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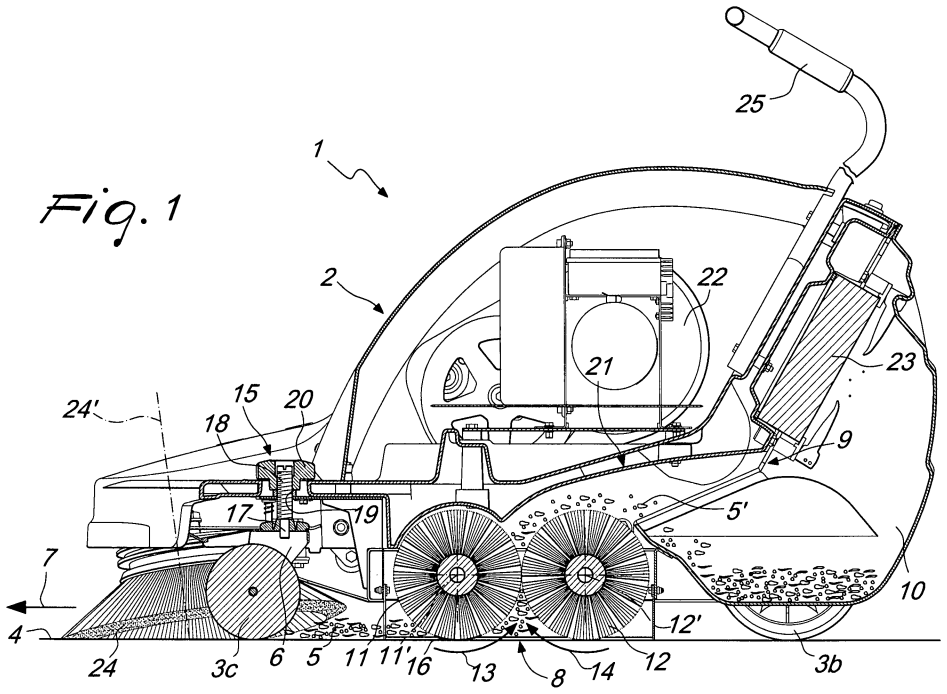
(54) Sweeping machine particularly for walkable surfaces

(57) A sweeping machine (1) particularly for walkable surfaces, comprising a supporting chassis (2), which is provided with wheels (3a, 3b, 3c) for supporting and rolling on a walkable surface and internally accommodates a unit (8) for collecting trash (5) from the surface and a unit (9) for transferring the collected trash (5') to an accumulation chamber (10); the collection unit comprising at least one substantially cylindrical collection and traction brush (11), which is associated with the chassis and can rotate about its own longitudinal axis, which is arranged substantially transversely to the direction of travel of the machine, and motor means adapted to turn the collection and traction brush (11) in the direction of travel of the machine; the machine further comprises presser means (15), which act on the collection and traction brush (11) and are adapted to keep at least one portion thereof in contact with the surface, the contact between the portion and the surface producing a traction of the machine for its movement.

Fig. 1



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Description

[0001] The present invention relates to a sweeping machine particularly for walkable surfaces.

[0002] Sweeping machines are known which are used to clean walkable surfaces, such as for example sidewalks, corridors and floors of open-air or indoor spaces (offices, hospitals, hotels, shopping centers and the like), from which they remove dust and trash in general.

[0003] Known sweeping machines are constituted substantially by a chassis provided with wheels for resting and rolling on the ground, which supports internally a front unit for conveying the trash toward a central collection region, a rear unit for collecting the trash conveyed into such region, and a unit for transferring the collected trash toward an accumulation chamber.

[0004] The front conveyance unit can be constituted for example by one or more frustum-shaped lateral brushes, which are arranged in contact with the surface to be cleaned and are made to turn about their own axis. In particular, the axis of said brushes is inclined with respect to the vertical, so that only their perimetric portion that is directed toward the outside of the chassis is in contact with the surface to be cleaned but the portion directed toward the inside of the chassis is not; therefore, by rotating, such brushes draw the trash from the sides of the machine and convey it to a central region of said machine.

[0005] The rear collection unit can be constituted for example by one or more cylindrical brushes, which are tangent to the surface to be cleaned and are made to rotate about their own axis, which is arranged transversely to the longitudinal axis of the machine. In particular, the rear collection unit can be constituted by a single cylindrical brush, which is made to rotate about its own longitudinal axis in the opposite direction with respect to the direction in which the machine travels. As an alternative, the rear collection unit can be constituted by two side-by-side cylindrical brushes, which have substantially parallel axes and are turned in opposite directions, the front one turning in the direction of travel of the machine.

[0006] The unit for transferring the collected trash can comprise for example a manifold, along which it is possible to arrange a trash lifting device (such as for example a rotor with vanes) and/or a trash suction device (such as for example one or more suction fans).

[0007] The chassis is provided at the rear with a grip element, such as a handlebar or one or more handles, by means of which an operator, by walking, steers the machine along the surface to be cleaned.

[0008] Finally, known sweeping machines are of the self-propelled type; i.e., they are equipped with motor means which, in addition to turning the brushes, also turn the wheels for resting and rolling on the ground by way of transmission means which can be actuated and adjusted by means of levers or buttons arranged proximate to the grip element.

[0009] These conventional self-propelled sweeping machines, however, suffer from drawbacks, including the fact that they are structurally and constructively very complicated, particularly due to the presence of the means for transmitting motion from the motor means to the supporting and rolling wheels.

[0010] Another drawback of conventional self-propelled sweeping machines consists in that they have disadvantageously high production, operation and maintenance costs.

[0011] Another drawback of conventional self-propelled sweeping machines is that they are difficult to maneuver for the workers assigned to operating them, particularly if they must make turns, go around obstacles or reverse the direction of travel.

[0012] The aim of the present invention is to eliminate the above-mentioned drawbacks of known sweeping machines, by providing a sweeping machine particularly for walkable surfaces which is structurally and constructively simple and has low manufacturing, operating and maintenance costs.

[0013] Within this aim, an object of the present invention is to provide a sweeping machine which can be maneuvered easily by workers assigned to operating it also for making turns, going around obstacles, reversing the direction of travel or other maneuvers, without particular physical effort on their part.

[0014] This aim and this and other objects, which will become better apparent hereinafter, are achieved by the present sweeping machine particularly for walkable surfaces, which comprises a supporting chassis, which is provided with wheels for supporting and rolling on a walkable surface and internally accommodates a unit for collecting trash from said surface and a unit for transferring the collected trash to an accumulation chamber, characterized in that said collection unit comprises at least one substantially cylindrical collection and traction brush, which is associated with said chassis and can rotate about its own longitudinal axis, which is arranged substantially transversely to the direction of travel of the machine, and motor means adapted to turn said collection and traction brush in the direction of travel of the machine, and in that it comprises presser means, which act on said collection and traction brush and are adapted to keep at least one portion thereof in contact with said surface, the contact between said portion and said surface producing a traction of said machine for its movement.

[0015] Further characteristics and advantages of the present invention will become better apparent from the detailed description of a preferred but not exclusive embodiment of a sweeping machine particularly for walkable surfaces, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a schematic sectional side view of a sweeping machine according to the invention;

Figure 2 is a front view of a sweeping machine according to the invention;

Figure 3 is an enlarged-scale sectional view of a de-

tail of the machine of Figure 1.

[0016] With reference to the figures, the reference numeral 1 generally designates a sweeping machine particularly for walkable surfaces, such as for example sidewalks, floors, corridors or the like of open-air or indoor spaces.

[0017] The machine 1 comprises a supporting chassis 2, which is provided with wheels 3a, 3b and 3c, for supporting and rolling on a surface 4 from which trash 5 is to be removed.

[0018] The wheels 3a, 3b and 3c are associated with the supporting chassis 2 so that they can rotate freely; the wheels 3a and 3b are mutually coaxial and arranged to the rear of the supporting chassis 2, while the wheel 3c lies in front of the supporting chassis 2 and is supported by a fork 6.

[0019] In the present description, the adjectives "front" and "rear" refer to the direction of travel of the machine 1 indicated by an arrow 7.

[0020] A unit 8 for collecting the trash 5 from the surface 4 and a unit 9 for transferring the collected trash 5' to an accumulation chamber 10 are accommodated within the supporting chassis 2.

[0021] The collection unit 8 comprises two brushes, a front one 11 and a rear one 12, which are substantially cylindrical, are in mutual contact and are associated with the supporting chassis 2 so that they can rotate about their own longitudinal axes 11' and 12', which are substantially parallel to each other and lie transversely with respect to the travel direction 7 of the machine 1.

[0022] The front brush 11 and the rear brush 12 are tangent to the surface 4.

[0023] The collection unit 8 further comprises motor means, which are associated with the front brush 11 and with the rear brush 12; said front brush is made to rotate so as to match the travel direction 7, as indicated by the arrow 13, and the rear brush is made to rotate in the opposite direction, as indicated by the arrow 14.

[0024] The machine 1 further comprises presser means 15, which act on the front brush 11 and are adapted to keep at least one portion 16 thereof in contact with the surface 4; the contact between the portion 16 and the surface 4 produces a traction of the machine 1 in the travel direction 7, and therefore the front brush 11 acts as a collector for the trash 5 and as a drive for the machine 1.

[0025] Advantageously, the rear brush 12 is made of a first plastic material, while the front brush 11, i.e., the collection and traction brush, is made of a second plastic material, which is harder than the first one, so as to generate more friction between the front brush 11 and the surface 4 than between the rear brush 12 and the surface 4. In particular, the two brushes 11 and 12 can be made of nylon, PPL or the like; however, alternative embodiments are not excluded.

[0026] The presser means 15 comprise an adjustment device, which is interposed between the supporting chassis 2 and the support of at least one of the wheels 3a, 3b and 3c and is adapted to adjust (reduce) the relative distance of the former with respect to the latter, i.e., the height of the supporting chassis 2 with respect to the surface 4.

[0027] In particular, since the front brush 11 is arranged proximate to the front wheel 3c, the presser means 15 are interposed between the supporting chassis 2 and the fork 6 that supports the front wheel 3c, so that the reduction of the relative distance between the supporting chassis 2 and the fork 6, i.e., of the height of the supporting chassis 2 with respect to the surface 4, leads to a propulsive action of the front brush 11 toward the surface 4 due to the contact of its portion 16 with the surface 4.

[0028] In the embodiment shown in the accompanying figures, the adjustment device is of the mechanical type and comprises a pivot 17, which is rigidly associated with the fork 6 and is extended by a threaded stem 18, which is inserted so as to pass through a seat 19 formed in the supporting chassis 2 and engages an adjustment ring 20 which rests on the supporting chassis 2.

[0029] However, alternative embodiments of the pressure means 15 are also possible which might have a different mechanical configuration or might be of the pneumatic, hydraulic or electrical type.

[0030] The transfer unit 9 comprises a manifold 21, which has an inlet for the collected trash 5' which is arranged above the collection unit 8 and an outlet for the collected trash 5' which is connected to the accumulation chamber 10.

[0031] The manifold 21 is functionally associated with at least one device for aspirating the collected trash 5' from the collection unit 8 toward the accumulation chamber 10, such as for example a suction fan 22 protected by a filter 23 or a rotor with vanes, which is not shown.

[0032] The machine 1 further comprises a unit for conveying the trash 5 from the surface 4 toward a central region thereof which is arranged in front of the collection unit 8 and comprises one or more lateral brushes 24, which are substantially frustum-shaped and are supported so that they can rotate about a respective rotation axis 24' proximate to the sides of the supporting chassis 2.

[0033] In particular, the machine 1 can be provided with a single lateral brush 24, the rotation axis 24' of which lies on a substantially vertical plane with respect to the surface 4 and is inclined with respect to the vertical direction, so that only the perimetric portion thereof that is directed toward the outside of the supporting chassis 2, but not the portion that is directed toward the inside of said chassis, is in contact with the surface 4; therefore, by rotating it draws the trash 5 from the sides of the machine 1 and conveys them to a central region thereof, where they are picked up by the collection unit 8.

[0034] The supporting chassis 2 is extended at the rear by a grip element 25, for example of the type of a handlebar.

[0035] In practice it has been found that the described

invention achieves the intended aim and object.

[0036] The sweeping machine according to the invention can be maneuvered easily by the workers assigned to its operation; it is in fact propelled substantially by the traction generated in the contact between the collection and traction brush and the surface to be cleaned, not by a driving force transmitted by motor means of its own; said traction, while being sufficient to move said machine, is more easily controllable by workers especially during maneuvers.

[0037] The sweeping machine according to the invention is further structurally and constructively simpler, since it lacks the means for transmitting motion from the motor means that drive the brushes to the wheels, which are instead able to rotate freely.

[0038] For this very reason, the sweeping machine according to the invention has reduced production, operating and maintenance costs.

[0039] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0040] All the details may further be replaced with other technically equivalent ones.

[0041] In practice, the materials employed, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope of the protection of the appended claims.

[0042] The disclosures in Italian Patent Application No. MO2005A000030, from which this application claims priority, are incorporated herein by reference.

[0043] 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 sweeping machine particularly for walkable surfaces, comprising a supporting chassis, which is provided with wheels for supporting and rolling on a walkable surface and internally accommodates a unit for collecting trash from said surface and a unit for transferring the collected trash to an accumulation chamber, **characterized in that** said collection unit comprises at least one substantially cylindrical collection and traction brush, which is associated with said chassis and can rotate about its own longitudinal axis, which is arranged substantially transversely to the direction of travel of the machine, and motor means adapted to turn said collection and traction brush in the direction of travel of the machine, and **in that** it comprises presser means, which act on said collection and traction brush and are adapted to keep at least one portion thereof in contact with said surface, the contact between said portion and said surface producing a traction of said machine for its movement.

2. The machine according to claim 1, **characterized in that** said wheels are associated with said chassis so that they can rotate freely.

3. The machine according to one or more of the preceding claims, **characterized in that** said collection unit comprises two substantially cylindrical brushes which are in mutual contact and can rotate about their respective longitudinal axes, which are substantially mutually parallel and lie transversely to said travel direction, the brush located in front in the direction of travel of the machine being made to rotate with a direction of rotation which matches the travel direction of said machine, the rear brush being made to rotate in the opposite direction, said collection and traction brush being formed by said front brush.

4. The machine according to one or more of the preceding claims, **characterized in that** said rear brush is made of a first material and said front brush is made of a second material, which is harder than the first one.

5. The machine according to one or more of the preceding claims,
characterized in that said first material is of the plastic type.

6. The machine according to one or more of the preceding claims, **characterized in that** said second material is of the plastic type.

7. The machine according to one or more of the preceding claims, **characterized in that** at least one of said first and second materials is constituted by nylon, PPL or the like.

8. The machine according to one or more of the preceding claims, **characterized in that** said presser means comprise an adjustment device, which is interposed between said chassis and the support of at least one of said wheels and is adapted to adjust the relative distance of one with respect to the other, i.e., the height of the chassis with respect to said surface.

9. The machine according to one or more of the preceding claims, **characterized in that** said adjustment device is of the mechanical, pneumatic, hydraulic, electric or electromechanical type.

10. The machine according to one or more of the preceding claims, **characterized in that** said wheels comprise at least one pair of rear wheels, which are

mutually substantially coaxial, and at least one front wheel, which is supported so that it can rotate freely by a fork associated with said chassis, said collection and traction brush being located proximate to said front wheel and said presser means being formed at said front wheel.

11. The machine according to one or more of the preceding claims, **characterized in that** said adjustment device is interposed between said chassis and said fork.

12. The machine according to one or more of the preceding claims, **characterized in that** said adjustment device comprises a pin which is associated with said fork and protrudes with a threaded stem, which is inserted through a corresponding seat provided in said frame and is coupled to an adjustment ring which rests on said chassis.

13. The machine according to one or more of the preceding claims, **characterized in that** said transfer unit comprises a manifold, which has a trash inlet arranged above said collection unit and a trash outlet which is connected to said accumulation chamber and is functionally associated with at least one device for aspirating the trash from said collection unit toward said accumulation chamber, such as a brush, a suction fan or the like.

14. The machine according to one or more of the preceding claims, **characterized in that** it comprises a unit for conveying trash from said surface toward a central region of said machine which is located, in the travel direction of said machine, in front of said collection unit.

15. The machine according to one or more of the preceding claims, **characterized in that** said conveyance unit comprises at least one brush which is substantially frustum-shaped and is supported so that it can rotate about a respective rotation axis proximate to one side of said chassis.

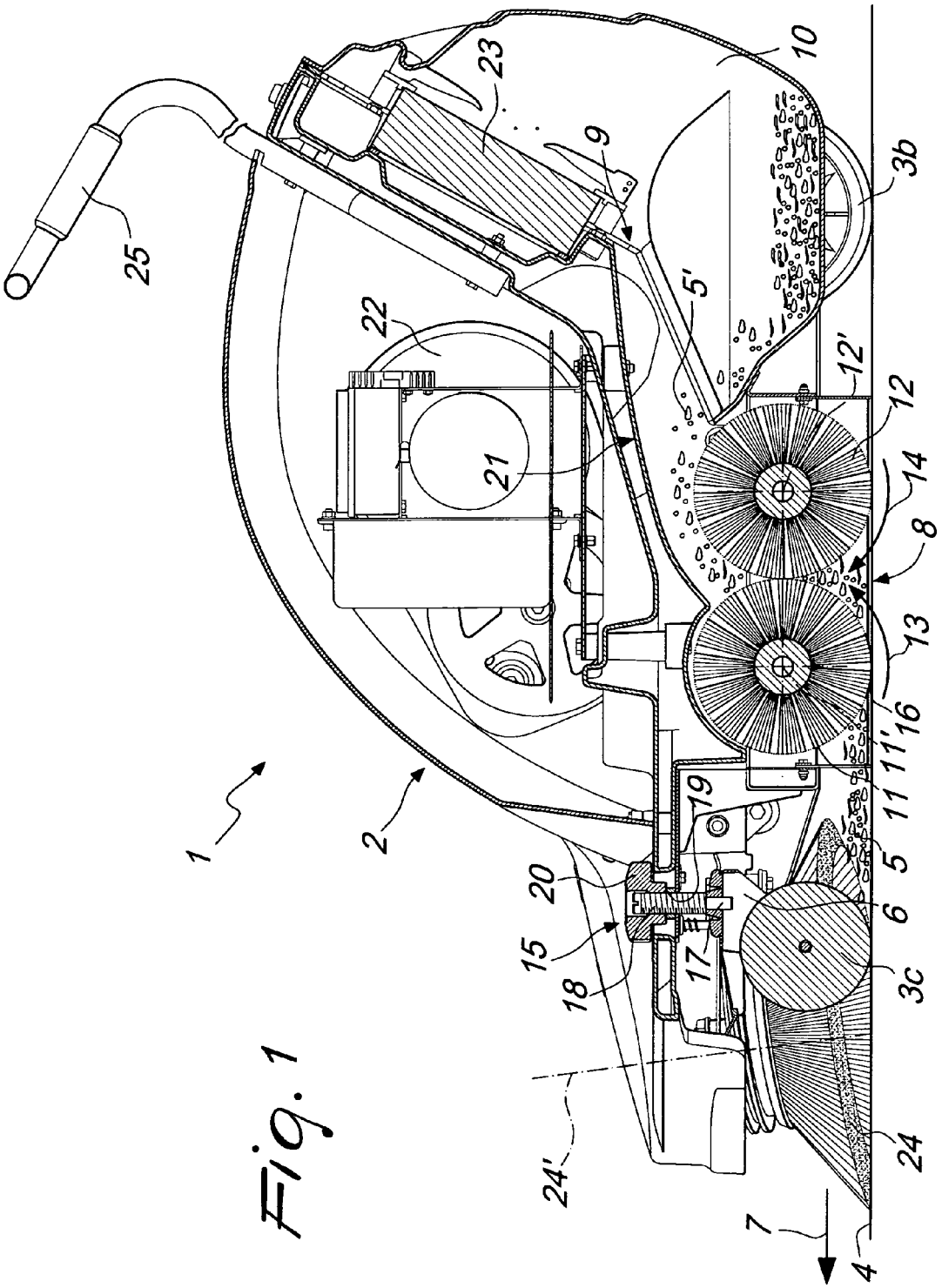
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Fig. 1

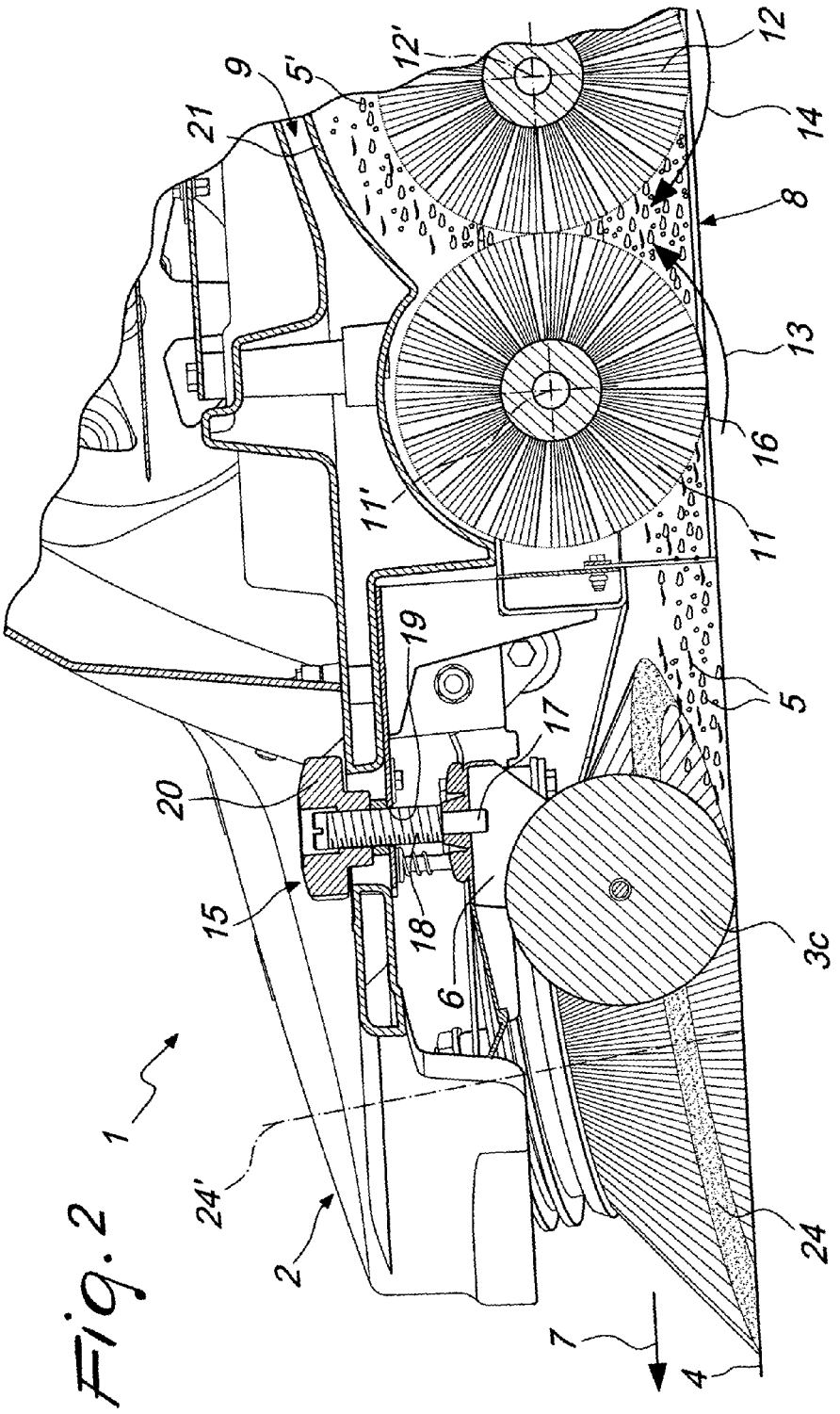

Fig. 2

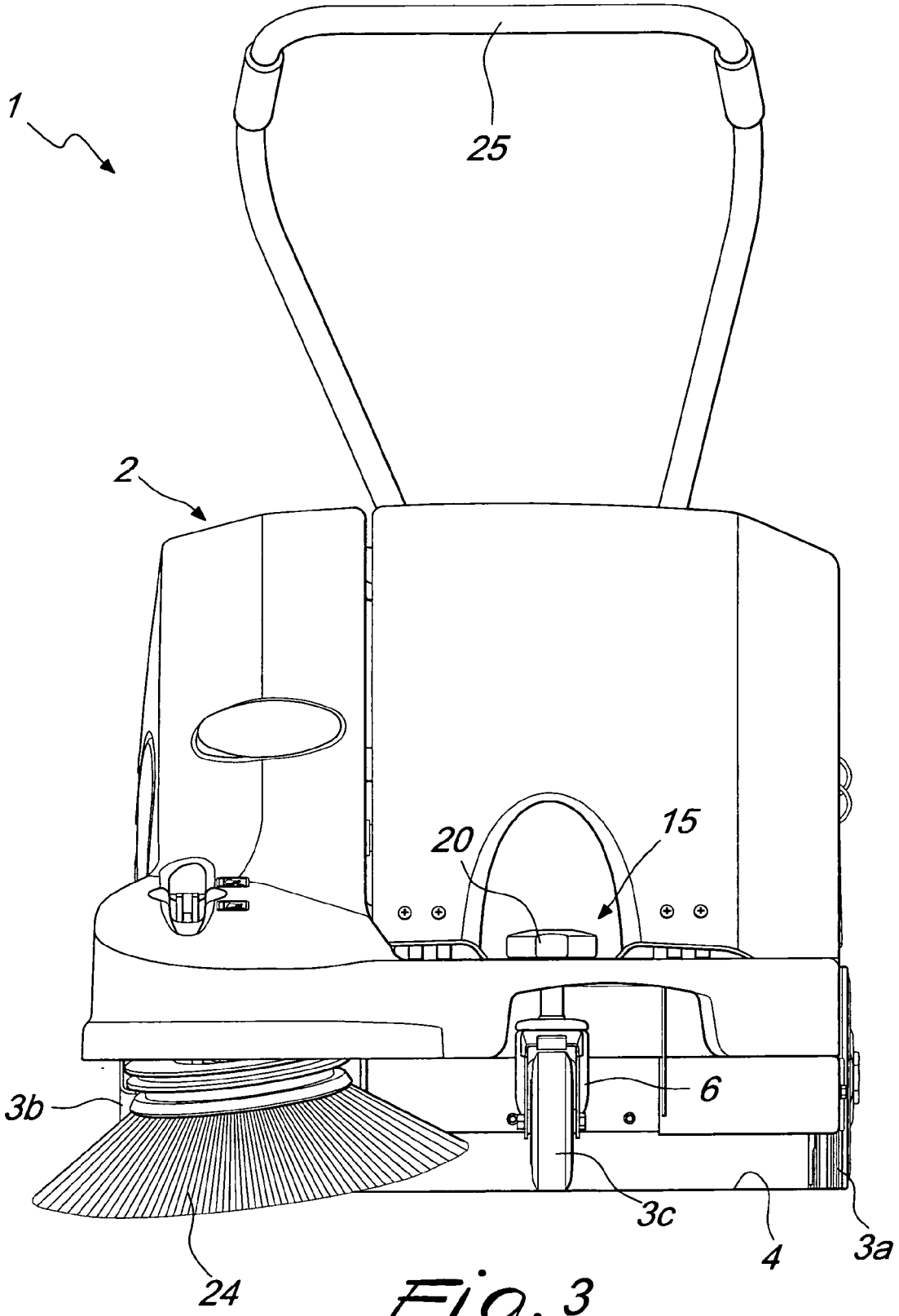

Fig. 3