

(19)



(11)

EP 2 398 310 B9

(12)

CORRECTED EUROPEAN PATENT SPECIFICATION

(15) Correction information:
Corrected version no 1 (W1 B1)
Corrections, see
Description Paragraph(s) 11
Claims EN 1

(51) Int Cl.:
A01K 1/01 (2006.01)

(86) International application number:
PCT/NL2010/000022

(48) Corrigendum issued on:
09.10.2013 Bulletin 2013/41

(87) International publication number:
WO 2010/107300 (23.09.2010 Gazette 2010/38)

(45) Date of publication and mention
of the grant of the patent:
15.05.2013 Bulletin 2013/20

(21) Application number: **10703998.4**

(22) Date of filing: **12.02.2010**

(54) **DEVICE FOR REMOVING MANURE FROM A FLOOR**

VORRICHTUNG ZUM ENTFERNEN VON DUNG VON EINEM BODEN

DISPOSITIF POUR L'ENLÈVEMENT DES DÉJECTIONS SUR LE SOL

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK SM TR**

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(30) Priority: **17.02.2009 NL 1036580**

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(43) Date of publication of application:
28.12.2011 Bulletin 2011/52

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Description

BACKGROUND OF THE INVENTION

[0001] The invention relates to a device for removing manure from a floor.

[0002] The invention relates in particular to such a device which is autonomously displaceable, i.e. provided with self-driving and self-steering.

[0003] From WO 00/70937 a device for removing manure from a floor is known, which is provided with a frame on which a manure slide (also called scraper) and a motor-driven drive wheel are mounted. The drive wheel is located behind the manure slide. During operation, the device is supported on the manure slide and on the drive wheel.

[0004] EP 1.690.450 shows a comparable device, wherein two drive wheels or drive caterpillars are disposed behind the manure slide (scraper), on both sides of a block in which the motor is accommodated. Steering takes place by actuating the two wheels individually or by means of an added small steering wheel. In front of the slide there is disposed a sliding shoe by means of which obstacles projecting from the floor, such as bolts or thresholds, can be overcome.

[0005] DE 103 09 106 shows a device for removing manure from a floor, in the form of a tricycle with motor-driven wheels at the rear, on both sides of a frame, and a steering wheel at the front. Two manure slides (scrapers) are located between the rear wheels and the front wheel.

[0006] There is further known a so-called auto-slide, which comprises a front manure slide and a rear manure slide (scraper) which is transverse to the direction of travel, which slides are interconnected by a longitudinal girder on which a drive device is provided as well.

SUMMARY OF THE INVENTION

[0007] It is an object of the invention to provide a device of the type mentioned in the preamble, which is provided with an alternative drive.

[0008] It is an object of the invention to provide a device of the type mentioned in the preamble, which is provided with an alternative steering.

[0009] It is an object of the invention to provide a device of the type mentioned in the preamble, by means of which the hindrance of projections on the floor can be limited.

[0010] It is an object of the invention to provide a device of the type mentioned in the preamble, which is compact.

[0011] In order to achieve at least one of these objects, the invention, from one aspect, provides an unmanned self-propelled and self-steering device for removing manure present on a floor, according to claim 1. Hereby the manure slide is moved forwards, the greatest resistance then being located behind the drive, and forms a compact embodiment where, driving and steering can then take place by one and the same component and the length of

the device can be utilized for accommodating manure and projecting components need hardly be present. The drive can be located near the opening of the manure-accommodating-space.

[0012] The accommodation space can be substantially U-shaped or V-shaped, in which case the legs can enhance the stability of the device. In this case, the manure slide can have two legs for forming the U-shape or V-shape, whose ends extend to at least near the front of the device, the drive being located behind the ends of the legs. The accommodation space can be relatively large, cover a large part of the device in top view, such as, for example, if the two legs have a length in the order of magnitude of the width of the manure slide. The device is then able to accommodate the manure of one working stroke over so-called closed floors and deliver same at an end of a passage(manure)way.

[0013] The two legs can have a length which is greater than half, preferably greater than 2/3, of the overall length of the device. The largest dimension of the accommodation space in longitudinal direction of the device can amount to the order of magnitude of the width of the manure slide.

[0014] From another aspect, not according to the invention, there is provided, an unmanned self-propelled and self-steering device for removing manure present on a floor, comprising a manure slide with a sliding wall and a drive device for the travelling over the floor, wherein the drive device comprises a single, rotatively driven drive which is in driving engagement with the floor and which also forms a steering member. Driving and steering can then take place by one and the same component, in a compact device.

[0015] As described above, in this case, the drive can advantageously be located in front of the sliding wall, wherein the manure slide forms a manure-accommodating-space which opens in forward direction and is confined in rearward direction by the sliding wall, wherein the drive is located within the accommodation space or is located near the opening of the manure-accommodating-space. The accommodation space can be substantially U-shaped or V-shaped, in particular reach the above described dimension.

[0016] The following of the floor can be enhanced if the legs of the U-shaped or V-shaped manure slide are plate-shaped and the manure slide is provided with means for enabling a mutual rotation of at least a portion of the lower edges of the legs in a vertical plane in which the portion concerned is located. The legs of the manure slide can, for example, be deformable in their plane, in particular as a result of the fact that constructive measures for this purpose, such as slots, have been taken in the legs of the manure slide. Alternatively, the manure slide can comprise a rear wall which is deformable about a centre line transverse to a central longitudinal plane of the manure slide.

[0017] In an embodiment which is compact in transverse direction, the drive is located in a central longitu-

dinal plane of the device.

[0018] In one embodiment, the device according to the invention comprises a frame, wherein the drive is fastened to the frame by a first connection, wherein the manure slide is fastened to the frame by a second connection, wherein the second connection is located behind the first connection. The second connection can comprise a hinge with a substantially horizontal centre line transverse to the longitudinal direction, as a result of which the contact of the manure slide with the floor is enhanced.

[0019] In a simple embodiment thereof, the second connection has only one horizontal hinge centre line, preferably located on the manure slide, so that a low point of rotation is obtained.

[0020] In an alternative embodiment, the second connection forms a parallelogram connection.

[0021] Lateral stability is enhanced if the second connection engages the manure slide in at least two locations which are in transverse direction at a distance from each other.

[0022] The second connection can engage the manure slide by a hinge connection, which hinge connection has a substantially horizontal rotational centre line which is perpendicular to a central longitudinal plane of the device, wherein the sliding wall has an upper edge, wherein the rotational centre line is located below at least a portion of the upper edge of the sliding wall.

[0023] It is observed that by unmanned self-propelled and self-steering devices are meant both at least substantially autonomously travelling and (freely) steering devices, whether or not programmed for this purpose, such as the Discovery (registered trademark) manure slide of the registered trademark Lely, and devices in which the travelling and/or steering are/is remotely controlled. In both cases, a motor for the travelling of the device is provided in the device.

[0024] The aspects and features described in this description and the claims of the application and/or shown in the figures of this application may, where possible, also be used separately from each other. These separate aspects may be the subject of divisional patent applications related thereto. This holds in particular for the features and aspects which are described per se in the dependent claims.

BRIEF DESCRIPTION OF THE FIGURES

[0025] The invention will be explained with reference to a number of exemplary embodiments shown in the accompanying figures, in which:

Figures 1A and 1B show a top view and a side view, respectively, of a first exemplary embodiment of a device according to the invention, and
Figures 2A and 2B show a top view and a side view, respectively, of a second exemplary embodiment of a device according to the invention.

DETAILED DESCRIPTION OF THE FIGURES

[0026] The device 1 shown in Figures 1A and 1B for removing manure from a floor 30 of a passageway of a stable comprises a central longitudinal plane M and a drive and control member 2, a large part of which is accommodated in a hood 50, and a manure slide or scraper 4 which is substantially U-shaped with plate-shaped legs 7a,b and plate-shaped rear wall or sliding wall 8, which define a manure-accommodating-space 25 between them. The rear wall 8 can distort to some extent about a horizontal centre line transverse to the central longitudinal plane M, so that the legs 7a,b can pivot to some extent in their plane. The length L and the width B are substantially defined by the manure slide 4. The width B can for example be 0.5 m to 1 m, and the length L for example 1 m. The manure slide 4, in particular the sliding wall 8, has a lower edge 9a, where a polyurethane strip is provided for a proper contact with the floor 30, and an upper edge 9b. In the area of the entrance opening O of the manure-accommodating-space 25, there is a centrally arranged drive wheel 3 for the device 1. The device 1 is supported on the floor 30 by said wheel 3 and the manure slide 4.

[0027] The hood 50 is mounted on a frame plate 45 on which a gearwheel 41 is bearing-supported in a pivotable manner (direction C). By a gearwheel 42 driven by an electric motor 18 controlled by a control unit 15, the gearwheel 41 can be pivoted in order to move the device 1 over the floor.

[0028] On the gearwheel 41 there is disposed an electric motor 17 which drives a pulley 49 and therewith a belt 44 by which the single, central wheel 3 is driven, in the desired direction. The wheel 3 is rotatably bearing-supported about a horizontal centre line at the lower end of a fork 20 which forms a rotatable unit with the gearwheel 41. A pulley 43 is rotationally fixed with the wheel 3 and is driven by the belt 44.

[0029] The electric motor 17 is controlled by the control unit 15. The control unit 15 is capable of being programmed remotely, so that the device 1 can follow autonomously a defined working route, in a repeating manner. The electric motors are fed by an accumulator 16 which can be charged at a non-shown stationary charging station.

[0030] The upper ends of two pairs of link rods 46 are fastened by means of pivot pins 47 in a rotatable manner (direction D) to the lower side of the frame plate 45, at the location of brackets 48, which rods 46 are fastened to cross-bars 22 in a rotatable manner as well (direction D). The cross-bars 22 are fastened to the legs 7a,b of the manure slide 4 at the location of 22a,22b. Alternatively, the rotatability (D) can be effected at said ends 22a,b. In both cases, there is formed a parallelogram construction in which the manure slide 4 is displaceable as a whole in a parallel manner (direction B) with respect to the frame plate 45. The rotational centre line of the connection at the location of the lower ends of the rods

46 is located below the upper edge 9b of the sliding wall 8. The frame plate 45 is kept at a distance above the manure slide 4 by non-shown double-acting torsion springs which are disposed at the location of the pivot pins 47 and tighten the link rods 46 to the depicted position. Alternatively, it is possible to dispose a number of blocks of elastic material between the manure slide 4 and the frame plate 45.

[0031] Rollers 13a,b are provided at the front of the legs 7a,b, in order not to impede the movement of the device 1 too much in the case of contact with a wall.

[0032] After the control unit 15 has been programmed and the accumulator 16 has been charged, it is possible for the device 1 to travel and steer autonomously along programmed trajectories during operation. As the width B will amount to a part of the width of the passageway, it will be necessary to travel over the passageway several times, in parallel paths. The manure-accommodating-space 25 can be so large that all the manure present in the path to be covered on a closed floor 30 (manure accumulation T) can be taken along to the end of the passageway where the entrance opening of a manure pit is located. Despite the fact that the size of the manure-accommodating-space is large with respect to the state of the art, the device 1 is compact and has a high manoeuvrability.

[0033] The device 101 depicted in Figures 2A and 2B corresponds to a large extent to that of Figures 1A and 1B, the outer dimensions being defined by the manure slide proper 104, L,B. The legs 107a,b are fastened in a freely rotatable manner (direction D) to the ends 122a,b of a cross-bar 122 at a location behind the wheel 103. The cross-bar 122 itself is bearing-supported in a freely rotatable manner, at a location below the upper edge 109b of the legs 107a,b, at the lower end of a downwardly and rearwardly extending rigid strip 146 which is fixed to a horizontal frame plate 145. A gearwheel 141 is supported on the frame plate 145 in a manner in which it is rotatable about a vertical centre line H (direction C). The gearwheel 141 engages pinion 142 which is driven by electric motor 118. The gearwheel 141 is provided with an electric motor 117 which drives a pulley 149 and therewith a belt 144 by which a pulley 143, which is rotationally fixed with the single, central wheel 103, is driven, in the desired direction. The wheel 103 is mounted, in a manner in which it is rotatable about a horizontal centre line, in a fork 120 which forms a unit, rotatable about a vertical centre line (direction H), with the gearwheel 141. The drive and the manure-accommodating-space 125 are upwardly screened by a hood 150.

[0034] The rear wall 108 can distort to some extent about a horizontal centre line transverse to the central longitudinal plane M. The device 101 is supported on the floor by the manure slide 104 and the wheel 103. The centre of gravity Z of the upper construction is situated at a short horizontal distance behind the centre line H. The centre line of the connection at the location of the lower end of the strip 146 is located below the upper edge

109b of the sliding wall 108.

[0035] During operation, when the device 101, like the device 1 of Figures 1A and 1B, is travelling and steering in an autonomous manner, manure will be accommodated in the accommodation space 125 which is defined by the legs 107a,b and rear wall 108. By means of the rotational connection at the location of the bar ends 122a, b, the manure slide 104 is able to properly follow the floor 30 in direction A. In this case it is advantageous that the point of rotation is located below the upper edge of the manure slide 104. By means of the electric motor 118 the wheel 103 can be rotated in directions C in order to steer the device 101. The electric motors 117 and 118 can be controlled by a non-shown control unit, as described in the foregoing.

[0036] Due to the position of the drive wheel 3,103 in front of the rear wall 8,108 of the manure slide, said wall will be urged against the floor to a greater extent when the device 1,101 accelerates, so that the slide function is enhanced.

[0037] The above-mentioned description serves to illustrate the operation of preferred embodiments of the invention, and not to limit the scope of the invention. On the basis of the above-mentioned explanation, it will be obvious for a person skilled in the art that there are many variations falling within the scope of the present invention.

30 Claims

1. Unmanned self-propelled and self-steering device (1;101) for removing manure present on a floor (30), comprising a manure slide (4;104) with a sliding wall (8;108) which, when viewed in the customary direction of travel of the device (1;101), forms a first contact surface for manure present on the floor (30), and comprising a drive device for the travelling over the floor (30), wherein the drive device comprises a rotatingly driven drive (3;103) which is in driving engagement with the floor (30) during operation and which is located in front of the sliding wall (8;108), and the drive (3;103) for the device is a single drive, and the drive (3;103) also forms a steering member, which is preferably rotatable as a unit about a substantially vertical centre line, and the manure slide (4;104) forms a manure-accommodating-space (25; 125) which opens in forward direction and is confined in rearward direction by the sliding wall, wherein the drive (3;103) is located within the accommodation space (25;125).
2. Device (1) according to claim 1, wherein the manure slide (4) forms a manure-accommodating-space (25) which opens in forward direction and is confined in rearward direction by the sliding wall (8), wherein the drive (3) is located near the opening of the manure-accommodating-space (25).

3. Device (1;101) according to claim 1 or 2, wherein the accommodation space (25;125) is substantially U-shaped or V-shaped.
4. Device (1; 101) according to claims 1 or 2 and 3, wherein the manure slide (4; 104) has two legs (7a, b; 107a, b) for forming the U- shape or V- shape, whose ends extend to at least near the front of the device (1; 101 wherein the drive (3; 103) is located behind the ends of the legs (7a, b; 107a, b) .
5. Device (1; 101) according to claim 4, wherein the two legs (7a, b; 107a, b) have a length in the order of magnitude of the width of the manure slide (4; 104) .
6. Device (1; 101) according to claim 4, wherein the two legs (7a, b; 107a, b) have a length which is greater than half, preferably greater than 2/3, of the overall length of the device (1) .
7. Device (1;101) according to any one of claims 1-6, wherein the greatest dimension of the accommodation space (25;125) in longitudinal direction of the device amounts to the order of magnitude of the width of the manure slide (4;104).
8. Device (1; 101) according to claim 4, wherein the legs (7a, b; 107a, b) of the manure slide (4; 104) are plate- shaped and the manure slide is provided with means for enabling a mutual rotation of at least a portion of the lower edges of the legs in a vertical plane in which the portion concerned is located.
9. Device (1,101) according to any one of the preceding claims 1-8, wherein the drive (3) is located in a central longitudinal plane of the device.
10. Device (1;101) according to any one of the preceding claims, 1-9 wherein the drive (3; 103) comprises a single wheel.
11. Device (1;101) according to any one of the preceding claims 1-10, comprising a frame (45;145), wherein the drive (3;103) is fastened to the frame (45;145) by a first connection (20;120), wherein the manure slide (4;104) is fastened to the frame by a second connection (46;146), wherein the second connection is located behind the first connection.
12. Device (1;101) according to claim 11, wherein the second connection (46;146) comprises a hinge with a substantially horizontal centre line transverse to the longitudinal direction.
13. Device (101) according to claim 12, wherein the second connection (146) has only one horizontal hinge centre line.
14. Device (101) according to claim 13, wherein the hinge is located on the manure slide (104).
15. Device (1) according to claim 12, wherein the second connection forms a parallelogram connection (46).
16. Device (1; 101) according to any one of claims 11-15, wherein the second connection engages the manure slide (4; 104) in at least two locations (22a, b; 122a, b), which are in transverse direction at a distance from each other.
17. Device (1;101) according to any one of claims 11-16, wherein the second connection engages the manure slide (4;104) by a hinge connection (22;122), which hinge connection has a substantially horizontal rotational centre line which is perpendicular to a central longitudinal plane of the device, wherein the sliding wall (8;108) has an upper edge (9b;109b), wherein the rotational centre line is located below at least a portion of the upper edge of the manure slide (8).
18. Device (1;101) according to any one of the preceding claims 1-17, wherein the device is self-steering.

Patentansprüche

1. Unbemannte, selbstfahrende und selbststeuernde Vorrichtung (1, 101) zum Entfernen von auf einem Boden (30) vorhandenen Dung, umfassend einen Dungschieber (4; 104) mit einer Gleitwand (8; 108), welche bei Betrachtung in üblicher Fahrtrichtung der Vorrichtung (1, 101) eine erste Kontaktfläche für den auf dem Boden (30) vorhandenen Dung bildet, und umfassend eine Antriebsvorrichtung zum Fahren über den Boden (30), wobei die Antriebsvorrichtung einen rotierend angetriebenen Antrieb (3; 103) umfasst, welcher sich in antreibendem Eingriff mit dem Boden (30) während des Betriebs befindet und welcher vor der Gleitwand (8; 108) angeordnet ist, und der Antrieb (3; 103) für die Vorrichtung ein Einzelantrieb ist und der Antrieb (3; 103) auch ein Lenkelement bildet, welches vorzugsweise eine um eine im Wesentlichen vertikale Mittellinie drehbare Einheit ist, und der Dungschieber (4; 104) einen Dungaufnahmeraum (25; 125) bildet, welcher nach vorne offen und nach hinten durch die Gleitwand geschlossen ist, wobei der Antrieb (3; 103) innerhalb des Aufnahmeraums (25; 125) angeordnet ist.
2. Vorrichtung (1) nach Anspruch 1, wobei der Dungschieber (4) einen Dungaufnahmeraum (25) ausbildet, welcher in die Richtung nach vorne offen ist und in die Richtung nach hinten durch die Gleitwand (8) begrenzt ist, wobei der Antrieb (3) nahe der Öffnung des Dungaufnahmeraums (25)

- angeordnet ist.
3. Vorrichtung (1, 101) nach Anspruch 1 oder 2, wobei der Aufnahmeraum (25; 125) im Wesentlichen U-förmig oder V-förmig ist.
 4. Vorrichtung (1, 101) nach den Ansprüchen 1 oder 2 und 3, wobei der Dungschieber (4; 104) zwei Schenkel (7a, b; 107a, b) zum Ausbilden der U-Form oder V-Form aufweist, deren Enden sich wenigstens bis nahe zur Vorderseite der Vorrichtung (1, 101) erstrecken, wobei der Antrieb (3; 103) hinter den Enden der Schenkel (7a, b; 107a, b) angeordnet ist.
 5. Vorrichtung (1, 101) nach Anspruch 4, wobei die zwei Schenkel (7a, b; 107a, b) eine Länge in der Größenordnung der Breite des Dungschiebers (4; 104) aufweisen.
 6. Vorrichtung (1, 101) nach Anspruch 4, wobei die zwei Schenkel (7a, b; 107a, b) eine Länge aufweisen, welche größer als die Hälfte der Gesamtlänge, vorzugsweise größer als 2/3 der Gesamtlänge der Vorrichtung (1) ist.
 7. Vorrichtung (1, 101) nach einem der Ansprüche 1 bis 6, wobei die größte Abmessung des Aufnahmeraums (25; 125) in Längsrichtung der Vorrichtung der Größenordnung der Breite des Dungschiebers (4; 104) entspricht.
 8. Vorrichtung (1, 101) nach Anspruch 4, wobei die Schenkel (7a, b; 107a, b) des Dungschiebers (4; 104) plattenförmig sind und der Dungschieber mit Mitteln ausgestattet ist, um eine gemeinsame Drehung wenigstens eines Abschnitts der unteren Kanten der Schenkel in eine vertikale Ebene zu ermöglichen, in welcher der betroffene Abschnitt angeordnet ist.
 9. Vorrichtung (1, 101) nach einem der Ansprüche 1 bis 8, wobei der Antrieb (3) in einer zentralen Längsebene der Vorrichtung angeordnet ist.
 10. Vorrichtung (1, 101) nach einem der Ansprüche 1 bis 9, wobei der Antrieb (3; 103) ein einzelnes Rad umfasst.
 11. Vorrichtung (1, 101) nach einem der Ansprüche 1 bis 10, umfassend einen Rahmen (45; 145), wobei der Antrieb (3; 103) am Rahmen (45; 145) durch eine erste Verbindung (20; 120) befestigt ist, wobei der Dungschieber (4; 104) am Rahmen durch eine zweite Verbindung (46; 146) befestigt ist, wobei die zweite Verbindung hinter der ersten Verbindung angeordnet ist.
- 5 12. Vorrichtung (1, 101) nach Anspruch 11, wobei die zweite Verbindung (46; 146) ein Scharnier mit einer im Wesentlichen horizontalen Mittellinie quer zur Längsrichtung umfasst.
 - 10 13. Vorrichtung (101) nach Anspruch 12, wobei die zweite Verbindung (146) nur eine horizontale Scharnierzmittellinie aufweist.
 - 15 14. Vorrichtung (101) nach Anspruch 13, wobei das Scharnier auf dem Dungschieber (104) angeordnet ist.
 - 20 15. Vorrichtung (1) nach Anspruch 12, wobei die zweite Verbindung eine Parallelogrammverbindung (46) ausbildet.
 - 25 16. Vorrichtung (1, 101) nach einem der Ansprüche 11 bis 15, wobei die zweite Verbindung an wenigstens zwei Stellen (22a, b; 122a, b) in Eingriff mit dem Dungschieber (4; 104) steht, welche in einer Querrichtung in einem Abstand zueinander vorliegen.
 - 30 17. Vorrichtung (1, 101) nach einem der Ansprüche 11 bis 16, wobei die zweite Verbindung in Eingriff mit dem Dungschieber (4; 104) durch eine Scharnierverbindung (22; 122) steht, wobei die Scharnierverbindung eine im Wesentlichen horizontale Mittellinie aufweist, welche senkrecht zu einer zentralen Längsebene der Vorrichtung liegt, wobei die Gleitwand (8; 108) eine obere Kante (9b; 109b) aufweist, wobei die Rotationsmittellinie unterhalb wenigstens eines Abschnitts der oberen Kante des Dungschiebers (8) angeordnet ist.
 - 45 18. Vorrichtung (1, 101) nach einem der Ansprüche 1 bis 17, wobei die Vorrichtung selbststeuernd ist.

Revendications

1. Dispositif automoteur et autoguidé sans pilote (1 ; 101) pour ôter du fumier présent sur un sol (30), comprenant une glissière à fumier (4 ; 104) avec une paroi coulissante (8 ; 108) qui, en vue dans la direction habituelle de déplacement du dispositif (1 ; 101), forme une première surface de contact pour du fumier présent sur le sol (30), et comprenant un dispositif d'entraînement pour le déplacement sur le sol (30), dans lequel le dispositif d'entraînement comprend un entraînement entraîné de façon rotative

- (3 ; 103) qui est en prise d'entraînement avec le sol (30) au cours du fonctionnement et qui est positionné devant la paroi coulissante (8 ; 108), et l'entraînement (3 ; 103) pour le dispositif est un entraînement seul, et l'entraînement (3 ; 103) forme également un élément de guidage, qui est de préférence rotatif de façon monobloc autour d'une ligne centrale sensiblement verticale, et la glissière à fumier (4 ; 104) forme un espace de logement de fumier (25 ; 125) qui s'ouvre dans une direction avant et est confiné dans une direction arrière par la paroi coulissante, dans lequel l'entraînement (3 ; 103) est positionné dans l'espace de logement (25 ; 125).
2. Dispositif (1) selon la revendication 1, dans lequel la glissière à fumier (4) forme un espace de logement de fumier (25) qui s'ouvre dans une direction avant et est confiné dans une direction arrière par la paroi coulissante (8), dans lequel l'entraînement (3) est positionné près de l'ouverture de l'espace de logement de fumier (25).
 3. Dispositif (1 ; 101) selon la revendication 1 ou 2, dans lequel l'espace de logement (25 ; 125) est sensiblement en forme de U ou en forme de V.
 4. Dispositif (1 ; 101) selon les revendications 1 ou 2 et 3, dans lequel la glissière à fumier (4 ; 104) comporte deux pieds (7a, b ; 107a, b) pour former la forme de U ou la forme de V, dont les extrémités s'étendent au moins jusqu'à proximité de l'avant du dispositif (1 ; 101), dans lequel l'entraînement (3 ; 103) est positionné derrière les extrémités des pieds (7a, b ; 107a, b).
 5. Dispositif (1 ; 101) selon la revendication 4, dans lequel les deux pieds (7a, b ; 107a, b) possèdent une longueur de l'ordre de grandeur de la largeur de la glissière à fumier (4 ; 104).
 6. Dispositif (1 ; 101) selon la revendication 4, dans lequel les deux pieds (7a, b ; 107a, b) possèdent une longueur qui est supérieure à la moitié, de préférence supérieure à 2/3, de la longueur totale du dispositif (1).
 7. Dispositif (1 ; 101) selon l'une quelconque des revendications 1 à 6, dans lequel la dimension la plus importante de l'espace de logement (25 ; 125) dans la direction longitudinale du dispositif équivaut à l'ordre de grandeur de la largeur de la glissière à fumier (4 ; 104).
 8. Dispositif (1 ; 101) selon la revendication 4, dans lequel les pieds (7a, b ; 107a, b) de la glissière à fumier (4 ; 104) présentent une forme de plaque et la glissière à fumier est pourvue de moyens pour permettre une rotation mutuelle d'au moins une partie des bords inférieurs des pieds dans un plan vertical dans lequel la partie concernée est positionnée.
 9. Dispositif (1 ; 101) selon l'une quelconque des revendications précédentes 1 à 8, dans lequel l'entraînement (3) est positionné dans un plan longitudinal central du dispositif.
 10. Dispositif (1 ; 101) selon l'une quelconque des revendications précédentes 1 à 9, dans lequel l'entraînement (3 ; 103) comprend une seule roue.
 11. Dispositif (1 ; 101) selon l'une quelconque des revendications précédentes 1 à 10, comprenant un cadre (45 ; 145), dans lequel l'entraînement (3 ; 103) est fixé au cadre (45 ; 145) par un premier raccord (20 ; 120), dans lequel la glissière à fumier (4 ; 104) est fixée au cadre par un second raccord (46 ; 146), dans lequel le second raccord est positionné derrière le premier raccord.
 12. Dispositif (1 ; 101) selon la revendication 11, dans lequel le second raccord (46 ; 146) comprend une articulation avec une ligne centrale sensiblement horizontale transversale à la direction longitudinale.
 13. Dispositif (101) selon la revendication 12, dans lequel le second raccord (146) comporte seulement une ligne centrale d'articulation horizontale.
 14. Dispositif (101) selon la revendication 13, dans lequel l'articulation est positionnée sur la glissière à fumier (104).
 15. Dispositif (1) selon la revendication 12, dans lequel le second raccord forme un raccord en parallélogramme (46).
 16. Dispositif (1 ; 101) selon l'une quelconque des revendications 11 à 15, dans lequel le second raccord entre en prise avec la glissière à fumier (4 ; 104) à au moins deux emplacements (22a, b ; 122a, b), qui sont, dans une direction transversale, à une distance l'un de l'autre.
 17. Dispositif (1 ; 101) selon l'une quelconque des revendications 11 à 16, dans lequel le second raccord entre en prise avec la glissière à fumier (4 ; 104) par l'intermédiaire d'un raccord articulé (22 ; 122), lequel raccord articulé comporte une ligne centrale de rotation sensiblement horizontale qui est perpendiculaire à un plan longitudinal central du dispositif, dans lequel la paroi coulissante (8 ; 108) comporte un bord supérieur (9b ; 109b), dans lequel la ligne centrale de rotation est positionnée en dessous d'au moins une partie du bord supérieur de la glissière à fumier (8).

18. Dispositif (1 ; 101) selon l'une quelconque des revendications précédentes 1 à 17, dans lequel le dispositif est autoguidé.

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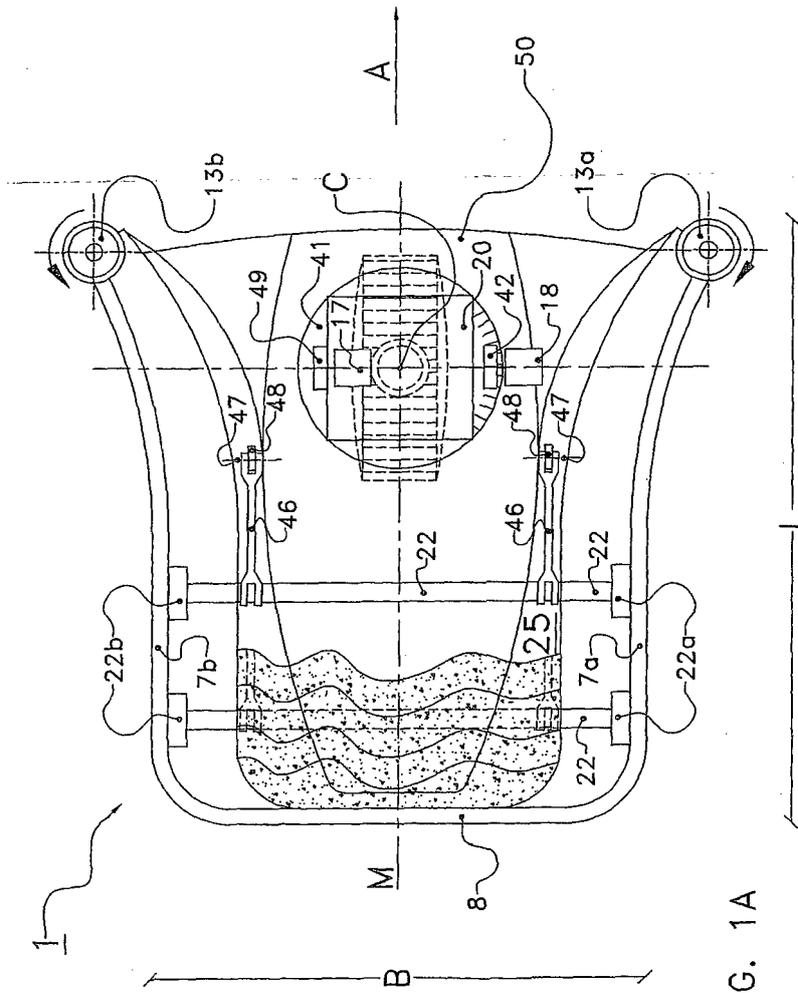
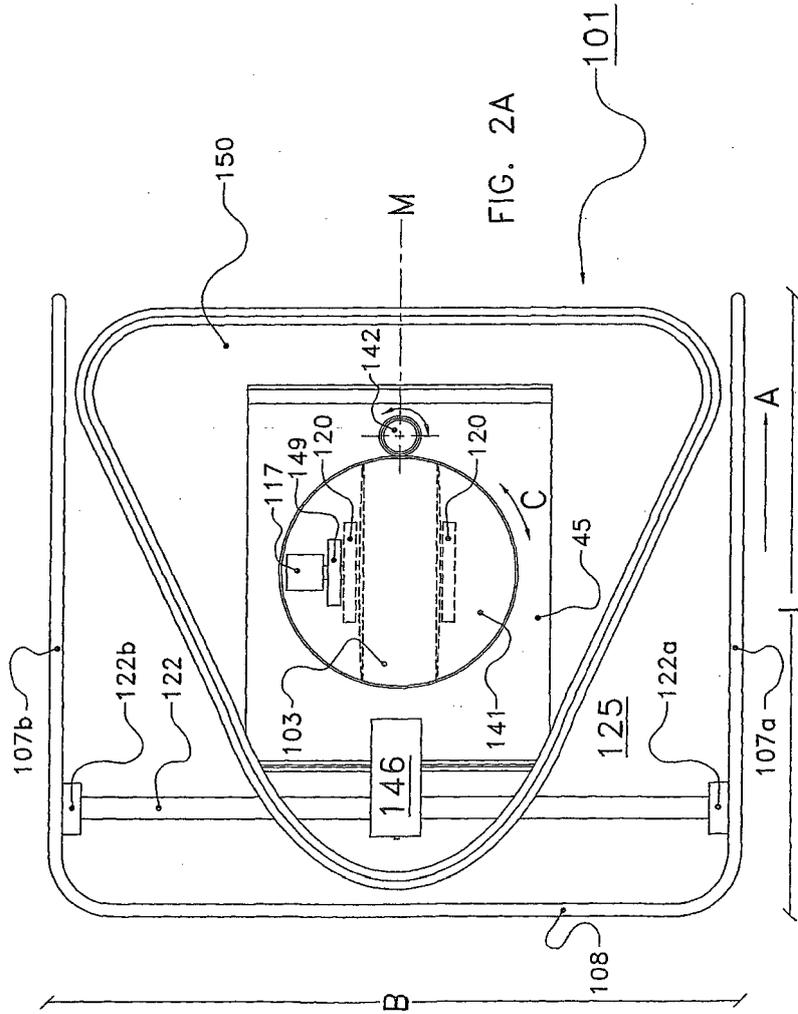
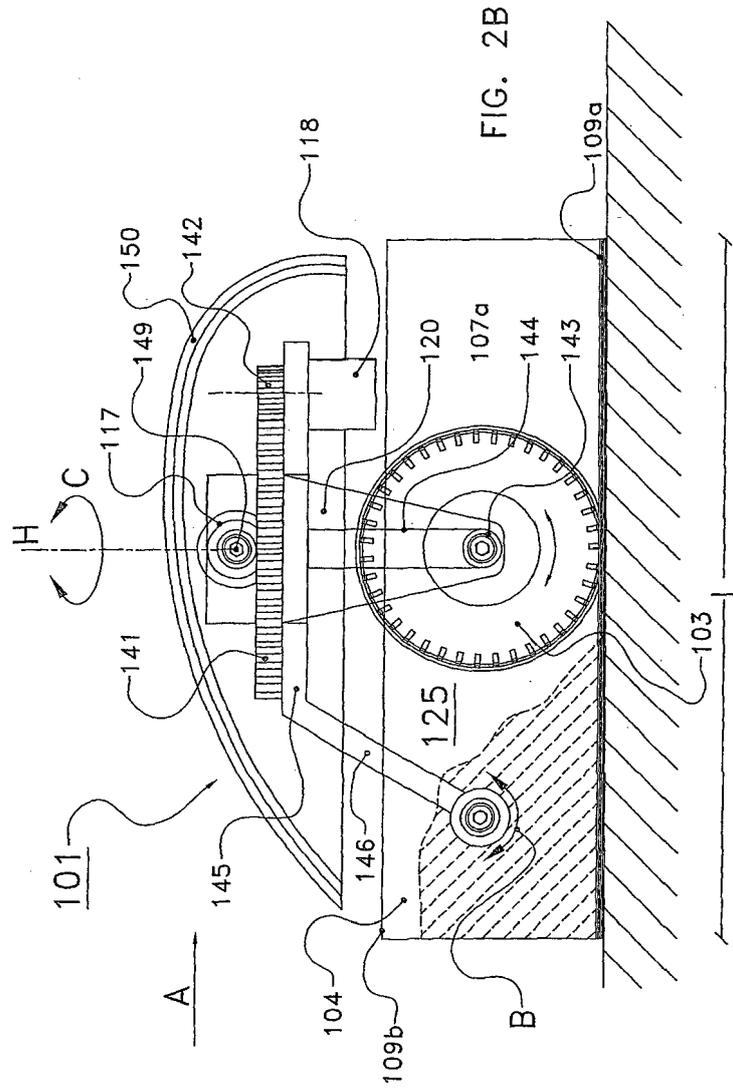


FIG. 1A





REFERENCES CITED IN THE DESCRIPTION

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