

(19)



(11)

EP 3 205 251 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.08.2017 Bulletin 2017/33

(51) Int Cl.:
A47L 11/282 (2006.01) **A47L 11/40** (2006.01)
A47L 11/24 (2006.01) **E01H 1/04** (2006.01)

(21) Application number: **17154933.0**

(22) Date of filing: **07.02.2017**

(84) Designated Contracting States:
**AL 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 RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(71) Applicant: **ING. O. FIORENTINI S.p.A.**
50033 Firenzuola (Firenze) (IT)

(72) Inventor: **FRANCHINI, Marco**
50039 Vicchio (Firenze) (IT)

(74) Representative: **Brazzini, Silvia et al**
Società Italiana Brevetti S.p.A.
Corso dei Tintori, 25
50122 Firenze (IT)

(30) Priority: **09.02.2016 IT UB20160601**

(54) **PROFESSIONAL SWEEPER WITH EXTRACTABLE COLLECTING BODY FOR COLLECTING DIRT**

(57) The present invention refers to a new model of professional sweeper with on-board operator and with extractable and tiltable collecting body for collecting dirt.

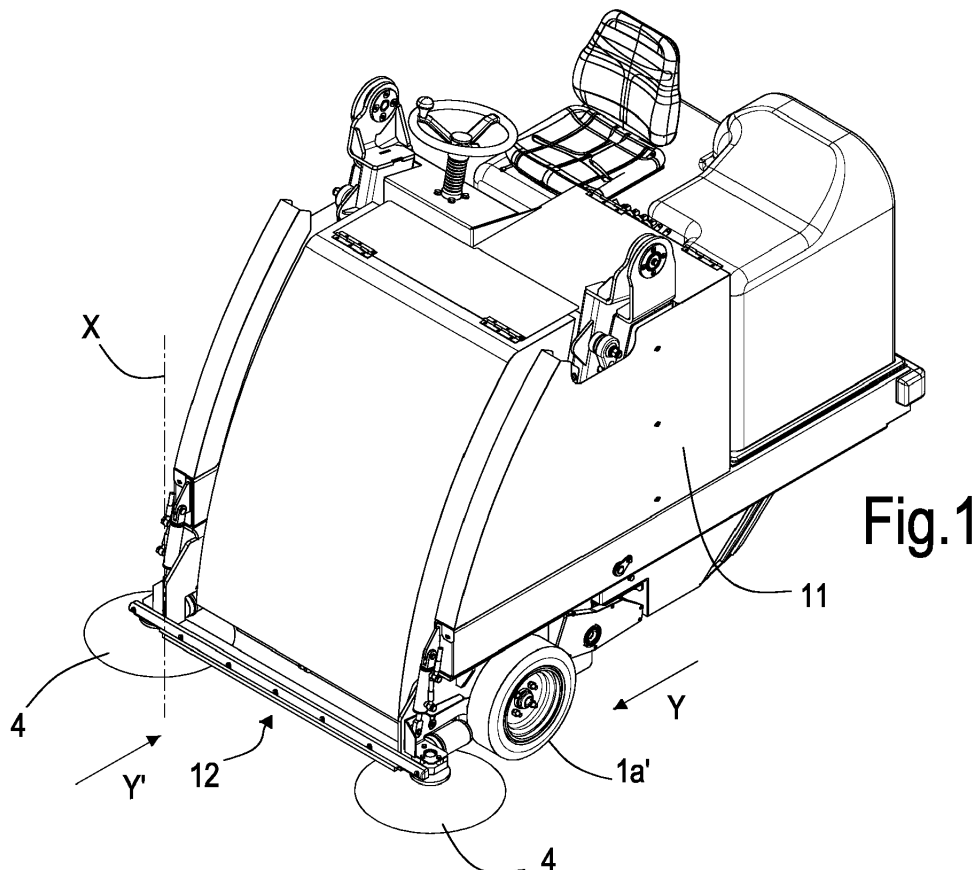


Fig.1

EP 3 205 251 A1

Description

[0001] The present invention refers to a new model of professional sweeper with on-board operator. Such known sweepers are used in the field of professional cleaning and are used specifically for cleaning large spaces.

[0002] In the state of the art all machines with on-board operator have a configuration comprising a machine body generally with three wheels, a collecting body hinged to the machine body and moved by an electric or hydrodynamic actuator between an unloading position in which it is extracted from the machine body and a working position, in which it is engaged with the machine body.

[0003] The sweeper also comprises a sweeping group constrained in substantially central position and below the machine body that comprises a brush or, in some variants also two counter-rotating brushes.

[0004] Known sweepers comprise models with a front collecting body and with a rear collecting body. In machines with a front collecting body the collecting body is extracted and lifted towards the front direction, and in machines with a rear collecting body the collecting body is extracted towards the rear direction. In both cases there is a door that is open when the dirt is thrown by the brush into the collecting body, and is completely closed before the collecting body is lifted, so that nothing falls while it is lifted.

[0005] A filtering system also acts on the collecting body, said filtering system being made up of a filter and an electrical aspirator that sucks directly from the filter. The filtering system promotes the suction towards the collecting body of the direct and dust lifted by the sweeping group.

[0006] Possibly, the machine can also foresee a second sweeping group made up of side brushes that have a secondary function of conveying and particularly of cleaning flush with the wall, which cannot otherwise be reached.

[0007] The central sweeping group is usually surrounded on its perimeter by four straps of flexible material, which are in contact with the ground and which prevent dust and small debris from escaping from the front or side.

[0008] In machines with a rear collecting body, the strap that is placed in front of the sweeping group with one brush, being in contact with the ground, curves and acts as an upward slide of the debris lifted by the brush, so that it ends up in the collecting body itself.

[0009] In the variant with a rear collecting body, the collecting body is often undersized for the actual amount of dirt collected. Therefore, there is a need to have a collecting body of larger dimensions and capacity.

[0010] In the variant with a front collecting body, the sweeping group violently pushes the dirt forwards along the ground towards the mouth of the collecting body. The same door, when open, can constitute a valid help for directing the dirt towards the collecting body.

However, in this case the dirt tends to accumulate as the opening of the collecting body, constituting an obstacle for the complete and uniform filling of the collecting body itself.

[0011] Of course, the problems of filling the collecting body described above are substantial because they limit the functionality of the machine. Moreover, given that the emptying operations of the collecting body are complex, emptying the collecting body would frequently involve a substantial number of machine stops and a major slowing down of the cleaning operations.

[0012] The scope of the sweeper according to the invention is to solve the problems of the known sweepers just discussed. In particular, a scope of the sweeper according to the invention is to obtain a high efficiency in terms of cleaning and dirt collected.

[0013] Furthermore, a further scope of the sweeper according to the invention is to optimise and facilitate the unloading operations of the dirt collected.

[0014] Another scope of the present invention is to provide a sweeper that has the possibility of installing filters of increased size with respect to currently known sweepers.

[0015] Yet another scope is for the sweeper according to the invention to be easy to repair and to make ordinary and/or extraordinary maintenance operations, in particular of the central sweeping group, easy.

[0016] The characteristics and advantages of the sweeper according to the invention will become clearer from the following description of an embodiment thereof, given as an example and not for limiting purposes, with reference to the attached drawings, in which:

- figure 1 is a perspective view of the sweeper according to the invention;
- figure 2 shows a side view of the sweeper of figure 1;
- figure 3 shows a cross section of the sweeper of the previous figures with an extractable and tiltable body of the sweeper in unloading position;
- figure 4 is a perspective view of the sweeper of figure 3.

[0017] With reference to said figures, the sweeper according to the invention comprises a machine main body 1 that houses a driving station 2. The machine body also installs locomotion means of the sweeper such as an engine and a system of wheels 1 a, of the known type and according to a conventional configuration, therefore not described in detail. The figures then indicate a direction Y that represents the advancing direction of the sweeper during work. Finally, the machine main body 1 defines a bottom 10 and two sides 11 that extend from the bottom. A passage 12 that extends according to the direction Y is defined below said machine body, being upwardly delimited between the bottom 10, downwardly by the surface to be cleaned; at the side, the passage 12 is delimited by the sides 11. On each side, on top of the machine the front wheels 1 a' are mounted, whereas a

further single and motorised wheel 1 a" is mounted on the back of the machine.

[0018] Furthermore, the sweeper comprises a first 3 and a second 4 sweeping group the movement of which goes over the ground or more generally the surface to be cleaned on which the sweeper moves.

[0019] The first sweeping group 3, or main brushing group, comprises at least one horizontal central brush 3, i.e. with its own rotation axis Z parallel to the surface to be cleaned that is perpendicular to the direction Y, and has a main longitudinal extension according to such an axis. The at least one central brush 3 thus substantially occupies the entire width of the machine body 1, from one side to the other. In rotation the horizontal brush 3 tangentially licks the surface to be cleaned obtaining the lifting of the dirt towards a collecting body, which will be discussed further below.

[0020] The figures show a version of the sweeper in which the first brushing group 3 comprises two brushes.

[0021] The second sweeping group 4, or side brushes group, is supported on top of the sweeper and comprises at least two brushes pivoting with respect to its own vertical axis X arranged perpendicular to the surface to be cleaned.

[0022] The side brushes 4 are mounted integrally with the machine main body 1 and are arranged at the sides of the sweeper. The two brushes are counter-rotating with respect to one another so that their combined movement obtains the conveying of dirt towards such a passage 12, in a direction Y' opposite to the advancement direction, indicated in the figures.

[0023] The horizontal central brush 3 is placed in rearward position according to said advancement direction Y with respect to the side brushes 4.

[0024] In the variant illustrated in the figures, the two side brushes 4 are connected together by a bar 40 that is in a position, according to the variant embodiment illustrated in the figures, as close as possible to the ground. Possibly, in a further variant embodiment such a bar could also not be foreseen.

[0025] With particular reference to figure 4, the sweeper according to the invention also comprises an extractable and tiltable body 6 pivotally connected to the machine body in a front position with respect to the driver. In detail, the extractable and tiltable body 6 supports the main brushing group 3 and comprises a front portion 60 and a main portion 61 that defines, as will be seen shortly, the aforementioned collecting body.

[0026] The extractable and tiltable body 6 is pivotally connected to the machine body so as to be movable between a working position and an unloading position. In the working position the extractable and tiltable body defines an integrated part of the machine body; the front portion defines a nose of the sweeper in the working position, whereas the collecting body 61 is housed below the machine body, in the insertion passage 12. Furthermore, in the working position the second sweeping group affects the passage 12 and is placed in rearward position

with respect to the side brushes so as to intercept the dirt conveyed by them.

[0027] In the unloading position, on the other hand, the collecting body 61 is completely extracted from the machine body itself and in raised position at the front of the driving station. In such a position it is possible to unload the collecting body of the dirt accumulated during the cleaning operations.

[0028] The rotation of the extractable body from the unloading position to the working position is such as not to interfere with the axle of the side brushes 4.

[0029] Now the working position will be taken as reference.

[0030] The central brush 3 is arranged between the front portion 60 of the extractable and tiltable body 6 and the collecting body 61, so as to affect a mouth 61 a of the latter. The collecting body 61 has a main extension backwards with respect to the central sweeping group 3, according to the direction Y', so as to optimise the space and occupy the bottom 10 of the sweeper in full. In detail, the collecting body extends between the mouth 61 a and a discharge door 61 b placed at the opposite end with respect to such a mouth. In general, the mouth 61 a is close to the front wheels of the sweeper, whereas the discharge door 61 b is at the rear wheel.

[0031] The discharge door 61 b, when the extractable and tiltable body is in unloading position, can be opened to obtain the emptying of the collecting body (figure 4). In the unloading position the door 61 b advantageously faces downwards, towards the ground, so as to promote the unloading of the collecting body. The opening of the door is controlled by the operator after activation of hydraulic or pneumatic means such as a piston, of the known type and therefore not described in detail.

[0032] The collecting body also foresees an access door 61 c that makes it possible, when it is open, to place the inside of the collecting body in communication with a group of filtering means 7 arranged on-board the machine. In detail, at and downstream of the filters, according to a known solution, suction means (not shown) operate, to promote the collection of the dirt lifted by the second brushes group towards the collecting body. Such suction means are associated with filtering means. In the solution illustrated in the figures, the filtering means 7 are housed in a suitable chamber 70 on-board the machine, behind the driving station 2. The access door 61 c thus places such a chamber in communication with the inside of the collecting body.

[0033] Coming to the movement of the extractable and tiltable body, this is obtained with drive means 8, preferably but not for limiting purposes of the hydraulic type. In detail, the front portion 60 of the extractable and tiltable body comprises a side frame 60a the free end 600a of which is pivotally connected to the machine body 1, in a front position with respect to the driving station, in the hinge point indicated with G in the figures.

[0034] The drive means 8, in the preferred solution, are in the form of a hydraulic piston anchored between

the frame of the machine main body and the side frame 60a of the front portion. The extension of the piston determines the rotation about the hinge point G of the extractable and tiltable body and its simultaneous tilting effect by means of the misaligned anchoring of the piston.

[0035] The sweeper according to the invention has numerous advantages. In detail, thanks to the positioning of the second sweeping group directly on the extractable and tiltable body, the machine body has a bottom libero free from encumbrances that is exploited for the reversible insertion of the collecting body, through the rotation movement with respect to the machine main body.

[0036] The collecting body is thus particularly capacious because it is not installed in front of or behind the machine body but occupies an autonomous space below it. This means that the sweeper has a greater dirt load capacity with respect to known sweepers.

[0037] The movement of the extractable and tiltable body, as well as the opening or closing movements of the doors of the collecting body are controlled by the operator.

[0038] In raised position the central sweeping group is exposed and thus particularly easy to repair or in general to subject to maintenance and cleaning operations.

[0039] Although in the figures and in the description reference is made to a sweeper with on-board operator, there is no reason why the solution object of the claims cannot also be applied to sweepers that do not have the on-board driving station, but that are controlled by an operator on the ground by means of remote control.

[0040] Furthermore, since the filtering means are arranged on-board the machine and not inside the collecting body like in known sweepers, they can be larger in size, with a clear advantage in terms of efficiency of the suction system and also in terms of reduction of the cleaning operations, maintenance and replacements required. In particular, the filter surface reached can be up to 4 or 5 times greater than that of known machines, through larger filters or the use of more than one filter, also arranged in non-horizontal configuration.

[0041] Possibly, in a variant embodiment, the second main brushing group can foresee two counter-rotating horizontal brushes arranged adjacent to each other. In this case, between the two brushes there will be a deflector to promote the directing of the dirt towards the collecting body.

[0042] Furthermore, there is no reason why the central brush cannot have a rotation movement with respect to a vertical axis, perpendicular to the surface to be cleaned.

[0043] Moreover, the sweeper can foresee a group of straps like the one object of the prior art, and therefore not described again in detail, to surround the central sweeping group.

[0044] The present invention has been described with reference to a preferred embodiment thereof. It should be understood that there can be other embodiments that derive from the same inventive core, all of which are covered by the scope of protection of the claims given here-

inafter.

Claims

1. An industrial sweeper for cleaning a surface such as a floor, comprising:

- a machine main body (1) housing at least engine means and a system of wheels for the movement of said sweeper on said surface to be cleaned, said machine main body defining a bottom (10) which faces said surface to be cleaned;

- a passage (12) defined below said machine body, being defined upwardly from said bottom (10), downward from said surface to clean and laterally by sides (11) of said main body extending from said bottom, said passage extending according to a direction (Y') opposite to a advancement direction (Y) of the sweeper;

- a main brushing group (3) affecting said passage (12) for picking up dirt from said surface to be cleaned;

- side brushes group (4) placed in correspondence of said sides (11) of said machine main body to channel the dirt towards said passage (12);

said sweeper being **characterized in that** it further comprises an extractable and tiltable body (6) connected to said machine main body (1) and movable between a working position and an unloading position, said extractable and tiltable body defining a collecting body (61) for collecting said dirt, wherein in said working position said collecting body (61) is housed in said passage (12), while in said unloading position said collecting body is extracted from said machine main body, said main brushing group (3) being integral with said extractable and tiltable body (6) and arranged in correspondence of an inlet mouth (61 a) of said collecting body, so that in said working position said main brushing group (3) affects said passage (12) to collect the dirt and to direct it towards said mouth (61 a).

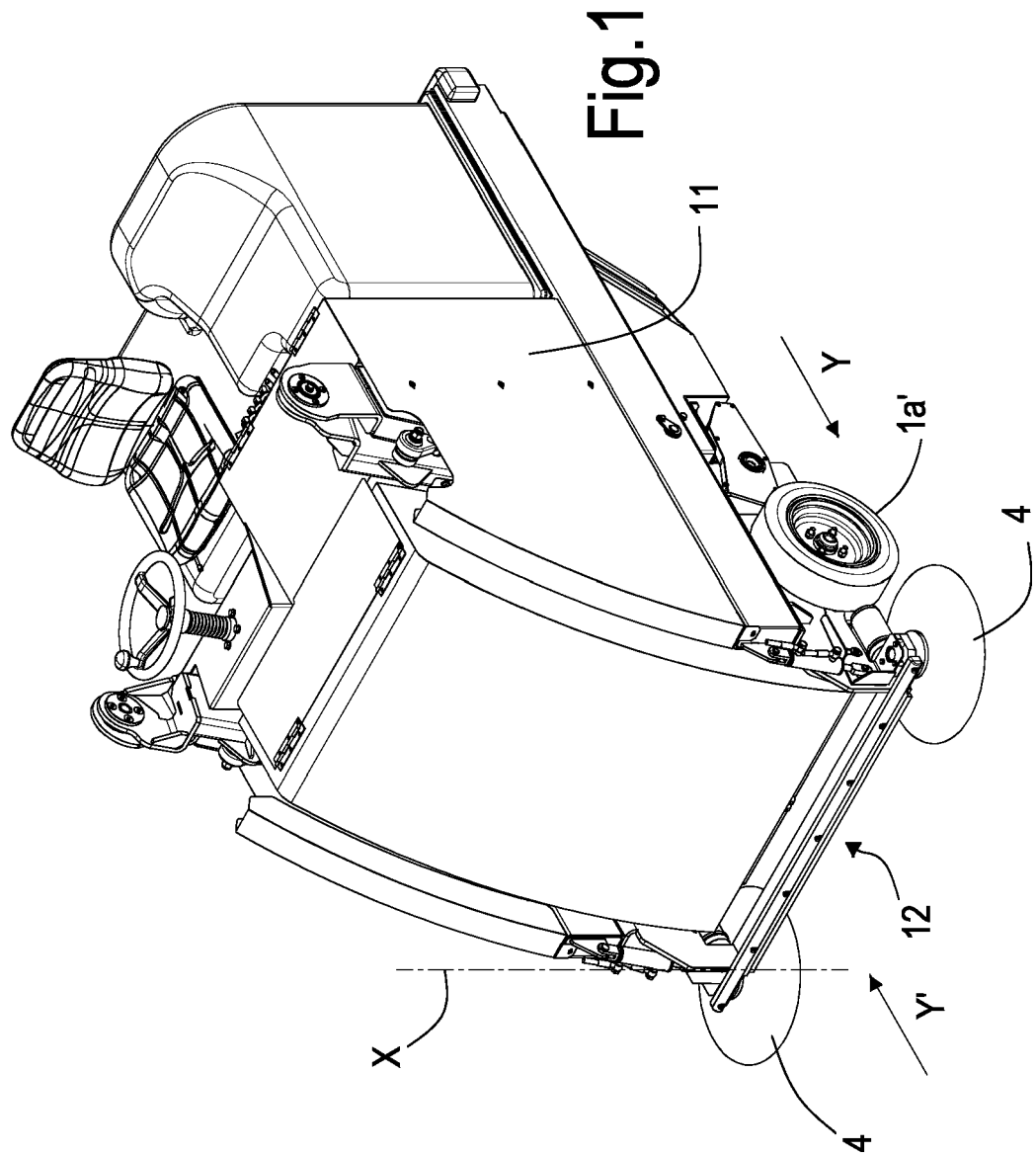
2. The sweeper according to claim 1, wherein said collecting body (61) comprises an discharge door (61 b) located at an opposite end with respect to said mouth (61 a), said discharge door (61 b) being directed toward the ground when said extractable and tiltable body is in the unloading position.

3. The sweeper according to claim 2, wherein in said working position said mouth (61 a) is placed in correspondence of the front of said sweeper, while said discharge door (61 b) is placed at the rear of said sweeper.

4. The sweeper according to any one of the previous claims, wherein said main brushing group (3) comprises at least one brush (3) rotatable around a respective horizontal axis (Z) parallel to said surface to be cleaned. 5
5. The sweeper according to claim 4 wherein, said side brushes group comprises two brushes (4) rotatable around a respective vertical axis (X) and mutually counter-rotating, each of them being placed in correspondence of a respective side (11) of said main body (1). 10
6. The sweeper according to claim 5, wherein in said working position, said at least one brush (3) is placed in a backward position with respect to said advancement direction (Y) with respect to said two brushes (4). 15
7. The sweeper according to any one of the previous claims, wherein said extractable and tiltable body (6) comprises a front portion (60) which in said working position defines a nose of said sweeper, said collecting body (61) extending from said front portion (60). 20 25
8. The sweeper according to any one of the previous claims, wherein said collecting body comprises an access door (61c), in said working position said door facing to a chamber (70) of said machine main body in which are housed filtering means (7), the opening of said access door putting in communication the interior of said collecting body with said chamber (70), and then with said filtering means (7). 30 35
9. The sweeper according to any one of the previous claims, wherein said extractable and tiltable body (6) is pivotally connected to said machine body (1) around a hinge point (G), the movement of said extractable and tiltable body (6) between said working position and said unloading position being obtained by means of hydraulic drive means (8). 40
10. The sweeper according to any one of the previous claims wherein said main brushing group (3) comprises two brushes with horizontal axis, placed adjacent. 45

50

55



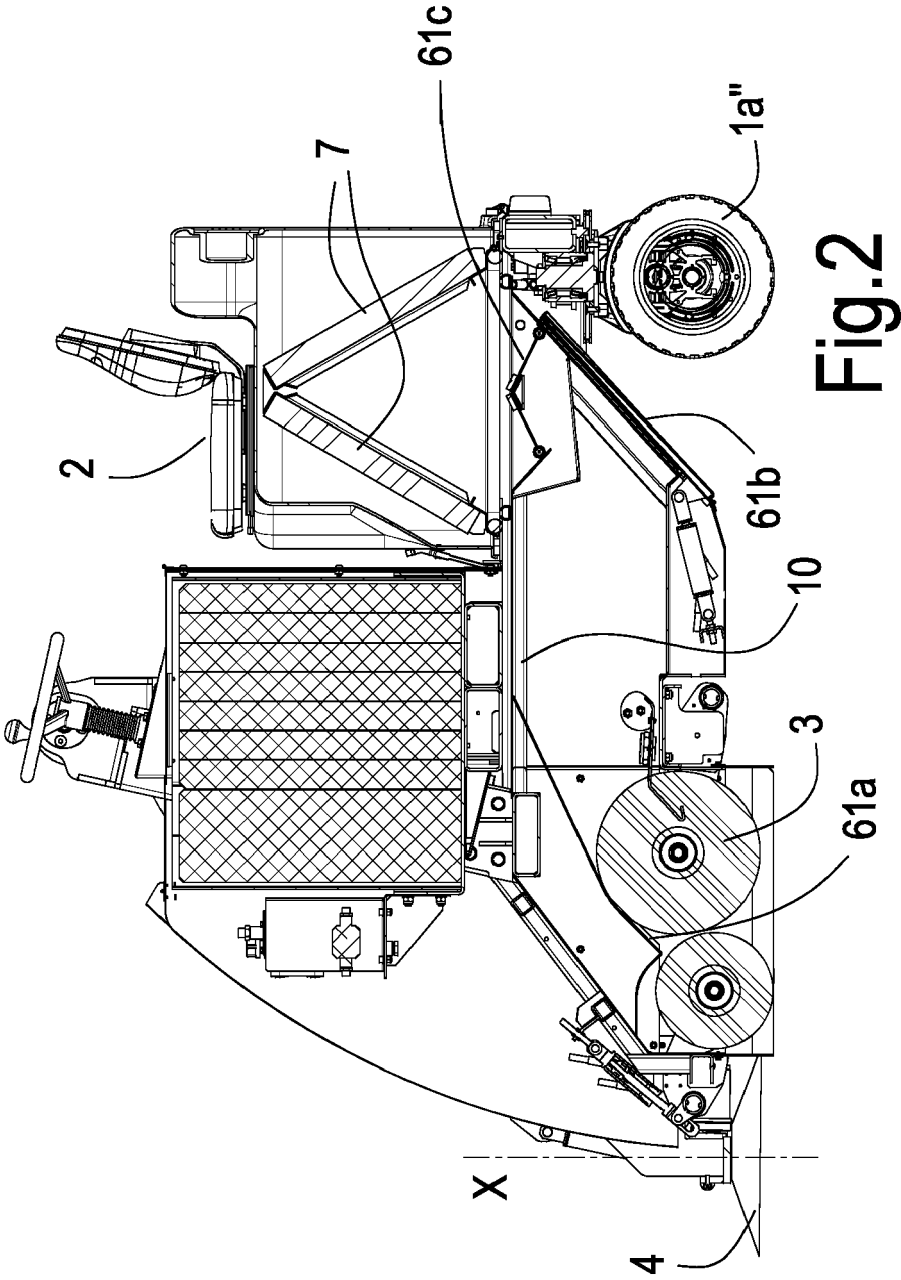
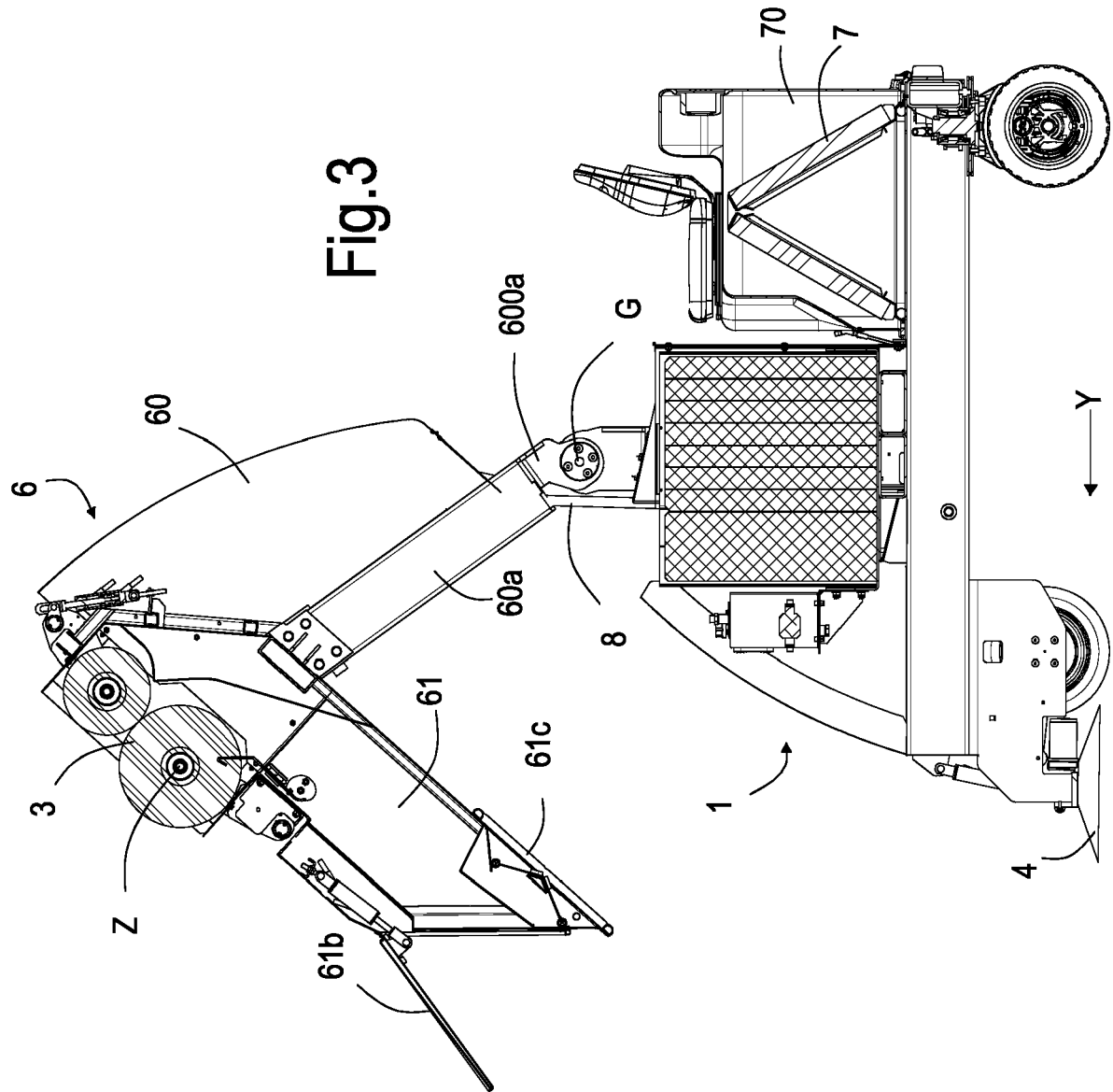
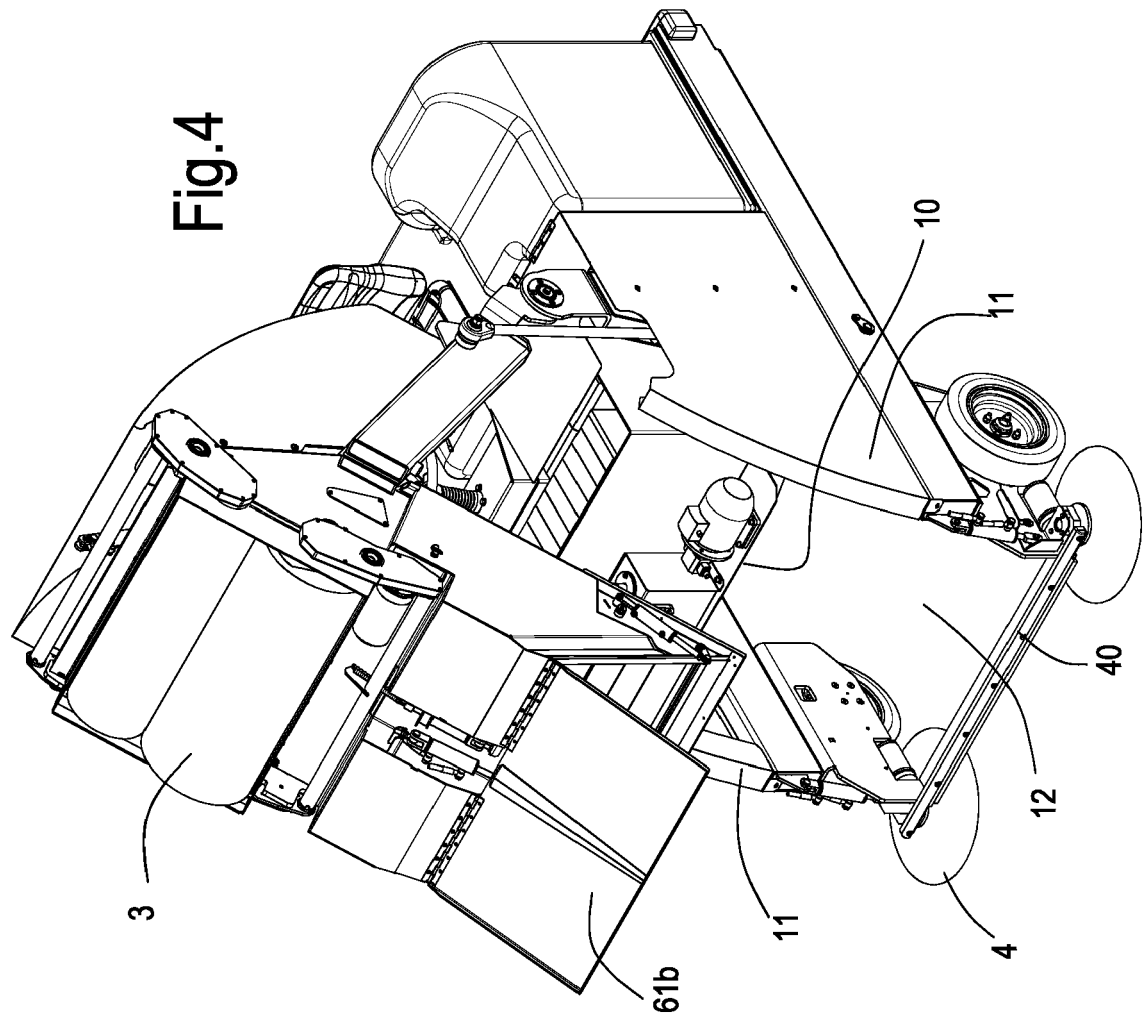


Fig.2







EUROPEAN SEARCH REPORT

Application Number
EP 17 15 4933

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 390 387 A (DUBE GERALD [CA] ET AL) 21 February 1995 (1995-02-21) * column 3, line 40 - column 5, line 29; claims; figures *	1	INV. A47L11/282 A47L11/40 A47L11/24 E01H1/04
A	US 2006/282975 A1 (BASHAM MICHAEL T [US] ET AL) 21 December 2006 (2006-12-21) * paragraphs [0021] - [0052]; figures 5-9 *	1	
A	US 2009/217480 A1 (WILMO MICHAEL STEWART [US]) 3 September 2009 (2009-09-03) * claims; figures *	1	
A	KR 2008 0003791 A (TENNANT CO [US]) 8 January 2008 (2008-01-08) * abstract; figure 8 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47L E01H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 June 2017	Examiner Lopez Vega, Javier
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 15 4933

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-06-2017

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5390387 A	21-02-1995	CA 2135980 A1	10-12-1995
		US 5390387 A	21-02-1995
US 2006282975 A1	21-12-2006	AU 2006244470 A1	16-11-2006
		BR PI0611656 A2	31-05-2011
		CN 101166454 A	23-04-2008
		EP 1887918 A1	20-02-2008
		JP 4779013 B2	21-09-2011
		JP 2008539888 A	20-11-2008
		KR 20080003791 A	08-01-2008
		US 2006282965 A1	21-12-2006
		US 2006282975 A1	21-12-2006
		WO 2006121783 A1	16-11-2006
US 2009217480 A1	03-09-2009	EP 2262954 A1	22-12-2010
		US 2009217480 A1	03-09-2009
		WO 2009108955 A1	03-09-2009
KR 20080003791 A	08-01-2008	AU 2006244470 A1	16-11-2006
		BR PI0611656 A2	31-05-2011
		CN 101166454 A	23-04-2008
		EP 1887918 A1	20-02-2008
		JP 4779013 B2	21-09-2011
		JP 2008539888 A	20-11-2008
		KR 20080003791 A	08-01-2008
		US 2006282965 A1	21-12-2006
		US 2006282975 A1	21-12-2006
		WO 2006121783 A1	16-11-2006