guidage manuel comportant :

une partie de base (23) dotée d'au moins une tête de travail rotative (37) et supportée par celle-ci pour le traitement du sol,

un moyen d'entraînement (26) servant à des fins de rotation de la tête de travail par rapport à la partie de base,

un moyen formant roue de guidage (18) servant à supporter la partie formant poignée et/ou la partie de base sur le sol, le moyen formant roue de guidage ayant un axe de rotation sensiblement transversal par rapport à la partie de base de manière à permettre à la machine de se déplacer sur le sol dans une direction de travail,

une partie formant poignée (12) servant à diriger ou à guider la machine dans la direction de déplacement de travail, la partie formant poignée ayant une région inférieure qui est dotée d'un agencement formant joint articulé qui permet le pivotement de la partie formant poignée par rapport à la partie de base en cours de fonctionnement de la machine, la région inférieure de la partie formant poignée étant reliée au moyen formant roue de guidage ou à la partie de base de manière à pouvoir diriger par la manipulation d'une région supérieure de la poignée,

dans laquelle un entraînement de traction par moteur est mis en œuvre pour entraîner le moyen formant roue de guidage de manière à permettre l'auto-propulsion de la machine sur le sol et un contrôleur de moteur est mis en œuvre pour commander le fonctionnement de l'entraînement de traction par moteur,

dans laquelle l'agencement formant joint articulé est adapté pour permettre un pivotement allant en avant/arrière et d'un côté à l'autre de la

- partie formant poignée par rapport à la partie de base et dans laquelle l'agencement formant joint permet également le transfert du couple de direction appliqué par un utilisateur à la partie formant poignée supérieure au moyen formant roue de guidage ou à la partie de base, pour de ce fait permettre de diriger en lacet le moyen formant roue de guidage vers la gauche ou vers la droite.
2. Machine selon la revendication 1, dans laquelle l'agencement formant joint comporte un joint de cardan configuré pour agir sur le moyen formant roue de guidage pour diriger en lacet le moyen formant roue de guidage conjointement avec la partie de base à laquelle le moyen formant roue de guidage est relié.
 3. Machine selon la revendication 1 ou la revendication 2, dans laquelle le contrôleur de moteur permet d'activer ou de désactiver l'entraînement de traction.
 4. Machine selon l'une quelconque des revendications 1 à 3, dans laquelle le contrôleur de moteur est configuré pour permettre une commande de l'entraînement de traction par moteur indépendamment du fonctionnement du moyen d'entraînement de tête de travail.
 5. Machine selon l'une quelconque des revendications précédentes, dans laquelle le contrôleur de moteur est configuré pour fournir une commande de vitesse de l'entraînement de traction.
 6. Machine selon l'une quelconque des revendications précédentes, dans laquelle le contrôleur de moteur est adapté pour permettre une commande de vitesse variable en continu, et/ou une commande de vitesse incrémentielle par paliers, et/ou l'adoption de l'un d'une pluralité de réglages de vitesse individuels discrets.
 7. Machine selon l'une quelconque des revendications précédentes, dans laquelle le moyen formant roue de guidage comporte une ou plusieurs roues, ou deux roues disposées côte à côte.
 8. Machine selon l'une quelconque des revendications précédentes, dans laquelle le moyen formant roue de guidage a un axe de rotation transversal fixe par rapport à la partie de base de la machine, de telle sorte que la partie de base tourne de manière correspondante vers la gauche ou vers la droite au fur et à mesure que le moyen formant roue est dirigé en lacet.
 9. Machine selon la revendication 8, dans laquelle les roues sont reliées mécaniquement les unes aux autres par un mécanisme de transmission différentielle qui permet la rotation d'une roue à une vitesse ou direction différente par rapport à l'autre.
 10. Machine selon l'une quelconque des revendications précédentes, dans laquelle l'entraînement de traction par moteur comporte au moins un moteur électrique combiné à une transmission qui comporte une chaîne, un train d'engrenages, une bande de transmission ou une courroie d'entraînement dentée ou des combinaisons de ceux-ci.
 11. Machine selon l'une quelconque des revendications précédentes, dans laquelle l'entraînement de traction par moteur est disposé sur ou dans la roue de guidage sous la forme d'un entraînement de moyeu de roue.
 12. Machine selon l'une quelconque des revendications précédentes, dans laquelle une interface utilisateur pour le contrôleur de moteur est mise en œuvre, interface qui comprend des commandes pour le fonctionnement de l'entraînement de traction par moteur, et dans laquelle l'interface utilisateur est dotée de commandes actionnables par l'utilisateur adaptées pour permettre : un actionnement marche/arrêt sélectionné par l'utilisateur de l'entraînement de traction par moteur, et éventuellement une commande de vitesse sélectionnée par l'utilisateur de l'entraînement de traction par moteur, et éventuellement un fonctionnement sélectif servant à mettre en œuvre un entraînement en marche avant dans le sens du travail ou un entraînement en marche arrière dans le sens opposé.
 13. Machine selon l'une quelconque des revendications précédentes, dans laquelle, lors de l'utilisation, le poids de la machine est supporté partiellement par le moyen formant roue de guidage et partiellement par les têtes de travail.
 14. Machine selon l'une quelconque des revendications précédentes, dans laquelle la partie formant poignée supporte un réservoir pour liquide de nettoyage de sol.
 15. Machine selon l'une quelconque des revendications précédentes, dans laquelle la machine est dotée d'un entraînement à aspiration et d'un appareil de collecte à raclette associé qui est agencé pour être entraîné derrière la ou les têtes de travail pour collecter et stocker le fluide de nettoyage usagé soulevé du sol dans un réservoir d'eau sale.
 16. Machine selon l'une quelconque des revendications précédentes, dans laquelle la partie formant poignée est en mesure d'être verrouillée dans une orientation rangée sensiblement verticale dans laquelle le pivo-

tement de la partie formant poignée par rapport à la partie de base est désactivé.

17. Machine selon l'une quelconque des revendications précédentes, dans laquelle la partie de base et la ou les têtes de travail associées sont mises en œuvre au niveau d'une région avant de la machine, le moyen formant roue de guidage étant disposé entre ou à l'arrière de la ou des têtes de travail. 5 10
18. Machine selon l'une quelconque des revendications précédentes, dans laquelle la rotation de la tête de travail sur le sol ne produit sensiblement aucun effet propulsif net sur la machine. 15
19. Machine selon l'une quelconque des revendications précédentes, dans laquelle le moyen d'entraînement comporte un ou plusieurs moteurs électriques portés par la partie de base et accouplés à la ou aux têtes de travail. 20
20. Machine selon la revendication 19, dans laquelle il y a deux têtes de travail généralement en forme de disque disposées côte à côte et orientées de manière à tourner autour d'axes de rotation verticaux parallèles respectifs. 25
21. Machine selon la revendication 20, dans laquelle le moteur ou les moteurs sont configurés et/ou commandés pour amener les têtes de travail à tourner en sens inverse l'une par rapport à l'autre. 30

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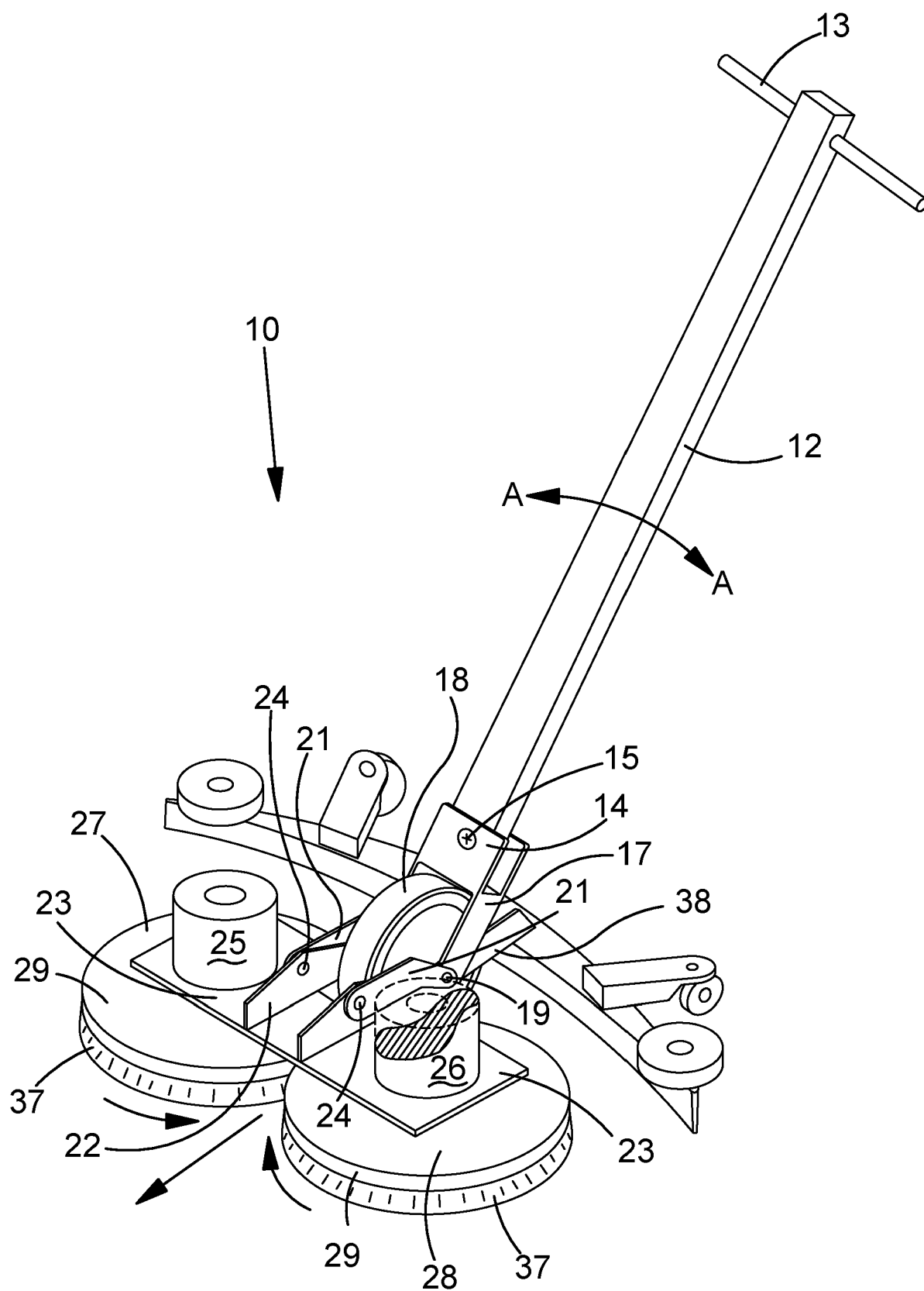


FIG.1

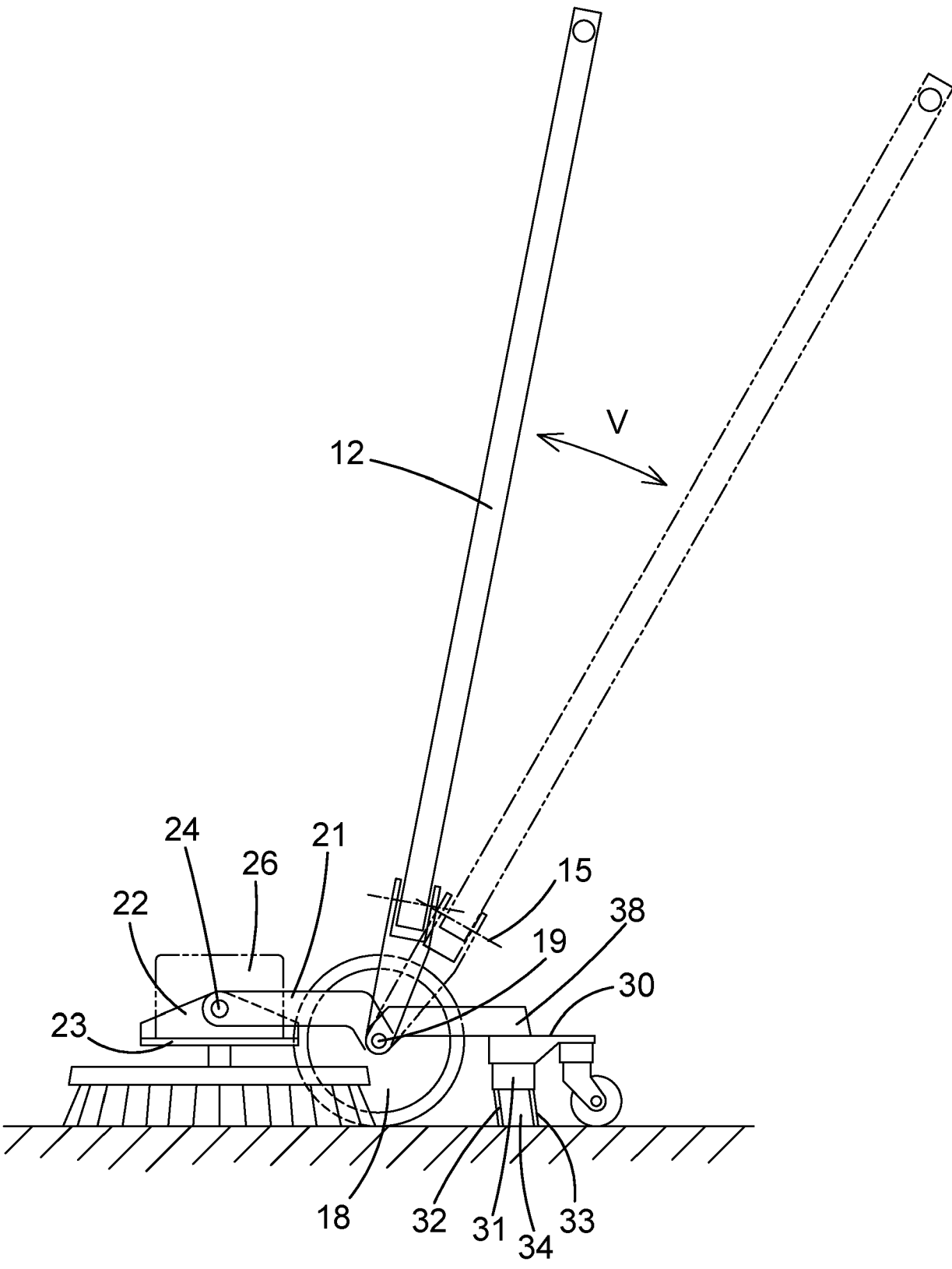


FIG.2

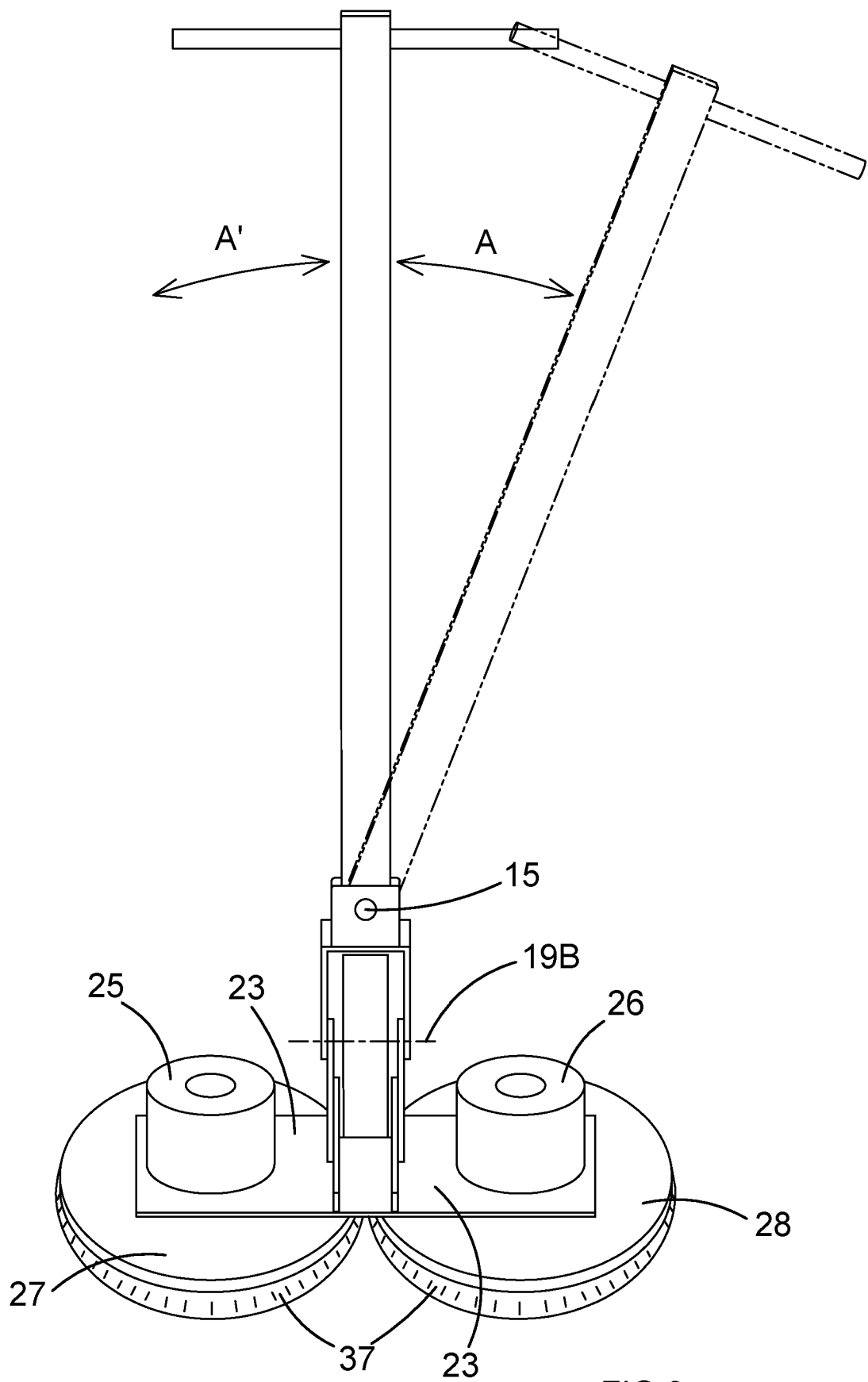


FIG.3

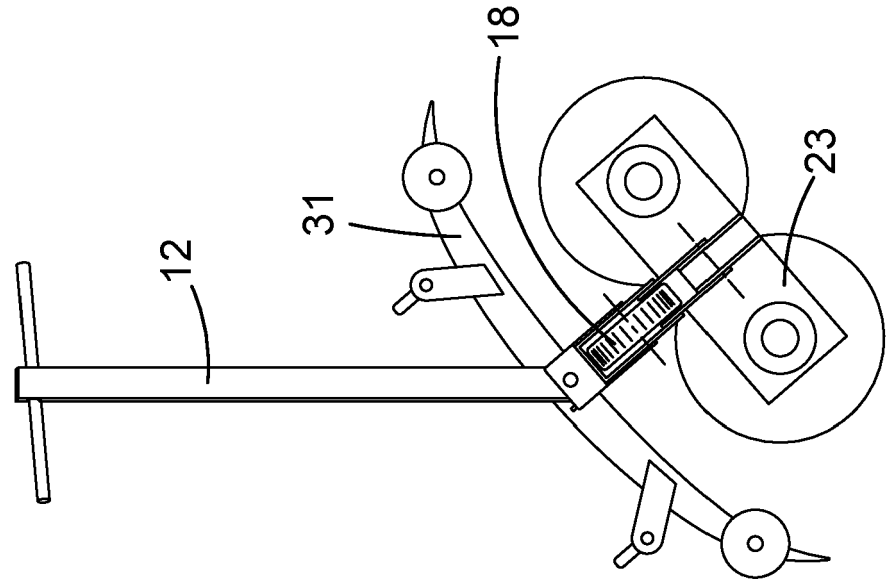


FIG. 4b

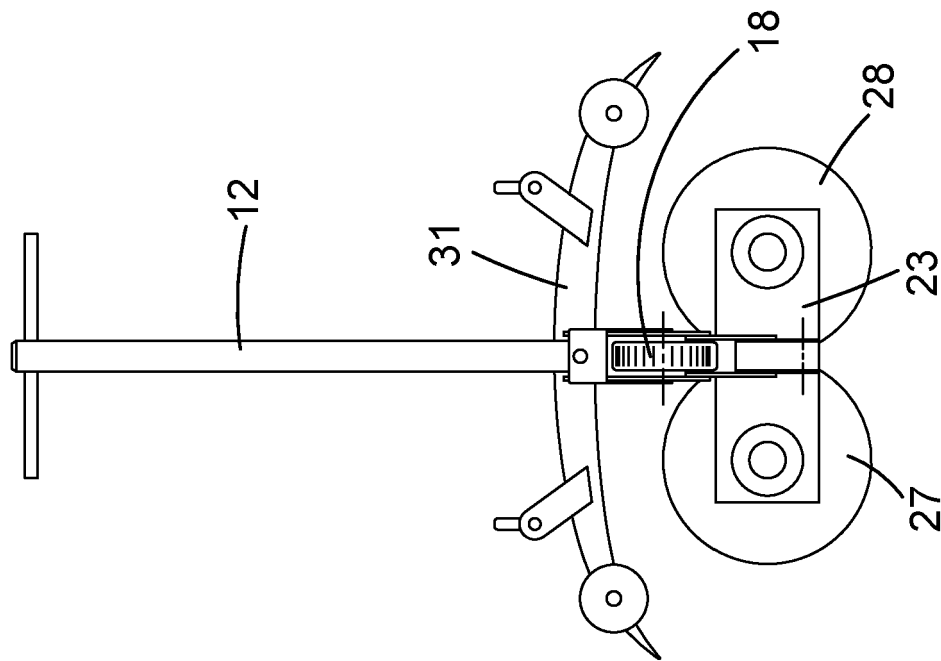


FIG. 4a

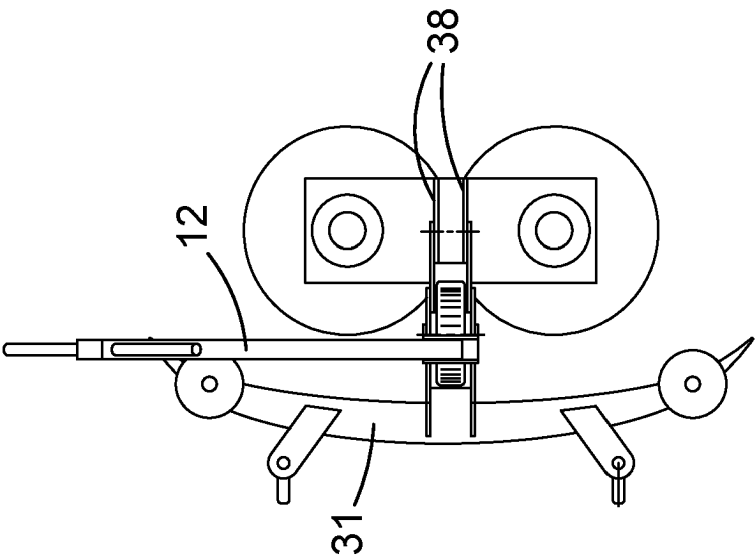


FIG. 4c

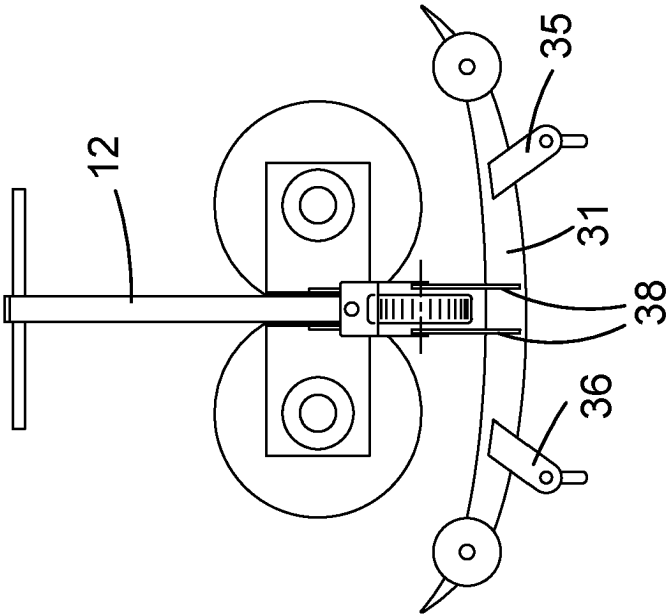


FIG. 4d

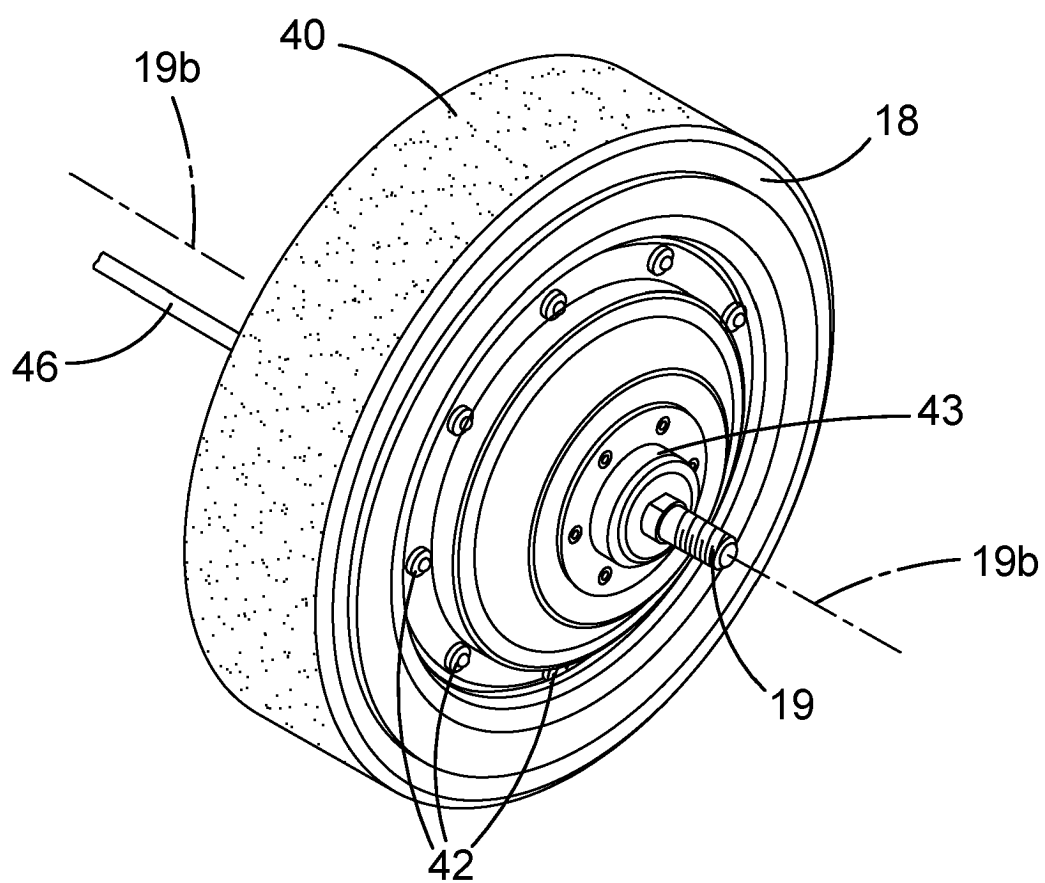


FIG.5A

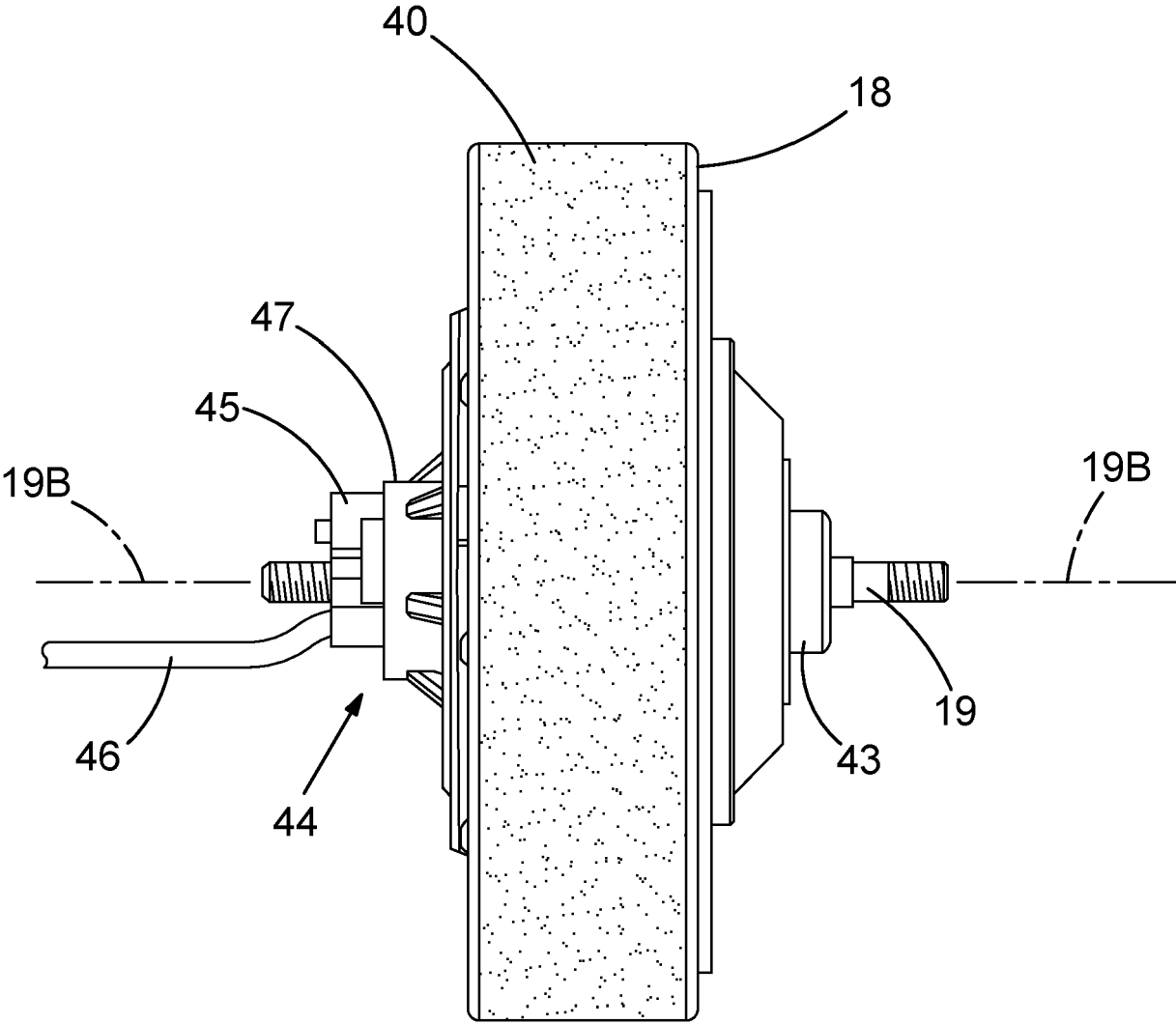


FIG.5B

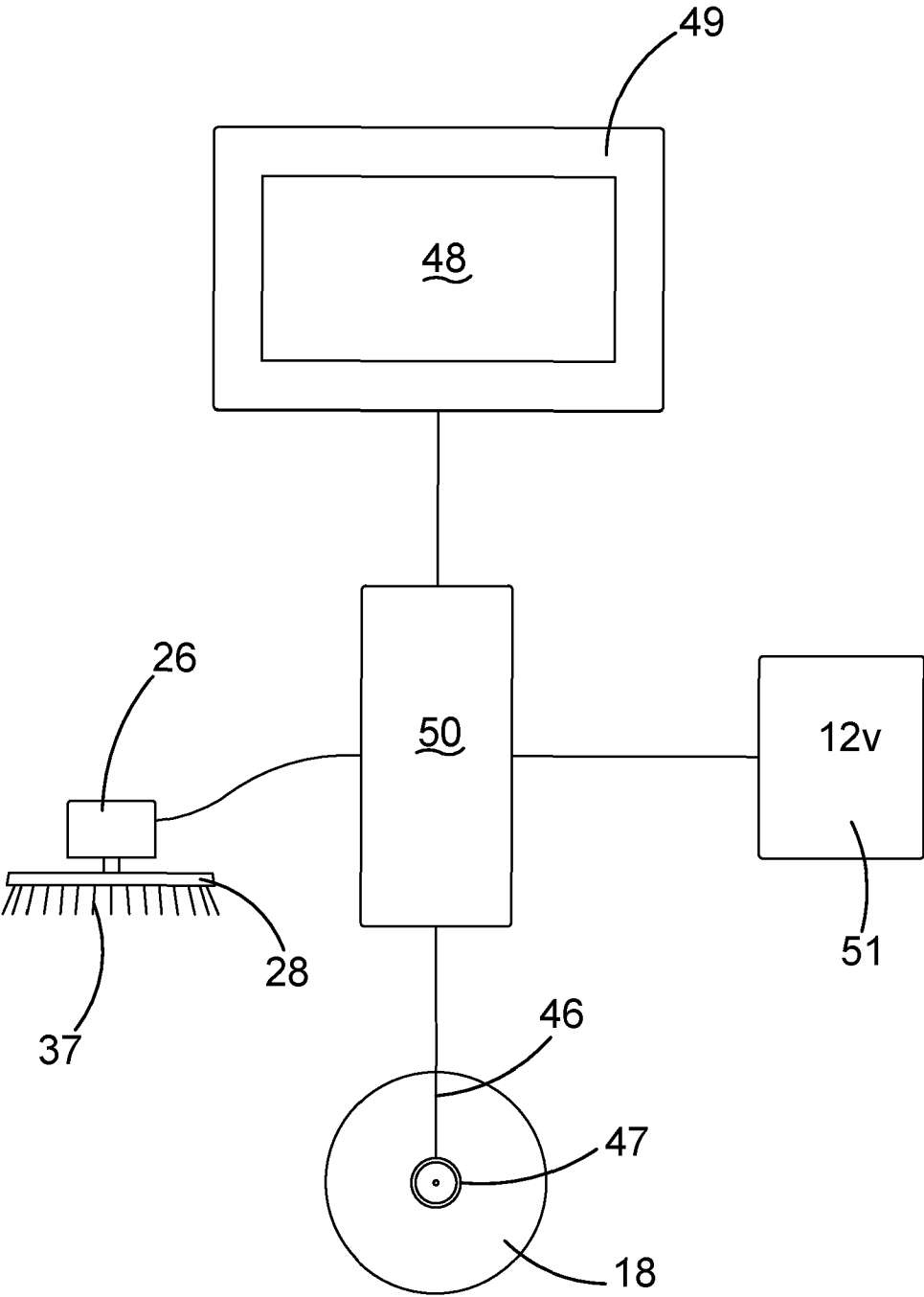


FIG.6

REFERENCES CITED IN THE DESCRIPTION

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