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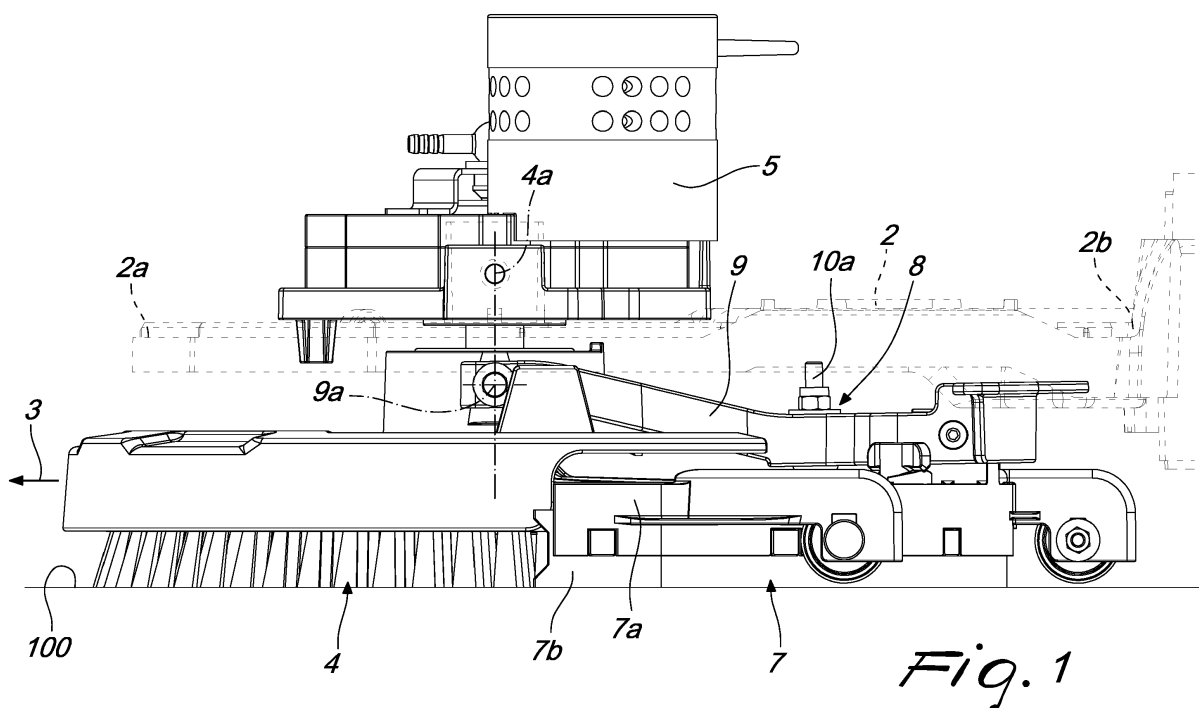
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MA(71) Applicant: **Fimap S.P.A.****37059 Zevio, Frazione Santa Maria (VR) (IT)**(72) Inventor: **Ruffo, Massimiliano****37121 Verona (IT)**(74) Representative: **Modiano, Micaela Nadia et al****Modiano & Partners (IT)****Via Meravigli, 16****20123 Milano (IT)**(30) Priority: **05.05.2014 IT VR20140120**(54) **FLOOR CLEANING MACHINE**

(57) A floor cleaning machine, comprising a supporting structure (2) that has, along a forward travel direction (3) of the machine, a front part (2a) and a rear part (2b) and supports a brush (4), which can be actuated rotationally, about a rotation axis (4a) that is arranged substantially vertically in use, and a squeegee (7) located in a rear position with respect to the brush (4) along the forward travel direction (3) of the machine; the squeegee (7) is mounted rotatably about an oscillation axis that is

substantially parallel to the rotation axis (4a) of the brush (4) and connection means (8) are provided which can be activated on command and are adapted to couple rigidly the squeegee (7) to the brush (4) in its rotation about the rotation axis (4a), in order to move the squeegee (7) from the rear position to a forward position with respect to the brush (4), along the forward travel direction (3) of the machine.

*Fig. 1***EP 2 941 996 A1**

Description

[0001] The present invention relates to a floor cleaning machine.

[0002] Floor cleaning machines are known which are equipped with a brush that rotates about a vertical axis and are provided with at least one nozzle for dispensing a washing liquid.

[0003] Furthermore, these machines have a squeegee, which is arranged in a rear position with respect to the brush along the forward travel direction of the machine and slides in contact with the floor, allowing to collect the washing liquid and the dirt removed by the action of the brush so that they can be picked up by an intake, associated with the machine, so as to leave the floor dry and clean during the forward travel of the machine.

[0004] This type of machine suffers the drawback that when it is moved backward, i.e., in the opposite direction with respect to their normal forward travel direction, they leave the floor wet, since the squeegee is unable, in this situation, to collect the washing liquid released by the dispensing nozzle.

[0005] The aim of the present invention is to solve this drawback, by providing a floor cleaning machine that allows the squeegee to collect the washing liquid and dirt even when the machine is moved in the opposite direction with respect to its forward travel direction.

[0006] Within this aim, an object of the invention is to provide a floor cleaning machine that can be practical to use for the user.

[0007] Another object of the present invention is to provide a floor cleaning machine that has an extremely simple structure.

[0008] This aim and these and other objects that will become better apparent hereinafter are achieved by the floor cleaning machine according to the invention as defined in claim 1.

[0009] Further characteristics and advantages will become better apparent from the description of a preferred but not exclusive embodiment of the floor cleaning machine according to the invention, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figure 1 is a schematic side elevation view of the machine according to the invention, with parts omitted for the sake of simplicity;

Figure 2 is a side elevation view of the machine according to the invention, in which a portion is shown in cross-section along a vertical plane;

Figure 3 is a side elevation view of the machine according to the invention in the inclined position, with its front part raised;

Figure 4 is a view of the machine in the condition of Figure 3, with a part shown in cross-section along a vertical plane;

Figure 5 is an enlarged-scale view of a detail of Figure 4;

Figure 6 is a side view of the machine according to the invention in the inclined condition of Figure 3, in which the squeegee is located in front of the brush; Figure 7 is a side elevation view of machine according to the invention in a condition in which it is not tilted;

Figure 8 is a sectional view of the machine according to the invention, taken along a vertical plane and in a backward-tilted condition, with its front part raised; Figure 9 is a top plan view of the machine according to the invention, with the squeegee arranged in a forward position.

[0010] With reference to the figures, a floor cleaning machine according to the invention, designated generally by the reference numeral 1, comprises a supporting structure 2, which has, along a forward travel direction 3 of the machine, a front part 2a and a rear part 2b.

[0011] In particular, the supporting structure 2, on its side directed toward the floor 100, supports a brush 4, which can be actuated by motor means 5 with a rotary motion about a rotation axis 4a that is arranged, during use, substantially vertically.

[0012] In particular, the brush 4 can, for example, be constituted by a disk 6a that can be coupled detachably to the actuation shaft of the motor means 5. Bristles 6b are anchored to the disk 6a and are intended to act by friction on the floor 100.

[0013] Optionally, one or more nozzles for dispensing a washing liquid can be associated with the supporting structure 2.

[0014] A squeegee 7 is further associated with the supporting structure 2 and is located in the rear position with respect to the brush 4 along the forward travel direction 3 of the machine.

[0015] In particular, according to the illustrated example, the squeegee 7 is formed as usual by an arc-like supporting body 7a, which is extended around a portion of the brush 4 and to which one or more flexible laminas 7b, intended to slide on the floor 100, are coupled.

[0016] According to the invention, the squeegee 7 is mounted so that it can rotate about an oscillation axis that is substantially parallel to or, more preferably, substantially coincides with the rotation axis 4a of the brush 4.

[0017] Also according to the invention, there are connection means 8, which can be activated on command and are adapted to integrally associate the squeegee 7 with the brush 4, so that the squeegee 7 can be turned by the brush about its oscillation axis, so as to move the squeegee 7 from the position behind the brush 4, along the forward travel direction 3 of the machine, to a diametrically opposite position, in which it is arranged in practice in front of said brush, again along the forward travel direction 3 of the machine.

[0018] In this manner, once the squeegee 7 has been moved to said front position, it is possible to move the supporting structure 2 in the opposite direction with respect to the forward travel direction 3, i.e., backwards or

in reverse, with the squeegee 7 always in a position behind the brush 4 and therefore capable of acting on the floor 100 after the brush 4, so as to be able to collect effectively the washing liquid emitted by the dispensing nozzles and the dirt removed by the brush 4, leaving the floor 100 dry and clean.

[0019] Advantageously, the connection means 8 can be activated by tilting the supporting structure 2, lifting its front part 2a from the floor 100, with respect to its rear part 2b, as shown in particular in Figure 8.

[0020] For example, this tilt of the supporting structure 2 can be achieved by the user by using as a lever an elongated handle 20, which rises upward from the rear part 2b of the supporting structure and by pivoting on wheels 21, conveniently associated with the rear part 2b of the supporting structure 2, in a position that lies behind the assembly constituted by the brush 4 and by the squeegee 7.

[0021] In particular, the user, by pushing downward on the grip end 20a of the handle 20, can rotate the supporting structure 2 around the region of contact with the floor 100 of its rear part, constituted by the wheels 21, so as to raise from the floor its front part 2a with respect to its rear part 2b, as shown by way of example in Figure 3 and in Figure 8.

[0022] Advantageously, stop means are also provided which are adapted to stop the rotation performed by the squeegee 7 integrally with the brush 4 when the squeegee 7 is located at the front position, preventing it from continuing beyond in rotation.

[0023] For example, the stop means can be constituted by a resting surface, which is formed in the front part 2b of the supporting structure 2 and is intended to be engaged by abutment by a portion of the squeegee 7.

[0024] As shown, the squeegee 7 conveniently is connected to an end of a supporting arm 9, which is pivoted, at its other end, to the supporting structure 2 about the oscillation axis of the squeegee 7.

[0025] Advantageously, the connection means 8 comprise a friction body 10, which is supported by the supporting arm 9 and is adapted to make contact with the brush 4, following the activation of the connection means 8, so as to integrally couple the supporting arm 9 and therefore the squeegee 7 with respect to the brush.

[0026] More particularly, the supporting arm 9 can rotate with respect to the supporting structure 2 also about an articulation axis 9a that is substantially perpendicular to said oscillation axis of the squeegee 7, in order to allow the friction body 10 to pass from an inactive condition, shown in particular in Figure 2, in which it is disengaged from the brush 4, when the supporting structure 2 is in a position that is not inclined with respect to the floor, to an active condition, in which the friction body 10 is supported in contact with friction against the brush 4 when the supporting structure 2 is moved to an inclined condition with lifting of its front part 2a from the floor 100 with respect to its rear part 2b and vice versa.

[0027] In particular, the friction body 10 is arranged so

as to face the upper face of the disk 6a of the brush 4, so as to be able to make contact with it when it is in its active condition.

[0028] Conveniently, the friction body 10 can be made of elastically yielding material, such as for example rubber or the like, and for example can be fixed to the supporting arm 9 by means of a threaded portion 10a, which is integral therewith and can be engaged by a locking nut 10b.

[0029] Operation of the machine according to the invention is as follows.

[0030] In order to clean the floor 100, the motor means 5 of the brush 4 are activated so that it can move with a rotary motion about its own rotation axis 4a.

[0031] By causing the advancement of the supporting structure 2 along the forward travel direction 3, the brush 4 acts progressively on the various regions of the floor 100, removing the dirt that is present with the aid of the washing liquid emitted by the dispensing nozzles, and the squeegee 7 collects the washing liquid and the removed dirt.

[0032] In this situation, the supporting structure is in a condition that is not inclined with respect to the floor 100 and the friction body 10 is spaced from the brush 4 and accordingly the squeegee 7 is uncoupled with respect to the rotation of the brush 4.

[0033] If the user wishes to move the supporting structure 2 in the opposite direction with respect to the forward travel direction 3, he/she first of all tilts the supporting structure 2 so as to raise its front part 2a from the floor 100 with respect to the rear part 2b, pivoting on the wheels, as shown in Figure 8.

[0034] By doing so, the brush 4 and the squeegee 7 rise from the floor 100 and, by losing contact with the floor 100, rotate, due to its own weight, the supporting arm 9 about the articulation axis 9a, with consequent approach of the friction body 10 to the disk 6a of the brush 4 until the friction body 10 makes contact with the disc 6a of the brush 4.

[0035] Once the friction body 10 has made contact with the disc 6a of the brush 4, the squeegee 7 is turned by the brush 4 about its own oscillation axis, thus moving from the position behind the brush to the position in front of said brush, remaining in this position thanks to its retention caused by the stop means.

[0036] At this point the user can return the supporting structure 2 to a non-tilted condition, lowering again the front part 2a of the supporting structure 2 and then, as shown in Figure 9, can move the machine in the opposite direction with respect to the forward travel direction 3, the squeegee 7 being always able to operate in a position that lies behind the brush 4.

[0037] To then return the squeegee 7 back to the rear position, it is sufficient for the user to move the machine in the forward travel direction 3 in order to achieve the automatic rotation of the squeegee 7 about its own oscillation axis from the front position to the rear position, due to the friction of the squeegee 7 with the floor 100.

[0038] From what has been described above it is evident that the invention is capable of achieving fully the intended aim, since it allows to clean the floor both by making the machine travel in its normal forward travel direction and by moving it in the opposite direction.

[0039] All the characteristics of the invention indicated above as advantageous, convenient or the like may also be omitted or be replaced with equivalents.

[0040] The individual characteristics described with reference to general teachings or particular embodiments may all be present in other embodiments or may replace characteristics in these embodiments.

[0041] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0042] In practice, the materials used, so long as they are compatible with the specific use, as well as the shapes and dimensions, may be any according to requirements.

[0043] All the details may further be replaced with other technically equivalent elements.

[0044] The disclosures in Italian Patent Application No. VR2014A000120 from which this application claims priority are incorporated herein by reference.

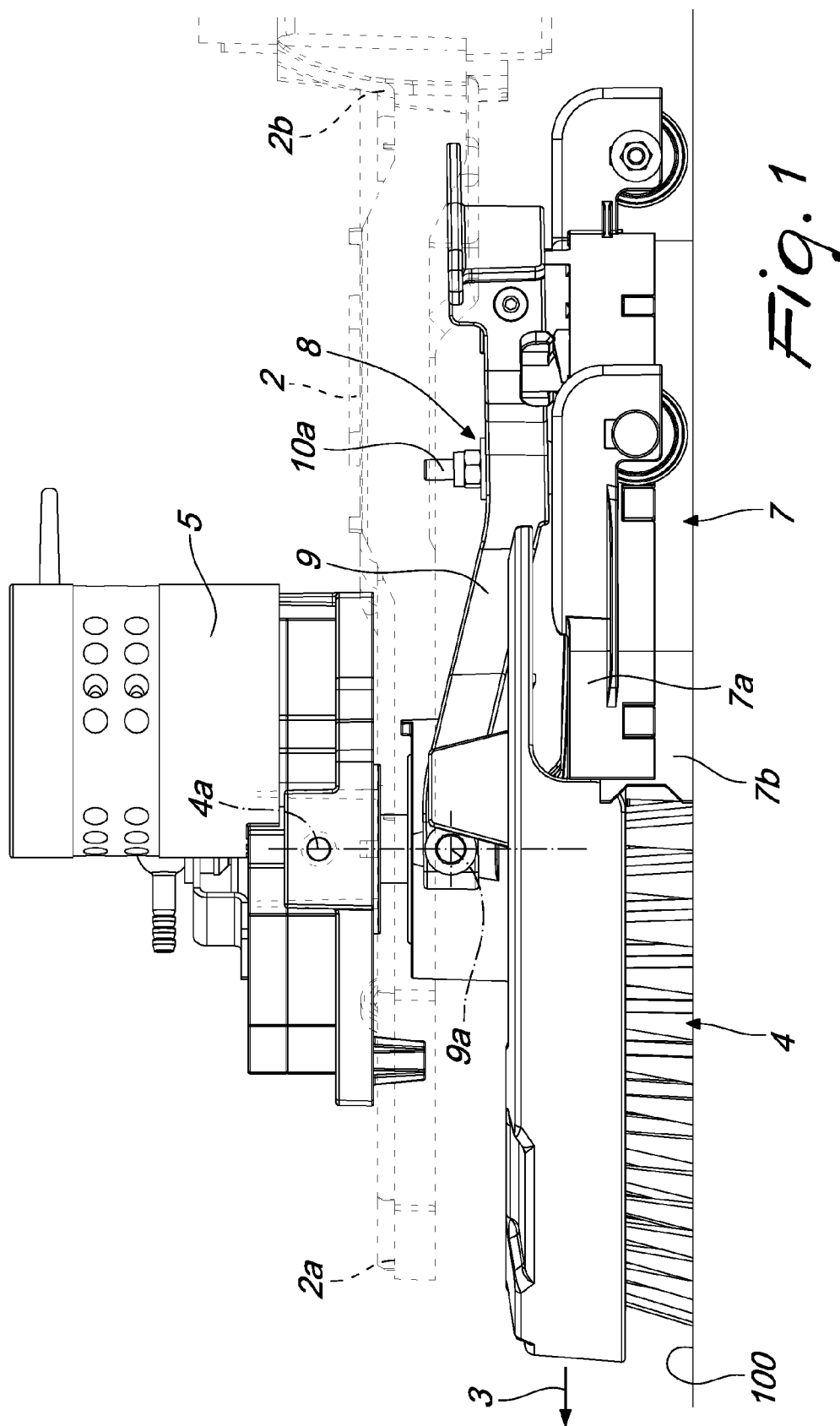
[0045] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

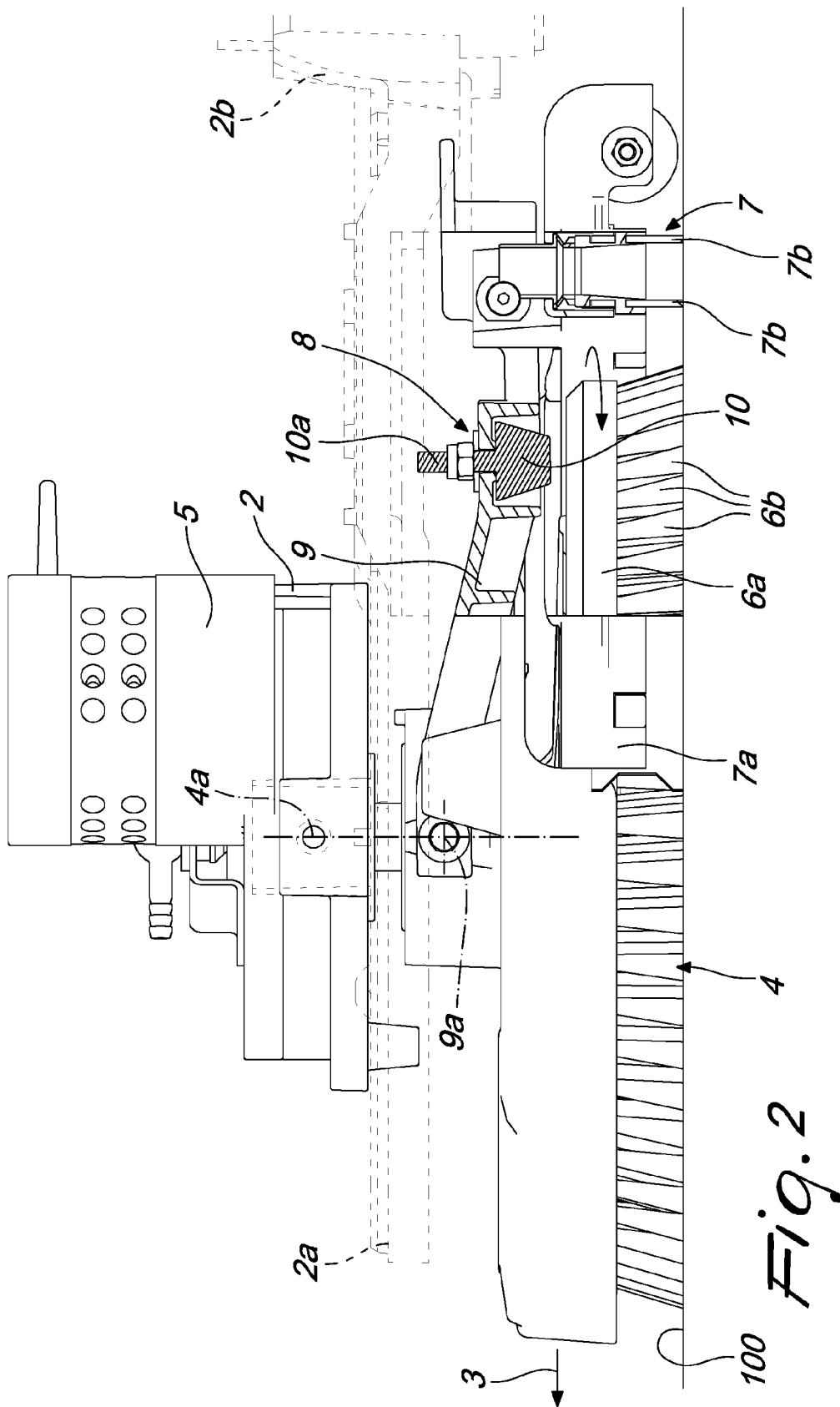
Claims

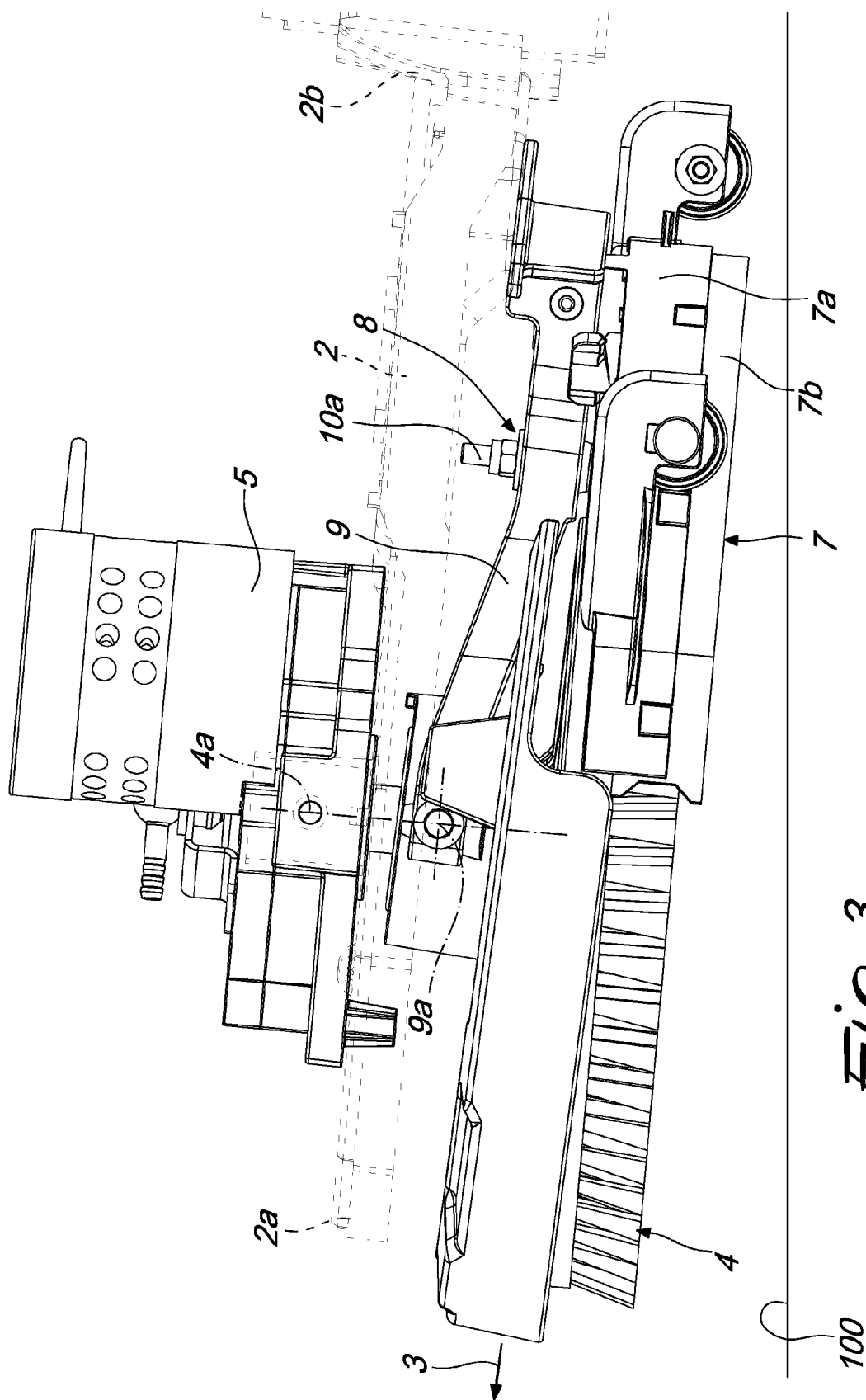
1. A floor cleaning machine, comprising a supporting structure (2) that has, along a forward travel direction (3) of the machine, a front part (2a) and a rear part (2b), said supporting structure (2) supporting a brush (4), which can be actuated rotationally, about a rotation axis (4a) that is arranged substantially vertically in use, and a squeegee (7) located in a rear position with respect to said brush (4) along said forward travel direction (3) of the machine, **characterized in that** said squeegee (7) is mounted rotatably about an oscillation axis that is substantially parallel to said rotation axis (4a) of said brush (4), connection means (8) being provided which can be activated on command and are adapted to couple rigidly said squeegee (7) to said brush (4) in rotation about said rotation axis (4a), in order to move said squeegee (7) from said rear position to a forward position with respect to said brush (4), along said forward travel direction (3) of the machine.
2. The machine according to claim 1, **characterized in that** said connection means (8) can be activated by means of an inclination of said supporting structure

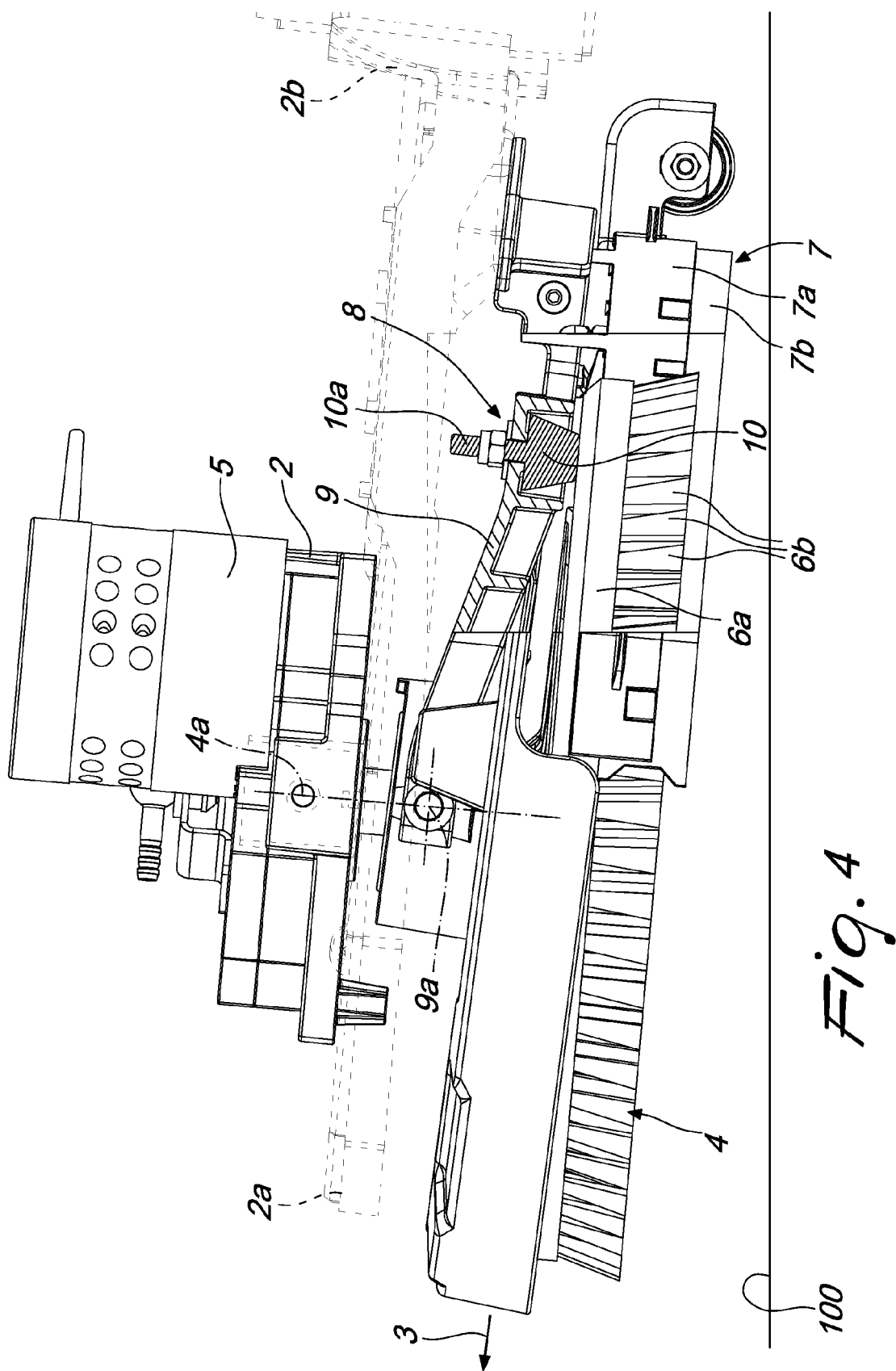
(2), with lifting of said front part (2a) from the floor with respect to said rear part (2b).

3. The machine according to one or more of the preceding claims, **characterized in that** it comprises stop means adapted to stop the integral rotation of said squeegee (7) with said brush (4) at said front position.
4. The machine according to one or more of the preceding claims, **characterized in that** said squeegee (7) is connected to one end of a supporting arm (9) that is pivoted, at its other end, to said supporting structure (2) about said oscillation axis.
5. The machine according to one or more of the preceding claims, **characterized in that** said connection means (8) comprise a friction body (10) that is supported by said supporting arm (9) and is adapted to make contact with said brush (4), so as to render said supporting arm (9) integral with said brush (4).
6. The machine according to one or more of the preceding claims, **characterized in that** said supporting arm (9) can rotate with respect to said supporting structure (2) about an articulation axis (9a) that is substantially perpendicular to said oscillation axis, in order to allow said friction body (10) to pass from an inactive condition, in which it is disengaged from said brush (4), with said supporting structure (2) in a non-tilted condition, to an active condition, in which said friction body (10) is in contact with friction against said brush (4), with said supporting structure (2) in the inclined condition, with lifting of said front part (2a) from the floor with respect to said rear part (2b), and vice versa.









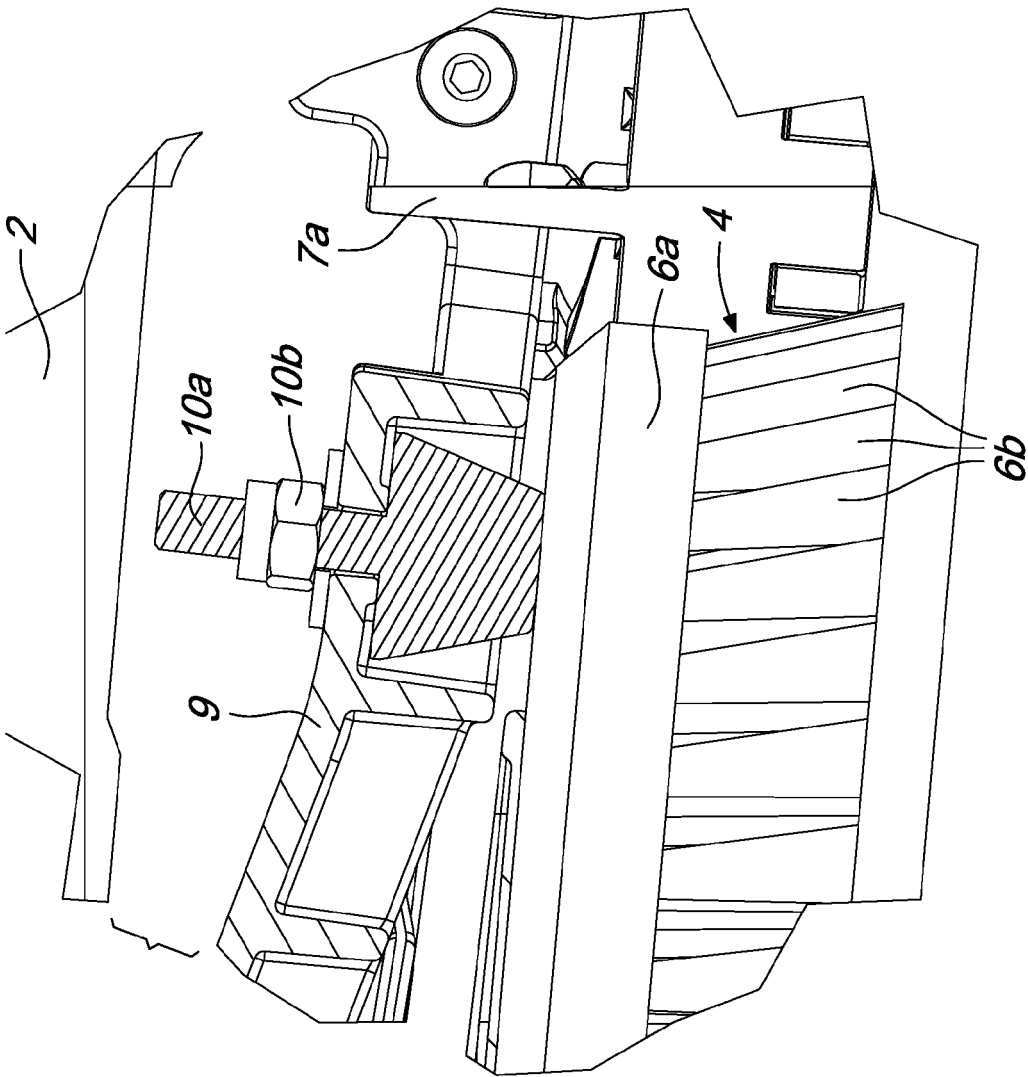
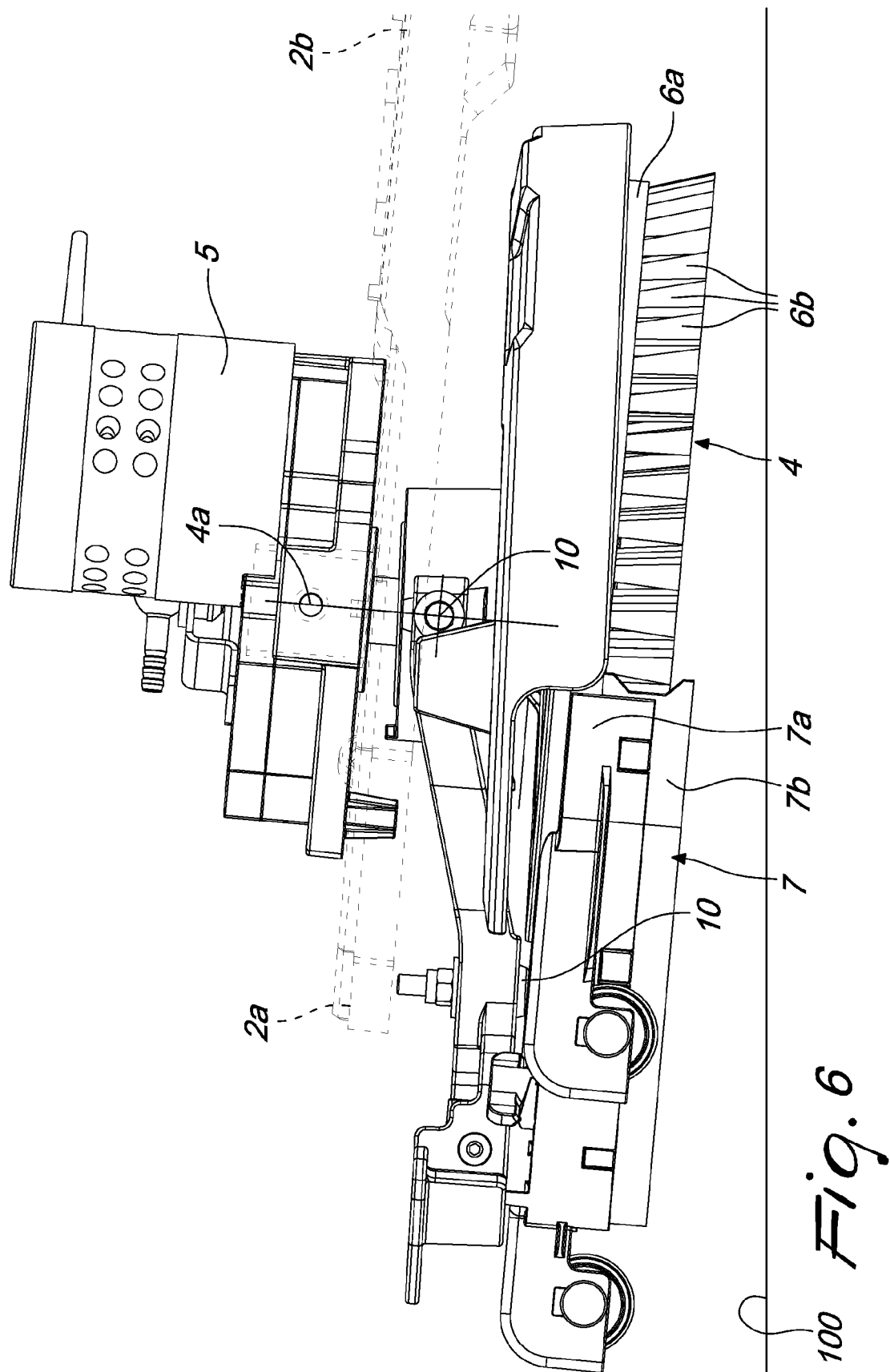
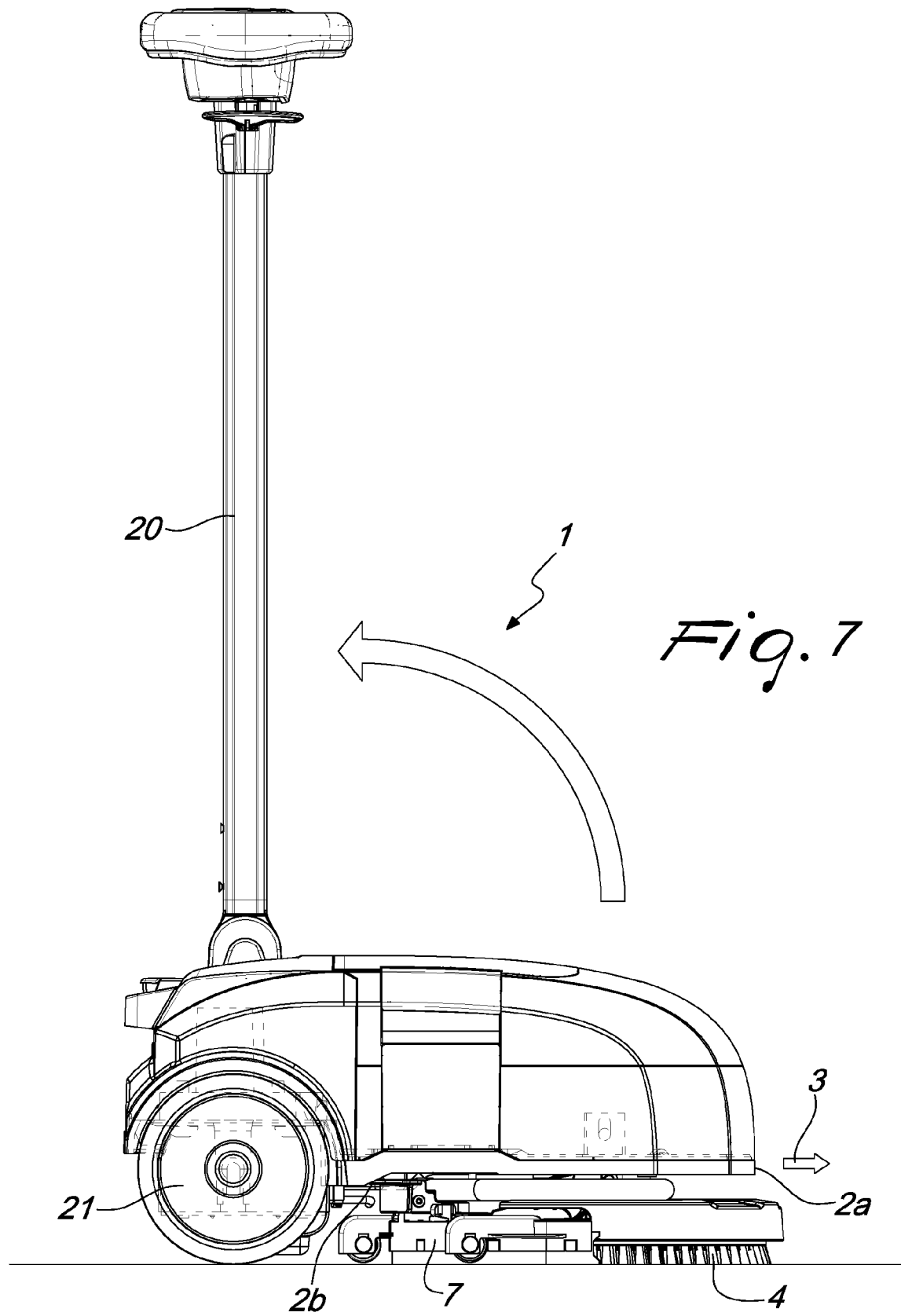


Fig. 5





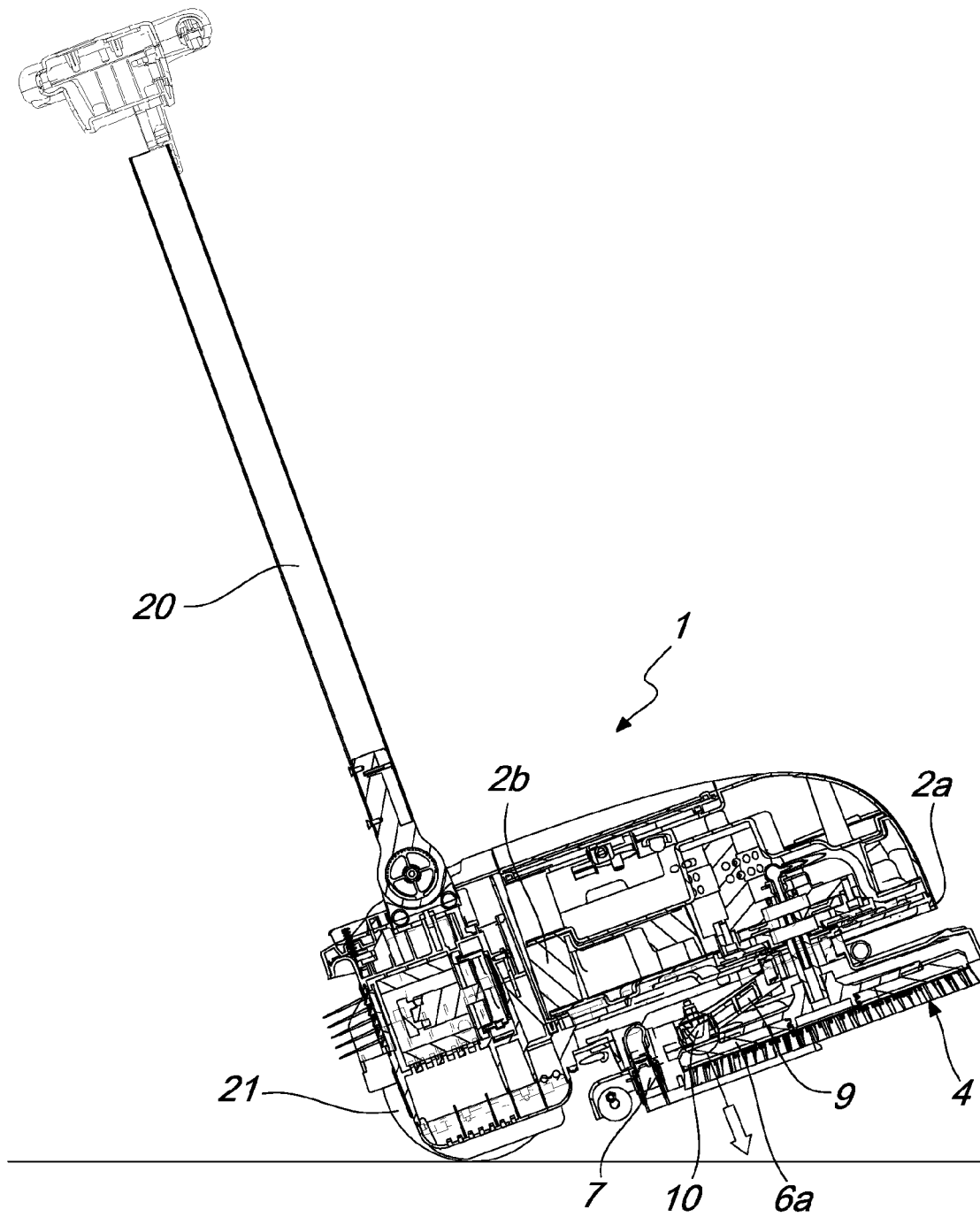


Fig. 8

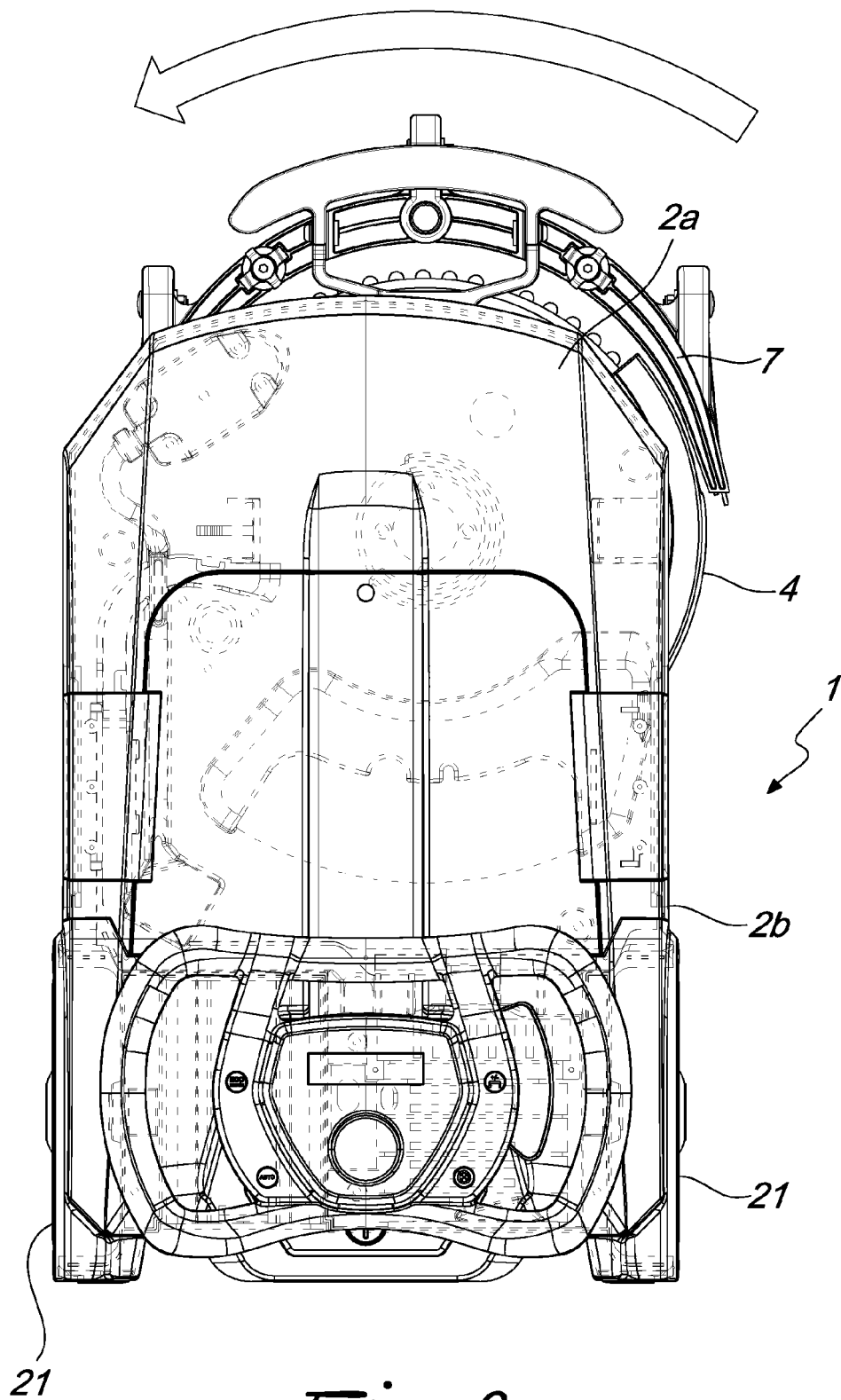


Fig. 9



EUROPEAN SEARCH REPORT

Application Number
EP 15 16 5706

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 4 805 256 A (MASON RICHARD A [US] ET AL) 21 February 1989 (1989-02-21) * figure 3 *	1-6	INV. A47L11/293 A47L11/30 A47L11/40
A	US 4 817 233 A (WALDHAUSER STEVEN J A [US]) 4 April 1989 (1989-04-04) * the whole document *	1-6	
A	US 5 623 743 A (BURGOON JACK L [US] ET AL) 29 April 1997 (1997-04-29) * figures 5,5a,10 *	1-6	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47L
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 September 2015	Examiner Trimarchi, Roberto
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	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 15 16 5706

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16-09-2015

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- IT VR20140120 A [0044]