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(54) **AUTONOMOUS CLEANING ROBOT EQUIPPED WITH A WET CLEANING DEVICE**

(71) Applicant: **SEB S.A.**, Ecully (FR)

(72) Inventors: **Laurent Delair**, Saint Etienne Du Rouvray (FR); **Mickael Boillet**, Maratainville-Epreville (FR)

(73) Assignee: **SEB S.A.**, Ecully (FR)

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(57) **ABSTRACT**

The autonomous cleaning robot includes a main body including a lower face and a suction opening, opening into the lower face; a wet cleaning device including two mop supports which are each movably mounted in translation relative to the main body in a direction of translation, and two mops mounted respectively on the two mop supports; and two drive wheels configured to roll over the surface to be cleaned and movably mounted in rotation on the main body respectively about two rotation axes which are substantially parallel. The two mop supports are located behind the rotation axes of the drive wheels, and the direction of translation extends substantially parallel to the rotation axes of the two drive wheels.

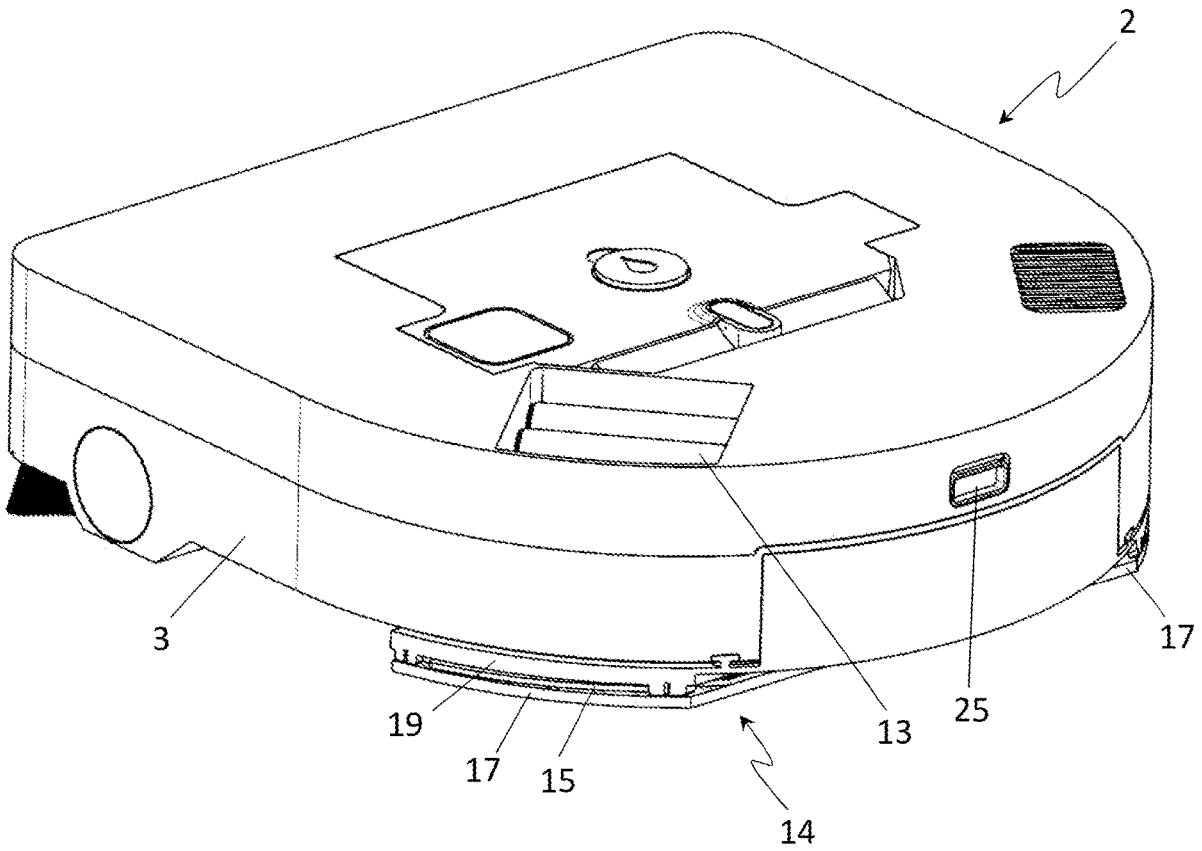


Fig 1

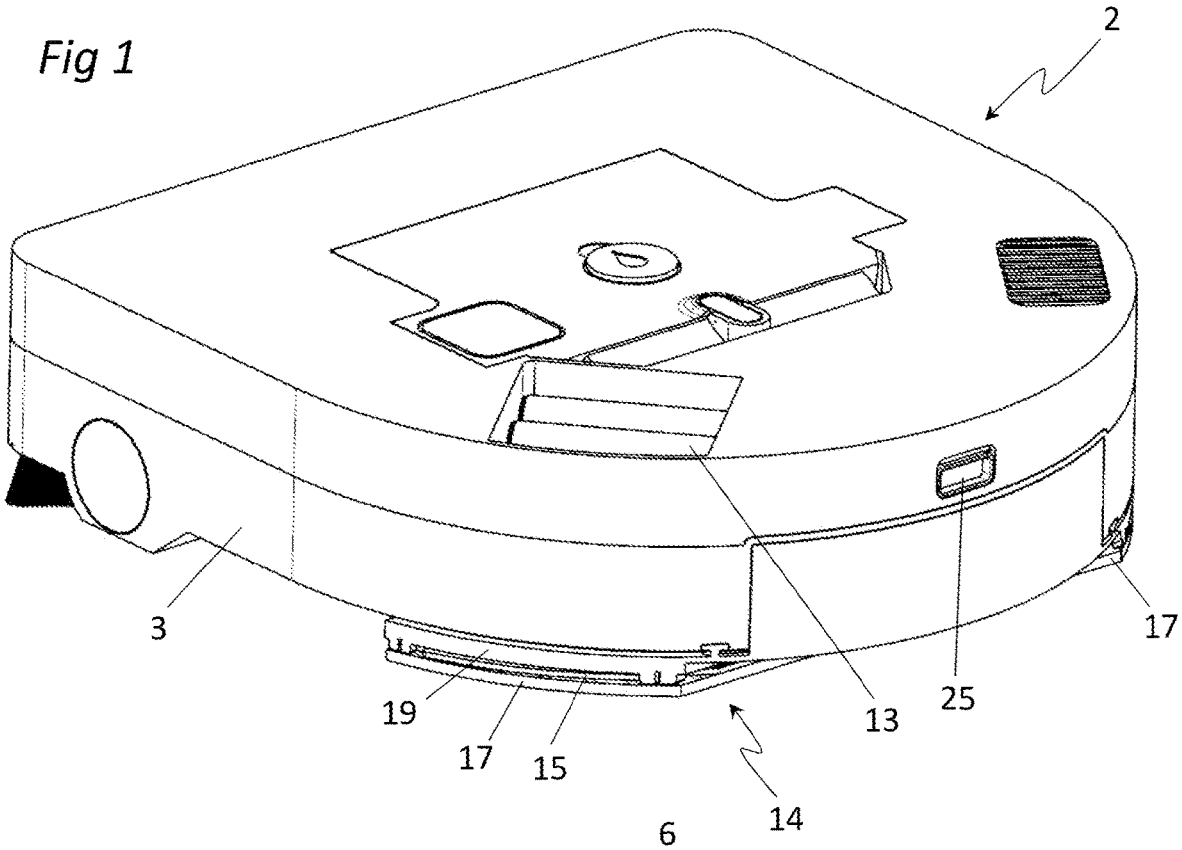


Fig 2

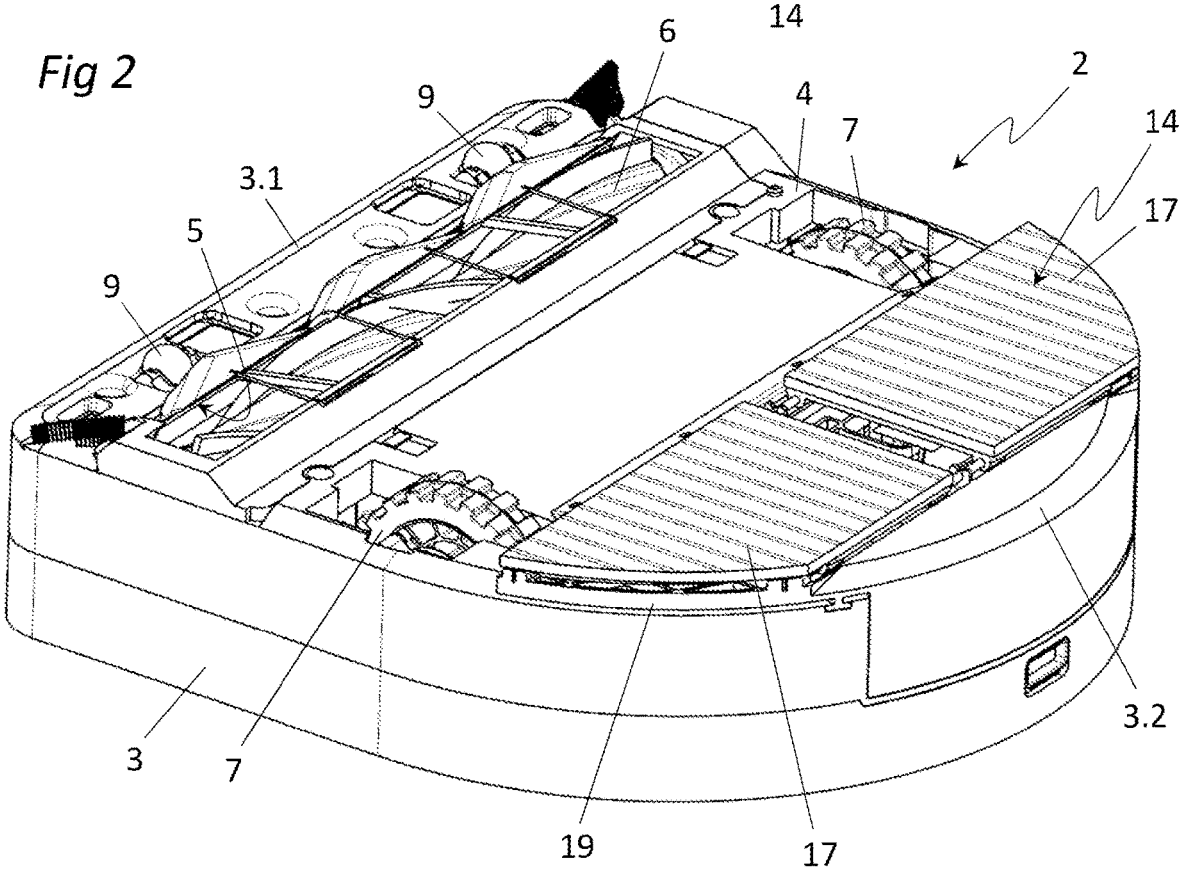


Fig 3

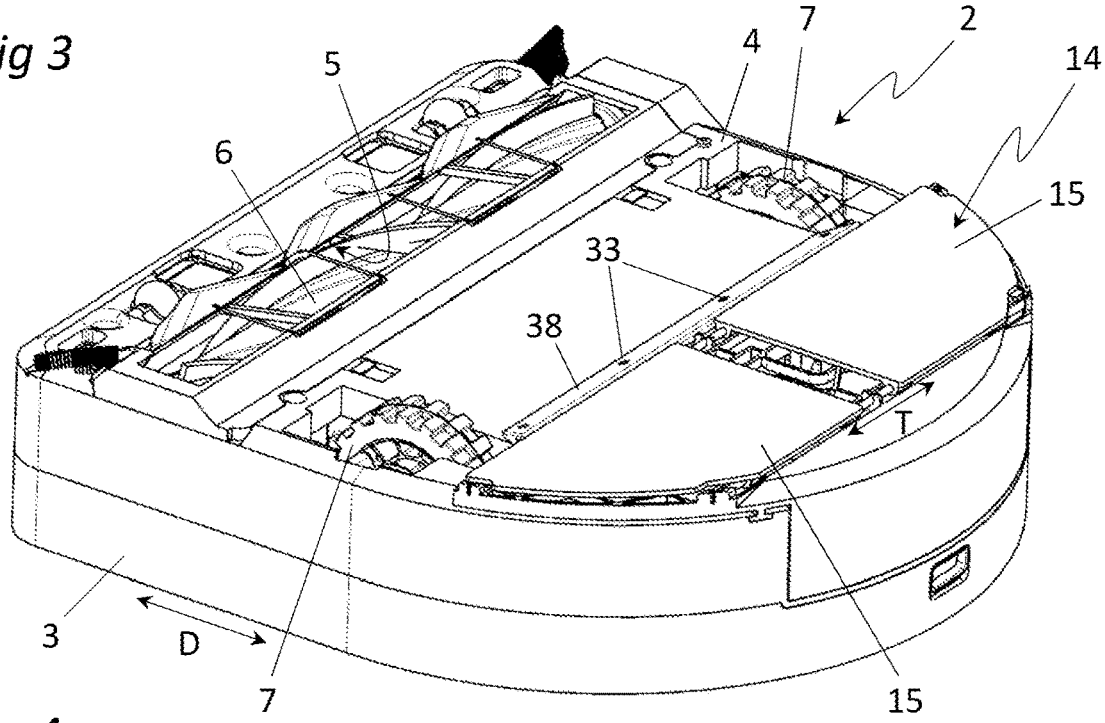


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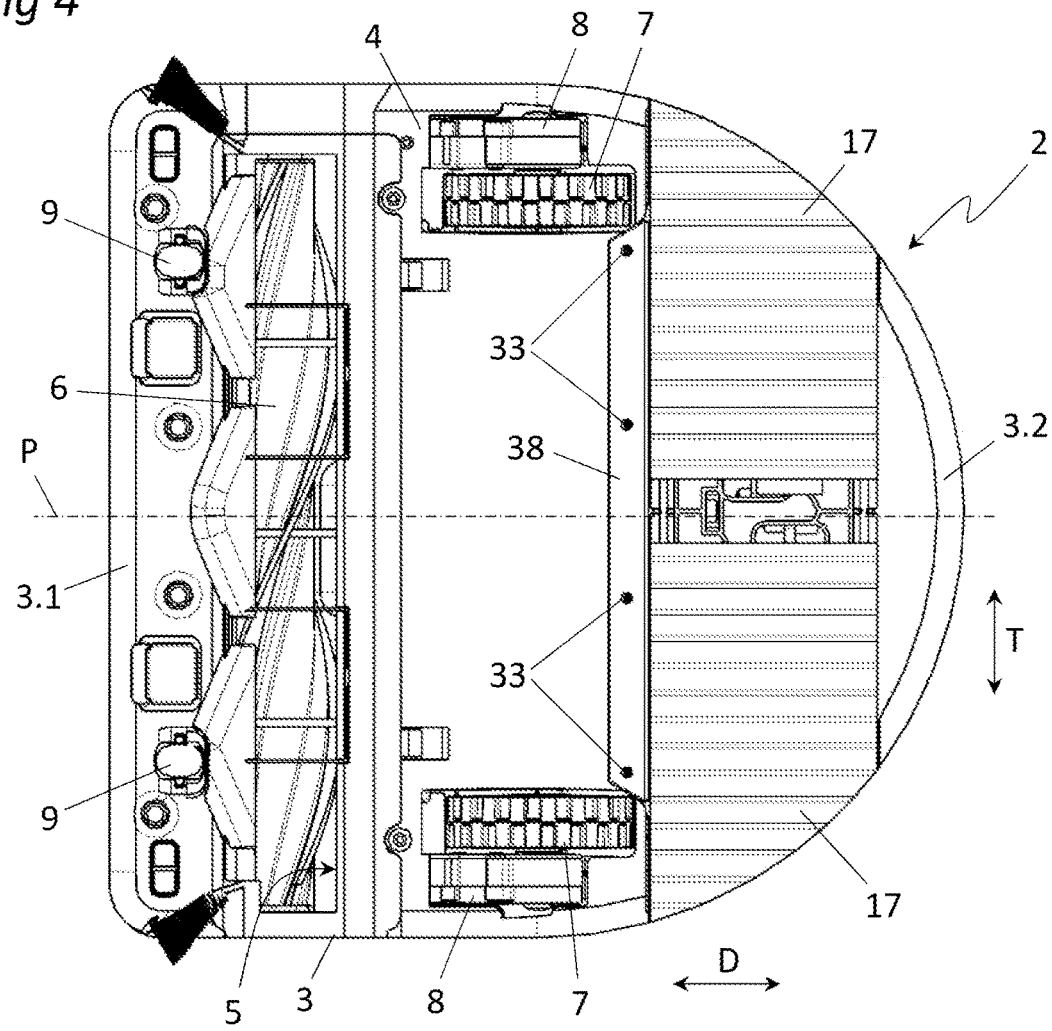


Fig 5

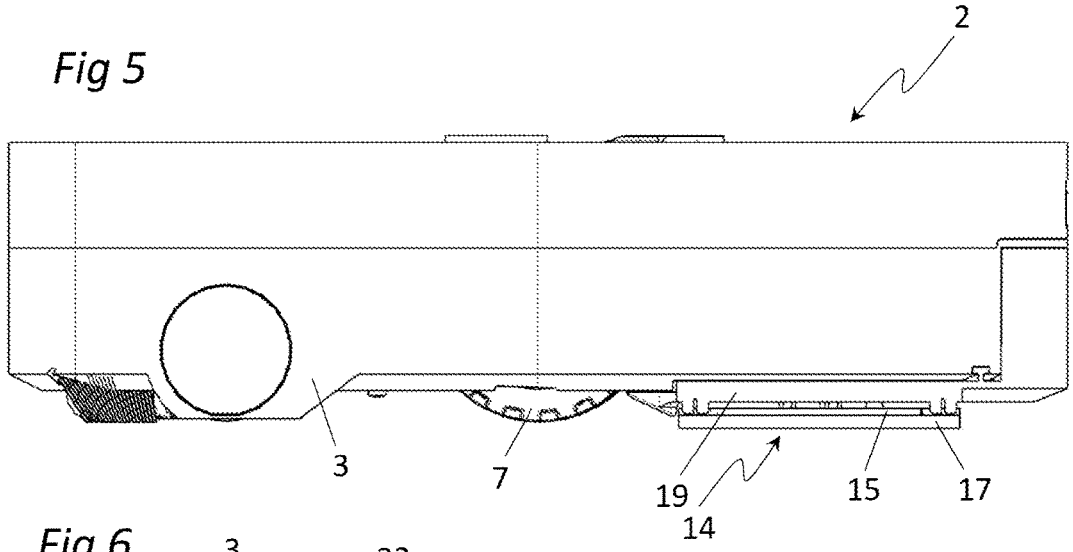


Fig 6

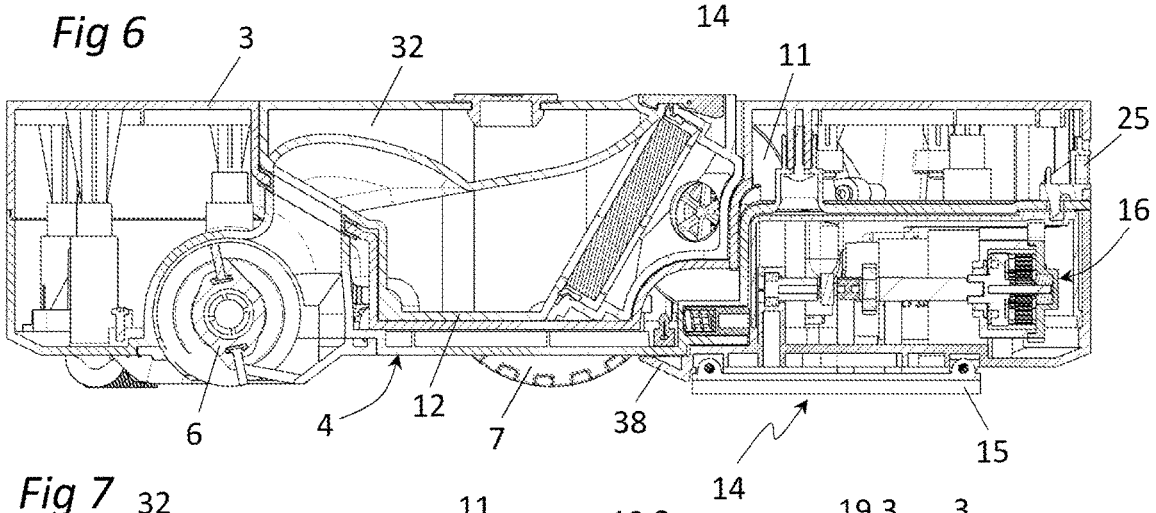


Fig 7

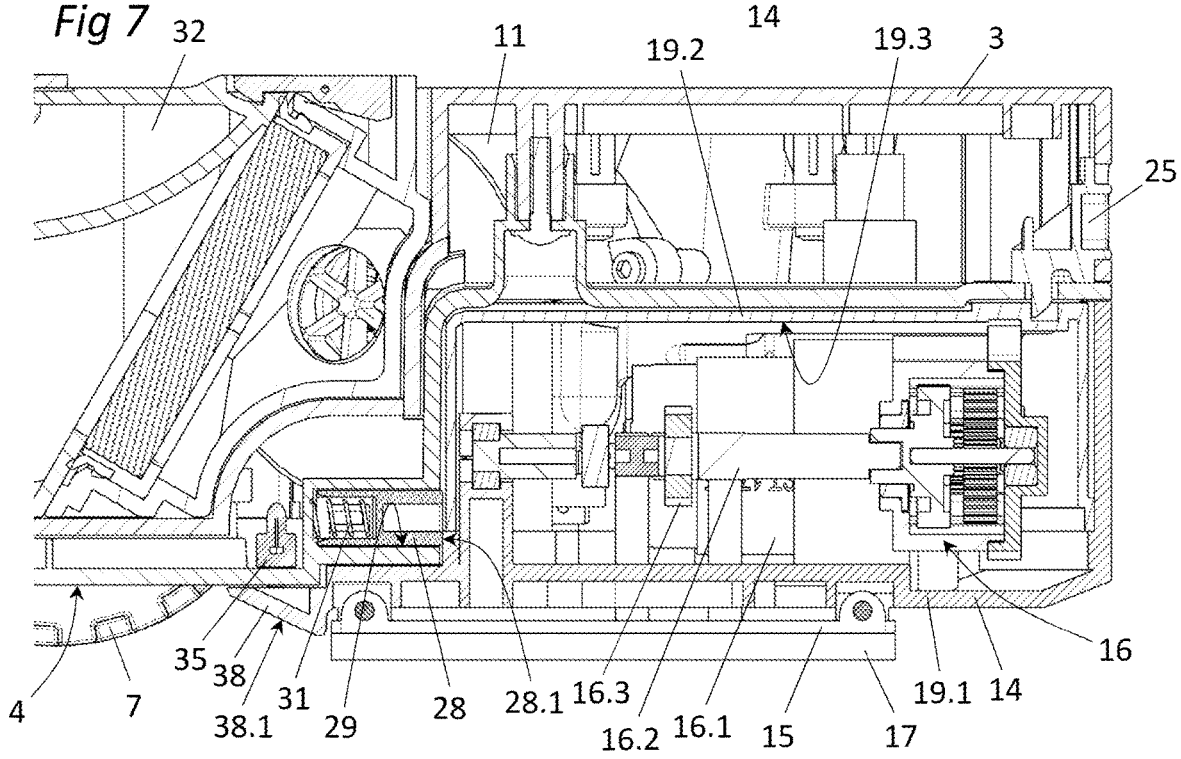


Fig 8

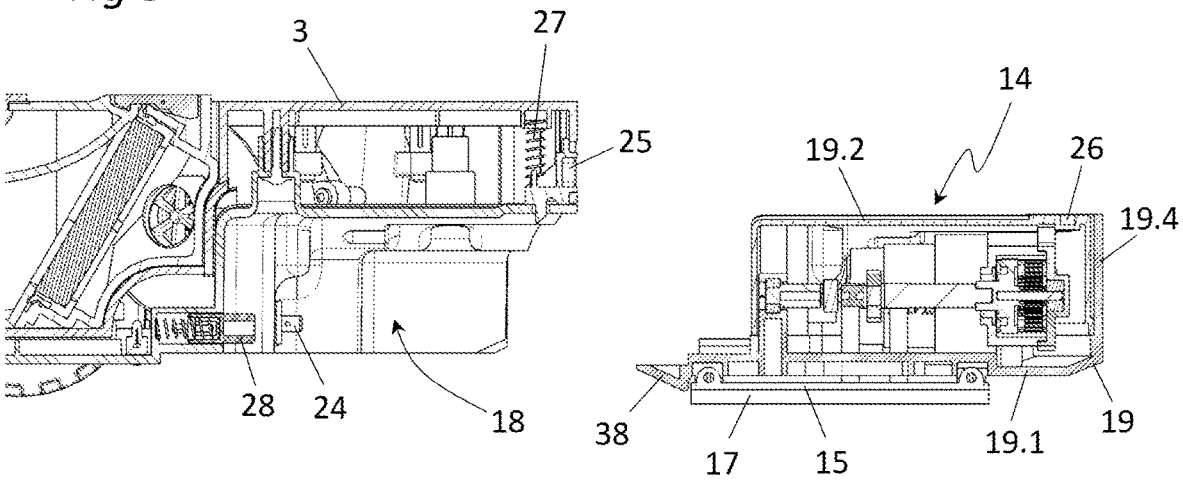

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Fig 9

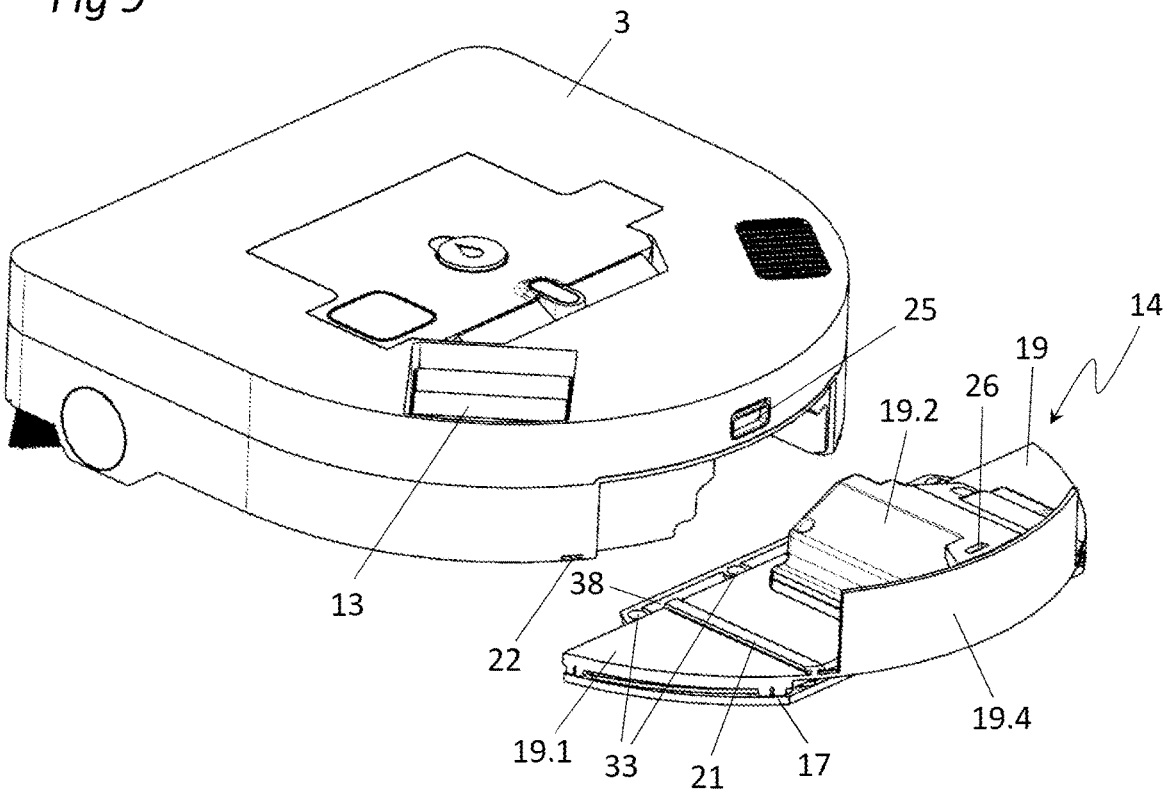

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Fig 10

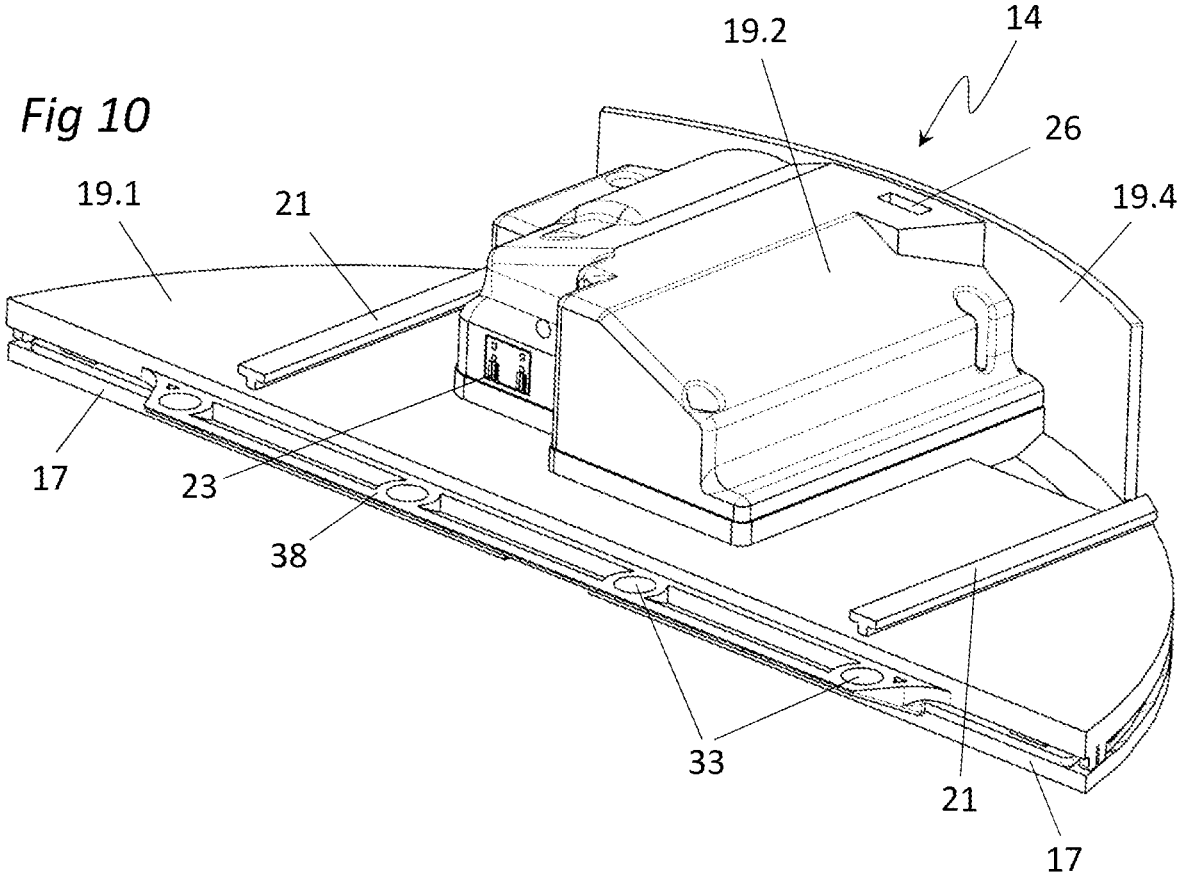


Fig 11

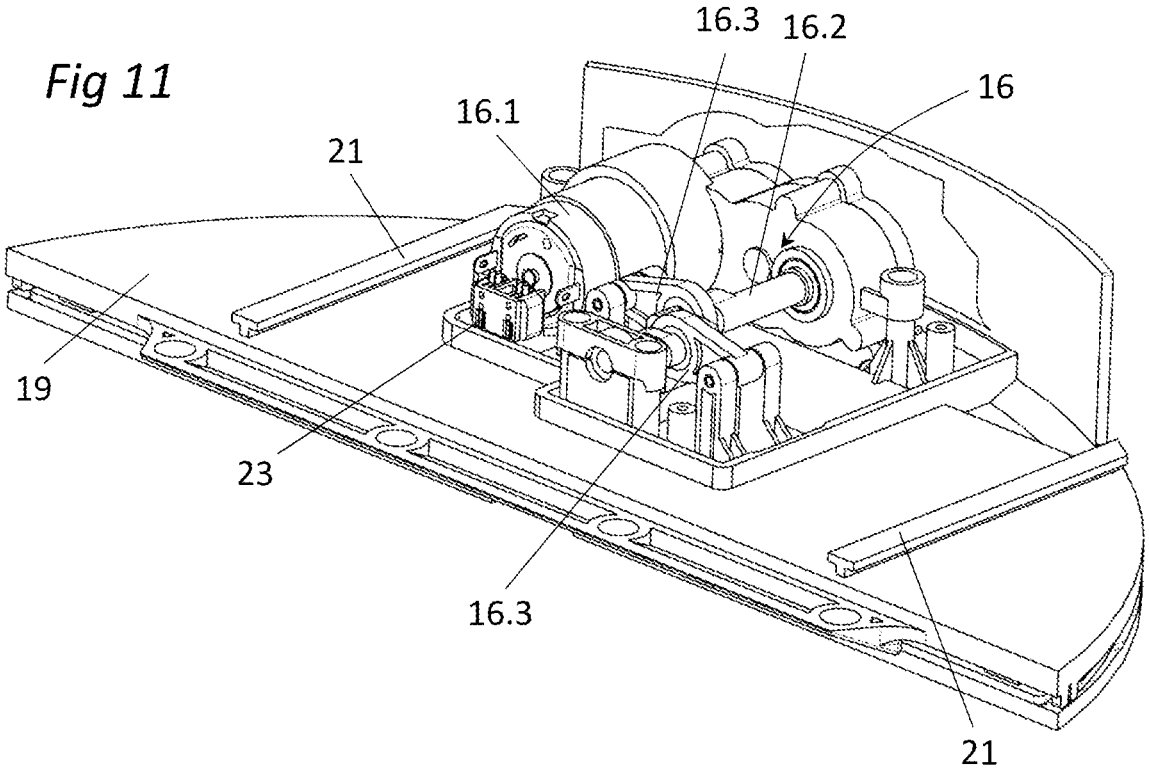


Fig 12

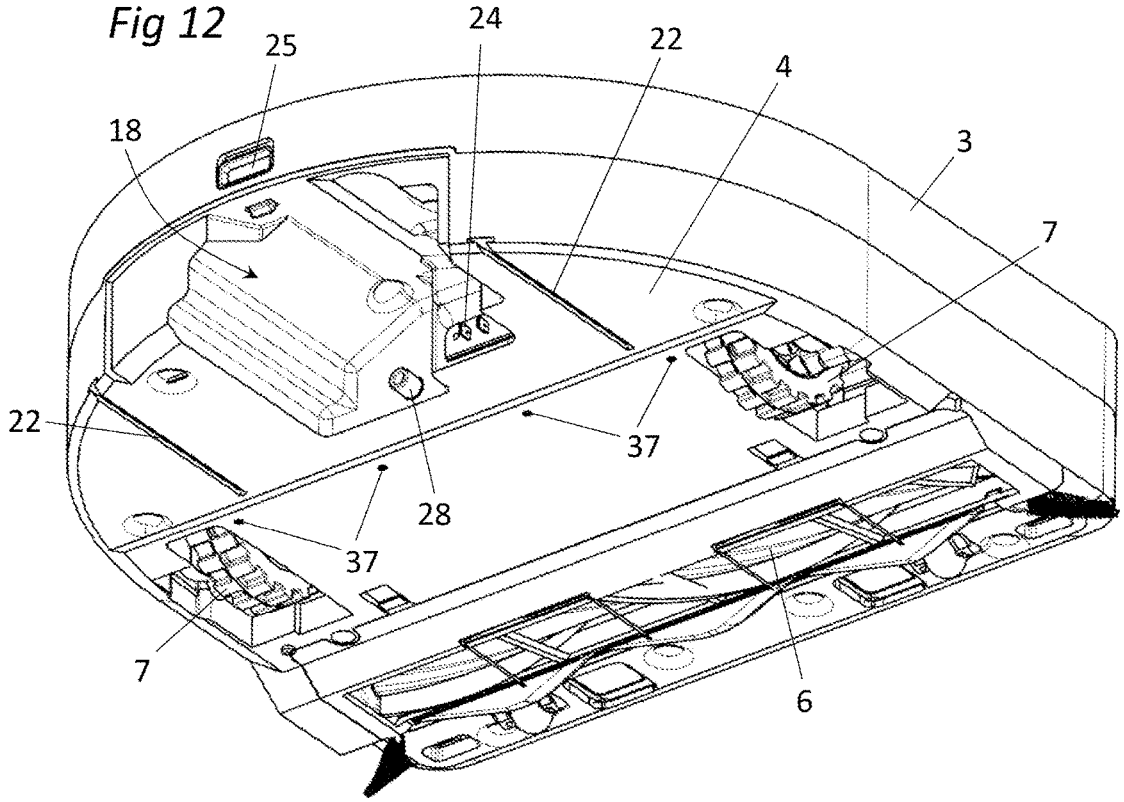


Fig 13

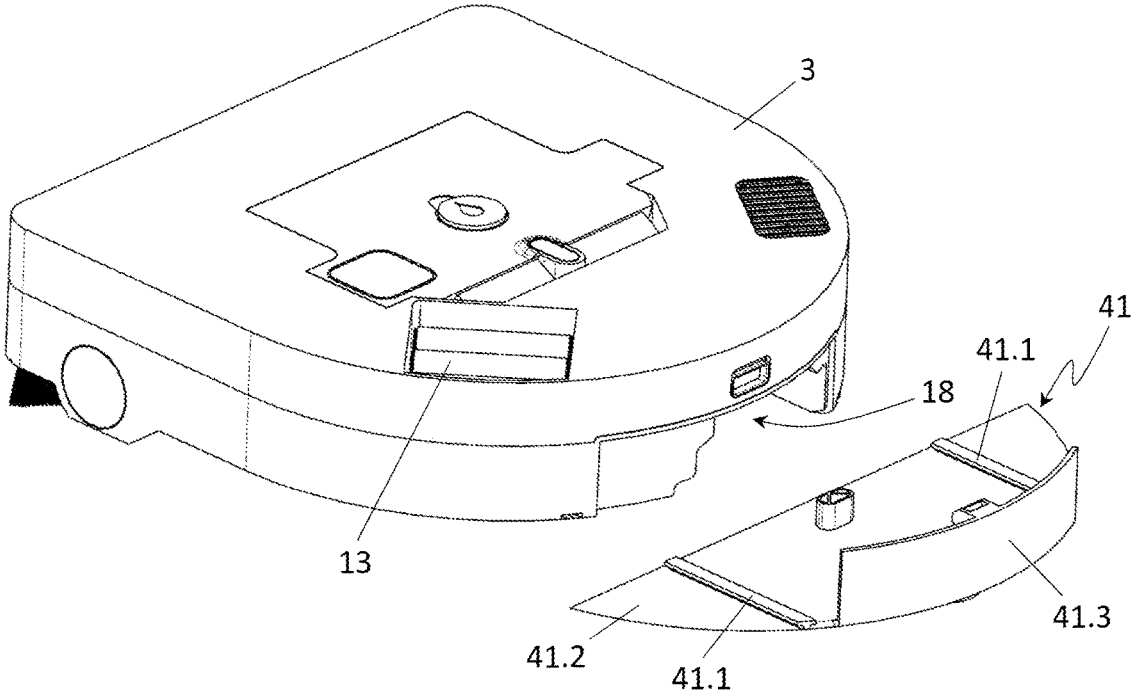
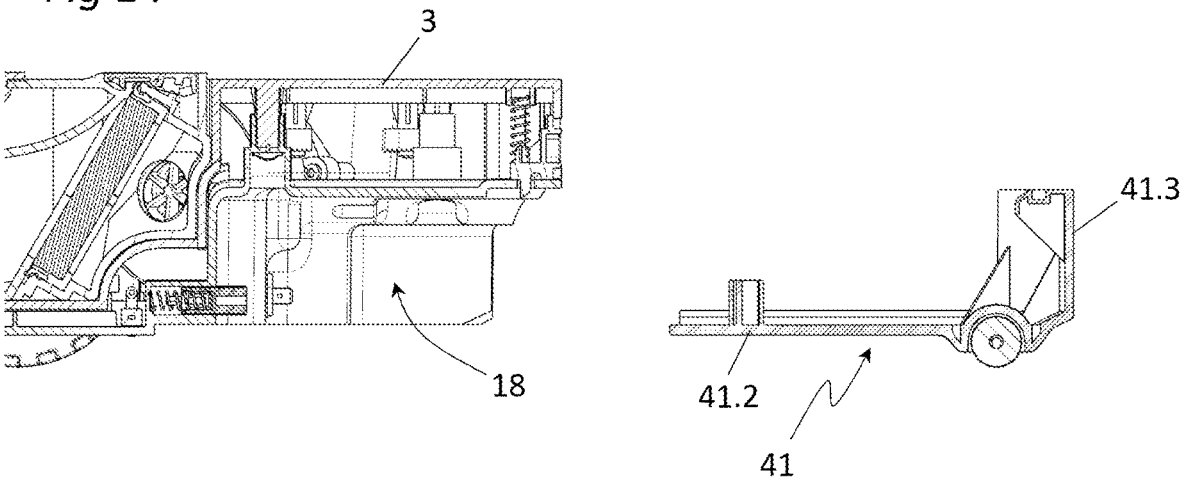


Fig 14



AUTONOMOUS CLEANING ROBOT EQUIPPED WITH A WET CLEANING DEVICE

TECHNICAL FIELD

[0001] The present invention relates to the field of autonomous cleaning apparatuses equipped with a wet cleaning device, and more particularly to the field of robot vacuum cleaners that could be displaced in a standalone manner over a surface to be cleaned and could suck dust and waste present on the surface to be cleaned, which may for example be tiling, parquet, laminated flooring, carpet or a rug, and possibly wash the surface to be cleaned simultaneously with a suction operation.

STATE OF THE ART

[0002] The autonomous cleaning robots have become of common use these days, these allowing cleaning complete surfaces of a dwelling without any assistance from the user to the extent that these surfaces are flat, that is to say on the same level. They thus save considerable time for users to practice other activities.

[0003] The document EP3257416A1 discloses an autonomous cleaning robot comprising:

[0004] a main body including a lower face which is configured to be oriented towards a surface to be cleaned and a suction opening provided in a front part of the main body and opening into the lower face of the main body,

[0005] a wet cleaning device including two mop supports which are each movably mounted in translation relative to the main body in a translation direction, and two mops removably mounted respectively on the two mop supports, the mops being configured to be in contact with the surface to be cleaned, and

[0006] two drive wheels configured to roll over the surface to be cleaned and movably mounted in rotation on the main body respectively about two rotation axes which are substantially parallel.

[0007] According to the document EP3257416A1, the two mop supports are mounted respectively on a front part of the main body and on a rear part of the main body, and are arranged on either side of the rotation axes of the drive wheels. Furthermore, according to the document EP3257416A1, the direction of translation of the mop supports extends parallel to a main displacement direction of the autonomous cleaning robot, that is to say according to a longitudinal direction of the autonomous cleaning robot.

[0008] The fact that the mop supports are displaced parallel to the main displacement direction of the wet cleaning robot significantly increases the risk of the drive wheels slipping on the surface to be cleaned when the mops do not exert the same friction forces on the floor to be cleaned (for example due to different wear or dirt on one mop compared to the other, or a displacement of the two mops on two different surfaces to be cleaned).

[0009] Yet, such slippage is likely to harm the autonomous navigation of the autonomous cleaning robot, thus requiring the autonomous cleaning robot to stop the cleaning operation in progress and to communicate with its docking station to be repositioned in the space (which increases the cleaning time of a floor and reduces the cleaning performance of the autonomous cleaning robot). To overcome such a drawback, it could be envisaged to equip the autonomous cleaning robot with a more complex and expensive control unit (which would be capable of taking into account the aforementioned slippage to control the navigation of the autonomous cleaning robot), this would, however, significantly increase the manufacturing costs of the autonomous cleaning robot.

[0010] Furthermore, due to the arrangement of the mop supports respectively at the front and rear of the drive wheels, the support forces exerted on the floor to be cleaned by each of the mops are low because these support forces are taken up mainly by the lateral wheels arranged between the two mop supports, which limits the cleaning performance of the cleaning robot described in the document EP3257416A1.

SUMMARY OF THE INVENTION

[0011] The present invention aims to remedy these drawbacks.

[0012] The technical problem underlying the invention consists in particular of providing an autonomous cleaning robot which is simple, economical and compact in structure, while having high cleaning performance.

[0013] To this end, the subject of the invention is an autonomous cleaning robot comprising:

[0014] a main body including a lower face which is configured to be oriented towards a surface to be cleaned and a suction opening provided in a front part of the main body and opening into the lower face of the main body,

[0015] a suction unit which is housed at least partly in the main body and which is configured to generate an air flow through the suction opening,

[0016] a wet cleaning device including two mop supports which are each movably mounted in translation relative to the main body in a direction of translation, and two mops removably mounted respectively on the two mop supports, the mops being configured to be in contact with the surface to be cleaned, and

[0017] two drive wheels configured to roll over the surface to be cleaned and movably mounted in rotation on the main body respectively about two rotation axes which are substantially parallel.

[0018] The two mop supports are located behind the rotation axes of the drive wheels, and the direction of translation extends substantially parallel to the rotation axes of the two drive wheels. In other words, the direction of translation extends transversely to a main displacement direction of the autonomous cleaning robot.

[0019] Such an arrangement of the mop supports, namely at the rear of the rotation axes of the drive wheels, makes it possible to increase the support force exerted by each of the mops on the surface to be cleaned, and therefore to increase the friction of the wet cleaning device on the surface to be cleaned, due to the weight exerted by the main body on the wet cleaning device. Thus, such an arrangement of the mop supports increases the scraping efficiency of the wet cleaning device on the floor and therefore the cleaning quality of the autonomous cleaning robot.

[0020] In addition, such an arrangement of the mop supports makes it possible to prevent the drive wheels from rolling over a wet area which has just been cleaned by the mops, and therefore to avoid the appearance of traces which could harm the quality of the cleaning carried out.

[0021] Furthermore, the fact that the mop supports are displaced parallel to the rotation axes of the two drive wheels, that is to say transversely to the main displacement direction of the wet cleaning robot, and not for example parallel to the main displacement direction, significantly limits the risk of slipping of the drive wheels on the surface to be cleaned when the mops do not exert the same friction forces on the floor to be cleaned (for example due to different wear or dirt on one mop compared to the other, or due to a displacement of the two mops on two different surfaces to be cleaned).

[0022] Compared to an autonomous cleaning robot equipped with mop supports displacing longitudinally, a transverse displacement of the mop supports also limits the length of the autonomous cleaning robot, while optimizing the surface of the mops which will be seen by a stain when displacing the autonomous cleaning robot. Indeed, due to the alternating movements of the mop supports and the proximity of the drive wheels, it would be necessary either to reduce the dimensions of the mops in a longitudinal direction so as not to impact the longitudinal dimensions of the autonomous cleaning robot (which would be detrimental for the cleaning quality of the autonomous cleaning robot), or to increase the dimensions of the autonomous cleaning robot to allow longitudinal displacements of large mops.

[0023] The autonomous cleaning robot which is the subject of the present invention is designed, like the majority of autonomous cleaning robots, to effectively clean floors when it is displaced in a displacement direction parallel to the longitudinal axis of the autonomous cleaning robot and in a predetermined displacement direction. The displacement direction parallel to the longitudinal axis of the autonomous cleaning robot and the predetermined displacement direction define a main displacement direction of the autonomous cleaning robot object of the present invention. Thus, a front part or a rear part of the main body of the autonomous cleaning robot is identified with respect to the main displacement direction of the autonomous cleaning robot.

[0024] The autonomous cleaning robot may further have one or more of the following characteristics, taken alone or in combination.

[0025] According to an embodiment of the invention, the suction opening is located in front of the rotation axes of the drive wheels.

[0026] According to an embodiment of the invention, the two mop supports are arranged side by side.

[0027] According to an embodiment of the invention, the rotation axes of the two drive wheels are collinear.

[0028] According to an embodiment of the invention, the wet cleaning device is arranged in a rear part of the main body.

[0029] According to an embodiment of the invention, the mop supports are movably mounted relative to each other between a close configuration in which the two mop supports are brought closer to each other and a remote configuration in which the two mop supports are spaced apart from each other.

[0030] According to an embodiment of the invention, the autonomous cleaning robot includes a translation drive mechanism configured to displace the mop supports in translation according to the direction of translation, and preferably according to alternating movements.

[0031] According to an embodiment of the invention, the translation drive mechanism is configured to displace the mop supports in translation in the direction of translation and alternately between the close configuration and the remote configuration.

[0032] According to an embodiment of the invention, the translation drive mechanism is located at least partly above one of the mop supports.

[0033] According to an embodiment of the invention, the translation drive mechanism is configured to displace the two mop supports in translation in phase opposition. In other words, the translation drive mechanism is configured to translate the two mop supports in alternating movements and in opposite displacement directions.

[0034] According to an embodiment of the invention, each of the mops is configured to exert a support force on the surface to be cleaned when the autonomous cleaning robot rests on the surface to be cleaned. Advantageously, the support force is greater than 5 N, and for example greater than or equal to 9 N.

[0035] According to an embodiment of the invention, the two mop supports are arranged on either side of a median longitudinal plane of the main body. In this document, the term «median longitudinal plane» means a vertical plane which is parallel to the main displacement direction, and which divides the main body into two substantially equal parts.

[0036] According to an embodiment of the invention, the autonomous cleaning robot is configured such that, when the autonomous cleaning robot rests on a surface to be cleaned, a rear part of the autonomous cleaning robot rests on said surface to be cleaned directly with the two mops. Such a configuration of the autonomous cleaning robot allows the mops to directly take up at least part of the mass of the autonomous cleaning robot, and therefore to further increase the support force exerted by each of the mops on the floor to be cleaned. Thus, such a configuration of the autonomous cleaning robot makes it possible to further improve the cleaning quality of the autonomous cleaning robot.

[0037] According to an embodiment of the invention, the two mop supports are positioned relative to the main body such that the two mop supports are not intersected by any vertical plane passing through rotation axes of wheels equipping the autonomous cleaning robot, and such that the two mop supports are not located at least partly between two vertical planes passing respectively through two rotation axes of wheels equipping the autonomous cleaning robot. Such a configuration of the **20** autonomous cleaning robot also allows the mops to directly take up at least part of the mass of the autonomous cleaning robot, and therefore to further improve the cleaning quality of the autonomous cleaning robot. On the contrary, if the mop supports were cut by a vertical plane passing through rotation axes of wheels equipping the autonomous cleaning robot (and for example two drive wheels) or **25** arranged between wheels of the autonomous cleaning robot whose rotation axes are parallel (for example between the rotation axes of the drive wheels and the axis of rotation of a rear wheel), the forces resulting from the mass of the autonomous cleaning robot would be taken up by the wheels and not by the mop supports.

[0038] According to an embodiment of the invention, the autonomous cleaning robot does not have an additional wheel located behind the rotation axes of the two drive wheels.

[0039] According to an embodiment of the invention, the autonomous cleaning robot includes additional wheels mov-

ably mounted in rotation on the main body and configured to roll over the surface to be cleaned, all the additional wheels being located at the front of the rotation axes of the two drive wheels.

[0040] According to an embodiment of the invention, the autonomous cleaning robot includes a power battery configured to electrically power the autonomous cleaning robot, the power battery being located at least partly above the one of the mop supports. Such an arrangement of the power battery makes it possible to increase the support force exerted by at least one of the mops on the surface to be cleaned, and therefore to further increase the scraping efficiency of the wet cleaning device on the floor and thus the cleaning quality of the autonomous cleaning robot.

[0041] According to an embodiment of the invention, the center of gravity of the power battery is located above one of the mop supports.

[0042] According to an embodiment of the invention, the power battery is entirely located above one of the mop supports.

[0043] According to an embodiment of the invention, the suction unit is located at least partly above one of the mop supports. Such an arrangement of the suction unit makes it possible to increase the support force exerted by at least one of the mops on the surface to be cleaned, and therefore to further increase the scraping efficiency of the wet cleaning device on the floor and thus the cleaning quality of the autonomous cleaning robot.

[0044] According to an embodiment of the invention, the suction unit comprises a suction motor and a fan which is coupled to the suction motor and which is configured to generate the air flow through the suction opening.

[0045] According to an embodiment of the invention, the center of gravity of the suction unit is located above one of the mop supports.

[0046] According to an embodiment of the invention, the suction unit is located entirely above one of the mop supports.

[0047] According to an embodiment of the invention, the suction unit and the power battery are arranged on either side of the median longitudinal plane of the main body. Such an arrangement of the suction unit and the power battery makes it possible to better distribute the masses of the autonomous cleaning robot and therefore to balance the support forces exerted by the two mops on the surface to be cleaned. These arrangements thus provide further improved cleaning performance to the autonomous cleaning robot.

[0048] According to an embodiment of the invention, the wet cleaning device is removably mounted relative to the main body.

[0049] According to an embodiment of the invention, the wet cleaning device is configured to be removed from the main body by a translation movement directed towards the rear of the main body. Thus, the removal of the wet cleaning device can be carried out without lifting the autonomous cleaning robot, and therefore without the risk of the autonomous cleaning robot falling in the event of mishandling of the latter by the user.

[0050] According to an embodiment of the invention, the wet cleaning device includes an inner housing in which the translation drive mechanism is arranged.

[0051] According to an embodiment of the invention, the wet cleaning device includes first guide means configured to cooperate with second guide means provided on the main body when mounting the wet cleaning device on the main body, so as to guide the wet cleaning device in a guide direction.

[0052] According to an embodiment of the invention, the first guide means include at least one guide rib, and the second guide means include at least one guide groove.

[0053] According to an embodiment of the invention, the second guide means are provided on the lower face of the main body.

[0054] According to an embodiment of the invention, the wet cleaning device includes a first electrical connector configured to cooperate with a second electrical connector mounted on the main body when mounting the wet cleaning device on the main body in a mounting direction which is directed towards the front of the main body. Such a configuration of the first and second electrical connectors ensures easy and automatic connection of the latter when mounting the wet cleaning device on the main body.

[0055] According to an embodiment of the invention, the autonomous cleaning robot includes a locking mechanism configured to lock the wet cleaning device on the main body. Such a locking mechanism makes it possible to limit the risks of untimely removal of the wet cleaning device.

[0056] According to an embodiment of the invention, the locking mechanism includes a locking member, such as a locking button, which can be actuated by a user and which is provided on the main body or the wet cleaning device, the locking member being movably mounted between a locking position in which the locking member is configured to cooperate with a locking element provided on the wet cleaning device or the main body so as to lock the wet cleaning device on the main body and a release position in which the locking member is configured to release the locking element so as to authorize a removal of the wet cleaning device from the main body.

[0057] According to an embodiment of the invention, the autonomous cleaning robot includes an ejection member configured to eject the wet cleaning device away from the main body and towards the rear of the main body when the locking member is displaced to the release position. The presence of such an ejection member makes it easier to remove the wet cleaning device.

[0058] According to an embodiment of the invention, the ejection member includes an ejection face configured to bear against the wet cleaning device. Advantageously, the ejection member is housed at least partly in a receiving cavity provided on the main body.

[0059] According to an embodiment of the invention, the ejection member is displaceable between a retracted position in which the ejection face of the ejection member is located recessed or near an insertion opening of the receiving cavity, and a deployed position in which the ejection face of the ejection member projects from the receiving cavity and is located at a distance from the insertion opening of the receiving cavity.

[0060] According to an embodiment of the invention, the wet cleaning device is configured to displace the ejection member into the retracted position when the wet cleaning device is mounted on the main body.

[0061] According to an embodiment of the invention, the ejection member is slidably mounted relative to the main body in a sliding direction which is substantially parallel to the main displacement direction of the autonomous cleaning

robot, that is to say substantially perpendicular to the rotation axes of the two drive wheels.

[0062] According to an embodiment of the invention, the autonomous cleaning robot includes a biasing element, such as a compression spring, configured to bias the ejection member towards the deployed position.

[0063] According to an embodiment of the invention, the locking member is displaceable in translation in an actuation direction which is substantially vertical when the autonomous cleaning robot rests on a horizontal surface.

[0064] According to an embodiment of the invention, the locking mechanism includes a biasing member, such as a compression spring, configured to bias the locking member towards the locking position.

[0065] According to an embodiment of the invention, the locking member is provided on a rear part of the main body.

[0066] According to an embodiment of the invention, the locking member includes a locking finger, and the locking element includes a locking housing configured to cooperate with the locking finger.

[0067] According to an embodiment of the invention, the autonomous cleaning robot includes a cleaning liquid reservoir, and the wet cleaning device includes a plurality of liquid outlet orifices which are configured to be fluidly connected to the cleaning liquid reservoir and which are configured to supply cleaning liquid to the mops mounted on the mop supports, the liquid outlet orifices being located at the front of the mop supports.

[0068] According to an embodiment of the invention, the cleaning liquid reservoir is mounted, for example in a removable manner, on the main body.

[0069] According to an embodiment of the invention, the autonomous cleaning robot includes a cleaning liquid supply circuit provided on the main body and configured to fluidly connect the liquid outlet orifices to the cleaning liquid reservoir. Advantageously, the cleaning liquid supply circuit includes a distributor housed in the main body, the distributor comprising a collection chamber which extends transversely to the main displacement direction of the autonomous cleaning robot, and which is fluidly connected to the cleaning liquid reservoir, and a plurality of evacuation orifices opening into the collection chamber and distributed along the collection chamber.

[0070] According to an embodiment of the invention, each evacuation orifice is located opposite a respective passage orifice which is provided on the main body and which opens into the lower face of the main body. Advantageously, each passage orifice is located opposite a respective liquid outlet orifice.

[0071] According to an embodiment of the invention, the liquid outlet orifices are located at the front of the mops. Advantageously, the liquid outlet orifices are located behind the rotation axes of the drive wheels.

[0072] According to an embodiment of the invention, the liquid outlet orifices are substantially aligned in an alignment direction which extends substantially parallel to the rotation axes of the two drive wheels, that is to say transversely to the main displacement direction of the autonomous cleaning robot. Such an arrangement of the liquid outlet orifices allows a more homogeneous dispersion of the cleaning liquid on the mops, which makes it possible to further improve the cleaning quality of the autonomous cleaning robot according to the present invention.

[0073] According to an embodiment of the invention, the autonomous cleaning robot includes a lifting ramp which extends substantially parallel to the rotation axes of the two drive wheels, that is to say transversely to the main displacement direction of the autonomous cleaning robot, and which is located in front of the mop supports, the lifting ramp including a lifting surface which is oriented towards a surface to be cleaned and which is inclined backwards and downwards, the lifting surface being configured to cause a lifting of a rear part of the main body when an obstacle, being presented frontally to the autonomous cleaning robot during forward displacement of the main body, comes into contact with said lifting surface and slides on said lifting surface. The presence of such a lifting ramp makes it easier to overcome frontal obstacles encountered by the autonomous cleaning robot.

[0074] According to an embodiment of the invention, the lifting surface is configured to be inclined relative to the horizontal by an angle of inclination comprised between 1° and 40° when the autonomous cleaning robot rests on a horizontal surface. Advantageously, the inclination angle is comprised between 2° and 30° and is for example approximately 25°.

[0075] According to an embodiment of the invention, the liquid outlet orifices are provided on the lifting ramp and are distributed along the lifting ramp. Advantageously, the liquid outlet orifices open into the lifting surface.

[0076] According to an embodiment of the invention, the lifting ramp has a length corresponding substantially to the distance between the two drive wheels.

[0077] According to an embodiment of the invention, the lifting ramp is provided on the wet cleaning device.

[0078] According to an embodiment of the invention, the autonomous cleaning robot comprises a rotating cleaning brush movably mounted in rotation in the main body about a brush rotation axis. Advantageously, the brush rotation axis extends substantially parallel to the rotation axes of the drive wheels. In other words, the brush rotation axis extends transversely to the main displacement direction of the autonomous cleaning robot.

[0079] According to an advantageous characteristic of the invention, the two drive wheels are lateral wheels of the autonomous cleaning robot.

BRIEF DESCRIPTION OF THE FIGURES

[0080] The aims, aspects and advantages of the present invention will be better understood from the description given below of a particular embodiment of the invention presented by way of non-limiting example, with reference to the appended drawings in which:

[0081] FIG. **1** is a top perspective view of an autonomous cleaning robot according to the present invention.

[0082] FIG. **2** is a bottom perspective view of the autonomous cleaning robot of FIG. **1**.

[0083] FIG. **3** is a partial bottom perspective view of the autonomous cleaning robot of FIG. **1**.

[0084] FIG. **4** is a bottom view of the autonomous cleaning robot of FIG. **1**.

[0085] FIG. **5** is a side view of the autonomous cleaning robot of FIG. **1**.

[0086] FIG. **6** is a longitudinal sectional view of the autonomous cleaning robot of FIG. **1**.

[0087] FIG. **7** is an enlarged scale view of a detail of FIG. **6**.

[0088] FIG. **8** is a partial longitudinal sectional view of the autonomous cleaning robot of FIG. **1** showing a wet cleaning device removed from a main body of the autonomous cleaning robot.

[0089] FIG. **9** is a top perspective view of the autonomous cleaning robot of FIG. **1** showing the wet cleaning device removed from the main body.

[0090] FIG. **10** is a front perspective view of the wet cleaning device.

[0091] FIG. **11** is a partial front perspective view of the wet cleaning device.

[0092] FIG. **12** is a partial bottom perspective view of the autonomous cleaning robot of FIG. **1** in which the wet cleaning device has been deposited.

[0093] FIG. **13** is a top perspective view of the autonomous cleaning robot of FIG. **1** showing a replacement module being assembled on the main body.

[0094] FIG. **14** is a partial longitudinal sectional view of the autonomous cleaning robot of FIG. **1** showing the replacement module being assembled on the main body.

DETAILED DESCRIPTION

[0095] Only the elements necessary for understanding the invention are represented. To make the drawings easier to read, the same elements carry the same references from one figure to another.

[0096] It will be noted that in this document, the terms «horizontal», «vertical», «lower», «upper», «top», «below» used to describe the autonomous cleaning robot or the main body refer to the autonomous cleaning robot in use when it rests on its wheels on a floor to be cleaned which is flat and horizontal.

[0097] FIGS. **1** to **14** represent an autonomous cleaning robot **2**, and more particularly a robot vacuum cleaner, configured to be displaced in an autonomous manner over a surface to be cleaned.

[0098] The autonomous cleaning robot **2** comprises a main body **3** including a lower face **4** which is configured to be oriented towards the surface to be cleaned, and a suction opening **5** which is provided in a front part **3**.**1** of the main body **3** and which opens into the lower face **4** of the main body **3**. Advantageously, the suction opening **5** is elongated and extends transversely, and more particularly perpendicularly, to a main displacement direction D of the autonomous cleaning robot **2**.

[0099] The autonomous cleaning robot **2** further comprises a rotating cleaning brush **6** movably mounted in rotation in the main body **3** about a brush rotation axis which extends transversely, and more particularly perpendicularly, to the main displacement direction D. Advantageously, the brush rotation axis is substantially horizontal when the autonomous cleaning robot **2** rests on a horizontal surface.

[0100] The autonomous cleaning robot **2** also comprises a drive mechanism (not visible in the figures) which is configured to rotatably drive the rotating cleaning brush **6** about the brush rotation axis.

[0101] As shown more particularly in FIGS. **2** to **4**, the autonomous cleaning robot **2** comprises two drive wheels **7** which are configured to roll over the surface to be cleaned. The two drive wheels **7** are movably mounted in rotation relative to the main body **3**, and have rotation axes which are parallel, and advantageously collinear. Advantageously, the rotation axes of the drive wheels **7** extend perpendicular to the main displacement direction D.

[0102] The two drive wheels **7** are configured to project from the lower face **4** of the main body **3**, and are arranged on either side of a median longitudinal plane P of the main body **3**. Advantageously, the two drive wheels **7** are arranged symmetrically with respect to the median longitudinal plane P of the main body **3**, and are lateral wheels of the autonomous cleaning robot **2**.

[0103] The two drive wheels **7** are advantageously motorized independently of each other. Thus, the autonomous cleaning robot **2** comprises two rotational drive mechanisms **8** housed in the main body **3** and each configured to rotatably drive a respective drive wheel **7** among the two drive wheels **7**. Each rotatably drive mechanism **8** includes a drive motor rotatably coupled to the respective drive wheel **7** and arranged for example in a respective lateral part of the main body **3**. Depending on the control of the two aforementioned drive motors, the main body **3** can pivot to the left, to the right or on itself, move forward or even backward.

[0104] According to the embodiment shown in the figures, the autonomous cleaning robot **2** includes additional wheels **9** freely mounted in rotation relative to the main body **3**, and for example two additional wheels **9** arranged on the front part **3**.**1** of the main body **3**. Advantageously, all the additional wheels **9** are located in front of the rotation axes of the two drive wheels **7**, so that the autonomous cleaning robot **2** does not have an additional wheel located behind the rotation axes of the two drive wheels **7**.

[0105] The autonomous cleaning robot **2** further comprises a suction unit **11** which is housed in the main body **3**. The suction unit **11** comprises a suction motor and a fan which is coupled to the suction motor and which is configured to generate a flow of air through the suction opening **5**.

[0106] The autonomous cleaning robot **2** also comprises a waste collection device **12** (see FIG. **6**) which is arranged upstream of the suction unit **11** and which is crossed by the air flow generated by the fan when the autonomous cleaning robot **2** is in operation.

[0107] The autonomous cleaning robot **2** also includes a power battery **13** configured to electrically power the autonomous cleaning robot **2**. Advantageously, the power battery **13** is rechargeable and is housed in the main body **3**.

[0108] As shown in particular in FIG. **2**, the autonomous cleaning robot **2** further comprises a wet cleaning device **14** which is arranged in a rear part **3**.**2** of the main body **3**. Advantageously, the wet cleaning device **14** is arranged opposite the rotating cleaning brush **6** relative to the rotation axes of the drive wheels **7**.

[0109] The wet cleaning device **14** includes two mop supports **15** which are arranged side by side and which are located behind the rotation axes of the drive wheels **7**. Advantageously, the two mop supports **15** are arranged on either side of the median longitudinal plane P of the main body **3**, and are configured to extend substantially horizontally when the main body **3** rests on a horizontal surface.

[0110] As shown more particularly in FIG. **3**, the two mop supports **15** are positioned relative to the main body **3** such that the two mop supports **15** are not intersected by any vertical plane passing through rotation axes of wheels equipping the autonomous cleaning robot **2**, and such that the two mop supports **15** are not located at least partly between two vertical planes passing respectively through two rotation axes of wheels equipping the autonomous cleaning robot **2**.

[0111] Advantageously, the power battery **13** is located at least partly, and for example entirely, above one of the mop

supports **15**, and the suction unit **11** is located at least partly, and for example entirely, above the other of the mop supports **15**. Thus, the suction unit **11** and the power battery **13** are arranged on either side of the median longitudinal plane P of the main body **3**.

[0112] The two mop supports **15** are each movably mounted in translation relative to the main body **3** in a direction of translation T which extends transversely, and advantageously perpendicularly, to the main displacement direction D of the autonomous cleaning robot **2**.

[0113] Advantageously, the mop supports **15** are movably mounted relative to each other between a close configuration in which the two mop supports **15** are brought closer to each other, and a remote configuration in which the two mop supports **15** are distant from each other.

[0114] The wet cleaning device **14** also includes a translation drive mechanism **16** configured to displace the mop supports **15** in translation in the direction of translation T and alternately between the close configuration and the remote configuration. Thus, the translation drive mechanism **16** is configured to displace the two mop supports **15** in translation in phase opposition. Advantageously, the translation drive mechanism **16** is located at least partly above the mop supports **15**.

[0115] According to the embodiment shown in the figures, the translation drive mechanism **16** includes a drive motor **16.1**, a crankshaft **16.2** coupled in rotation to the drive motor **16.1** and configured to be driven in rotation by the drive motor **16.1**, and two connecting rods **16.3** each comprising a first end portion hingedly mounted on the crankshaft **16.2** and a second end portion hingedly articulated on a respective mop support **15**.

[0116] The wet cleaning device **14** further includes two mops **17** removably mounted respectively on the two mop supports **15**. The mops **17** are configured to be in contact with the surface to be cleaned, and more particularly to exert a support force on the surface to be cleaned, when the autonomous cleaning robot **2** rests on the surface to be cleaned. The support force can for example be greater than or equal to 9 N.

[0117] Advantageously, the autonomous cleaning robot **2** is configured such that, when the autonomous cleaning robot **2** rests on a surface to be cleaned, a rear part of the autonomous cleaning robot **2** rests on said surface to be directly cleaned by the two mops **17**.

[0118] As shown more particularly in FIGS. **8** to **12**, the wet cleaning device **14** is removably mounted relative to the main body **3**, and the main body **3** includes a receiving housing **18** in which is received at least in part the wet cleaning device **14**. The wet cleaning device **14** is advantageously configured to be removed from the main body **3** by a translation movement directed towards the rear of the main body **3**.

[0119] According to the embodiment shown in the figures, the wet cleaning device **14** includes a support body **19** including more particularly a support plate **19.1** which comprises a lower surface on which the mop supports **15** are movably mounted, and a protective cowl **19.2** which is fixed on an upper surface of the support plate **19.1**. The support plate **19.1** and the protective cowl **19.2** define an inner housing **19.3** in which the translation drive mechanism **16** is arranged. The support body **19** further includes a lateral wall **19.4** which extends upwards from the support plate **19.1** and which is configured to cover at least partly the receiving housing **18**.

[0120] As shown in FIGS. **9** to **13**, the wet cleaning device **14** includes first guide means configured to cooperate with second guide means provided on the main body **3** during a mounting of the wet cleaning device **14** on the main body **3** and when removing the wet cleaning device **14** from the main body **3**, so as to guide the wet cleaning device **14** in a guide direction which is substantially perpendicular to the main displacement direction D. The first guide means may for example include two guide ribs **21**, such as T-shaped guide ribs, provided on the upper surface of the support plate **19.1**, and the second guide means may for example include two guide grooves **22**, such as T-shaped guide grooves, provided on the lower face **4** of the main body **3**.

[0121] According to the embodiment shown in the figures, the wet cleaning device **14** further includes a first electrical connector **23**, such as a male or female connector, configured to cooperate with a second electrical connector **24**, such as a female or male connector, mounted on the main body **3** during a mounting of the wet cleaning device **14** on the main body **3** in a mounting direction which is directed towards the front of the main body **3**.

[0122] The autonomous cleaning robot **2** also includes a locking mechanism configured to lock the wet cleaning device **14** on the main body **3**. The locking mechanism includes a locking member **25** which is operable by a user and which is provided on a rear part of the main body **3**, and for example on a rear face of the main body **3**.

[0123] The locking member **25** is movably mounted between a locking position in which the locking member **25** is configured to cooperate with a locking element **26** provided on the wet cleaning device **14** so as to lock the wet cleaning device **14** on the main body **3**, and a release position in which the locking member **25** is configured to release the locking element **26** so as to allow a removal of the wet cleaning device **14** from the main body **3**. The locking member **25** may for example include a locking finger, and the locking element **26** may for example include a locking housing configured to receive the locking finger.

[0124] Advantageously, the locking member **25** is movably mounted in translation relative to the main body **3** in an actuation direction which is substantially vertical when the autonomous cleaning robot **2** rests on a horizontal surface.

[0125] According to the embodiment shown in the figures, the locking mechanism includes a biasing member **27**, such as a compression spring, configured to bias the locking member **25** towards the locking position.

[0126] According to the embodiment shown in the figures, the autonomous cleaning robot **2** also includes an ejection member **28** configured to eject the wet cleaning device **14** away from the main body **3** and towards the rear of the main body **3** when the locking member **25** is displaced to the release position. Advantageously, the ejection member **28** is housed partly in a receiving cavity **29** provided on the main body **3** and has an ejection face **28.1** configured to bear against the wet cleaning device **14**.

[0127] The ejection member **28** is slidably mounted relative to the main body **3** in a sliding direction, which is parallel to the main displacement direction D of the autonomous cleaning robot **2**, and between a retracted position (see the FIG. **7**) in which the ejection face **28.1** of the ejection member **28** is located recessed or close to an insertion

opening of the receiving cavity **29**, and a deployed position (see FIG. **12**) in which the ejection face **28.1** of the ejection member **28** projects from the receiving cavity **29** and is located at a distance from the insertion opening of the receiving cavity **29**. Advantageously, the wet device cleaning device **14** is configured to displace the ejection member **28** into the retracted position when the wet cleaning device **14** is mounted on the main body **3**.

[0128] As shown more particularly in FIG. **7**, the autonomous cleaning robot **2** includes a biasing element **31**, such as a compression spring, configured to bias the ejection member **28** towards the deployed position.

[0129] The autonomous cleaning robot **2** also includes a cleaning liquid reservoir **32** which is mounted, for example in a removable manner, on the main body **3**. Advantageously, the cleaning liquid reservoir **32** and the waste collection device **12** are superimposed, and are secured to each other. Thus, the autonomous cleaning robot **2** can for example include a removable reservoir including a first compartment forming the cleaning liquid reservoir **32** and a second compartment forming the waste collection device **12**. Nonetheless, according to an embodiment of the invention, the cleaning liquid reservoir **32** could be provided directly on the wet cleaning device **14**, and therefore be separate from the waste collection device **12**.

[0130] The wet cleaning device **14** further includes a plurality of liquid outlet orifices **33** which are configured to be fluidly connected to the cleaning liquid reservoir **32** and which are configured to supply cleaning liquid to the mounted mops **17** on the mop supports **15**.

[0131] According to the embodiment shown in the figures, the liquid outlet orifices **33** are aligned in an alignment direction which extends perpendicular to the main displacement direction D of the autonomous cleaning robot **2**, and are regularly spaced from each other. Advantageously, the liquid outlet orifices **33** are located at the front of the mop supports **15**, and for example at the front of the mops **17**, and are configured to face the surface to be cleaned.

[0132] The autonomous cleaning robot **2** also includes a cleaning liquid supply circuit provided on the main body **3** and configured to fluidly connect the liquid outlet orifices **33** to the cleaning liquid reservoir **32**.

[0133] Advantageously, the cleaning liquid supply circuit includes a distributor **35** (see FIG. **7**) housed in the main body **3**. The distributor **35** comprises a collection chamber which extends transversely to the main displacement direction of the autonomous cleaning robot **2** and which is fluidly connected to the cleaning liquid reservoir **32**, and a plurality of evacuation orifices (not visible in the figures) which are provided on a lower face of the distributor, which open into the collection chamber and which are distributed along the collection chamber. Advantageously, each evacuation orifice is located opposite a respective passage orifice **37** (see FIG. **12**) which is provided on the main body **3** and which opens into the lower face **4** of the main body **3**, and each passage orifice **37** is located opposite a respective liquid outlet orifice **33**.

[0134] According to the embodiment shown in the figures, the autonomous cleaning robot **2** includes a lifting ramp **38** which extends transversely to the main displacement direction D of the autonomous cleaning robot **2** and which is located at the front of the mop supports **15**. The lifting ramp **38** can for example have a length corresponding substantially to the distance between the two drive wheels **7**. Advantageously, the lifting ramp **38** is provided on the wet cleaning device **14**, and is for example fixed to the body of the support **19**.

[0135] The lifting ramp **38** includes a lifting surface **38.1** which is oriented towards a surface to be cleaned and which is inclined backwards and downwards. Advantageously, the lifting surface **38.1** is substantially flat. The lifting surface **38.1** is more particularly configured to cause a lifting of the rear part **3.2** of the main body **3** when an obstacle, presenting itself frontally to the autonomous cleaning robot **2** during a forward displacement of the main body **3**, comes into contact with said lifting surface **38.1** and slides on said lifting surface **38.1**.

[0136] Advantageously, the lifting surface **38.1** is configured to be inclined relative to the horizontal by an angle of inclination comprised between 1° and 40°, and for example approximately 25°, when the autonomous cleaning robot rests on a horizontal surface.

[0137] According to the embodiment shown in the figures, the liquid outlet orifices **33** are provided on the lifting ramp **38** and are distributed along the lifting ramp **38**. Advantageously, the liquid outlet orifices **33** open into the lifting surface **38.1**.

[0138] As shown in FIGS. **13** and **14**, the autonomous cleaning robot also includes a replacement module **41** which is configured to be mounted on the main body **3** in place of the wet cleaning device **14** in particular when a wet cleaning of a surface to be cleaned is not desired. The replacement module **41** does not have a mop and can for example be installed on the main body in place of the wet cleaning device **14** when the suction of a soft floor, such as a carpet, is desired or when a wet cleaning of a hard ground is not desired.

[0139] Advantageously, the replacement module **41** includes guide means **41.1** identical to the guide ribs **21** provided on the wet cleaning device **14**, and also a bottom wall **41.2** and a rear wall **41.3** respectively similar to the plate support **19.1** and to the lateral wall **19.4** of the support body **19**.

[0140] According to an embodiment of the invention, the replacement module **41** could be provided with a module support configured to be mounted on the main body **3** in place of the wet cleaning device **14**, and at least a passive mop, that is to say which is immovably mounted in relation to the module support. Such a replacement module **41** allows a user to wipe the floor to be cleaned, which can be wet or dry depending on the user needs.

[0141] According to another embodiment of the invention, the replacement module **41** could be provided with a floor treatment element, other than a mop, configured to carry out a mechanical, chemical, thermal or radiant treatment of the ground.

[0142] Of course, the invention is in no way limited to the embodiment described and illustrated which has only been given by way of example. Modifications remain possible, particularly from the point of view of the constitution of the various elements or by substitution of technical equivalents, without departing from the scope of protection of the invention.

1. An autonomous cleaning robot comprising:

a main body including a lower face configured to be oriented towards a surface to be cleaned and a suction opening provided in a front part of the main body and opening into the lower face of the main body,

a suction unit housed at least partly in the main body, and configured to generate an air flow through the suction opening,

a wet cleaning device including first and second mop supports each movably mounted in translation relative to the main body in a direction of translation, and first and second mops removably mounted respectively on the first and second mop supports, the first and second mops configured to be in contact with the surface to be cleaned, and

first and second drive wheels configured to roll over the surface to be cleaned and movably mounted in rotation on the main body respectively about first and second rotation axes which are substantially parallel,

wherein the first and second mop supports are located behind the first and second rotation axes of the first and second drive wheels, and the direction of translation extends substantially parallel to the first and second rotation axes of the first and second drive wheels.

2. The autonomous cleaning robot according to claim **1**, wherein the first and second mop supports are movably mounted relative to each other between a close configuration in which the first and second mop supports are close to each other and a remote configuration in which the first and second mop supports are spaced apart from each other.

3. The autonomous cleaning robot according to claim **1**, wherein the first and second mop supports are arranged on either side of a median longitudinal plane of the main body.

4. The autonomous cleaning robot according to claim **1**, wherein, when the autonomous cleaning robot rests on a surface to be cleaned, a rear part of the autonomous cleaning robot is configured to rest on said surface to be cleaned directly by the first and second mops.

5. The autonomous cleaning robot according to claim **1**, wherein the first and second mop supports are positioned relative to the main body such that the first and second mop supports are not intersected by any vertical plane passing through the first and second rotation axes of the first and second drive wheels, and such that the first and second mop supports are not located at least partly between two vertical planes passing respectively through the first and second rotation axes of the first and second drive wheels.

6. The autonomous cleaning robot according to claim **1**, further comprising a power battery configured to electrically power the autonomous cleaning robot, the power battery being located at least partly above one of the first and second mop supports.

7. The autonomous cleaning robot according to claim **1**, wherein the suction unit is located at least partly above one of the first and second mop supports.

8. The autonomous cleaning robot according to claim **1**, wherein the wet cleaning device is removably mounted relative to the main body.

9. The autonomous cleaning robot according to claim **8**, wherein the wet cleaning device is configured to be removed from the main body by a translation movement directed towards the rear of the main body.

10. The autonomous cleaning robot according to claim **9**, wherein the wet cleaning device comprises first guide means configured to cooperate with second guide means provided on the main body during a mounting of the wet cleaning device on the main body, so as to guide the wet cleaning device in a guide direction.

11. The autonomous cleaning robot according to claim **8**, wherein the wet cleaning device includes comprises a first electrical connector configured to cooperate with a second electrical connector mounted on the main body during a mounting of the wet cleaning device on the main body in a mounting direction which is directed towards the front of the main body.

12. The autonomous cleaning robot according to claim **8**, further comprising a locking mechanism configured to lock the wet cleaning device on the main body.

13. The autonomous cleaning robot according to claim **12**, wherein the locking mechanism comprises a locking member which is operable by a user and provided on the main body or the wet cleaning device, the locking member movably mounted between a locking position in which the locking member is configured to cooperate with a locking element provided on the wet cleaning device or the main body so as to lock the wet cleaning device to the main body and a release position in which the locking member is configured to release the locking element so as to authorize a removal of the wet cleaning device from the main body.

14. The autonomous cleaning robot according to claim **13**, wherein the locking member is displaceable in translation according to an actuation direction which is substantially vertical when the autonomous cleaning robot rests on a horizontal surface.

15. The autonomous cleaning robot according to claim **1**, wherein the autonomous cleaning robot comprises a cleaning liquid reservoir, and the wet cleaning device comprises a plurality of liquid outlet orifices configured to be fluidly connected to the cleaning liquid reservoir and configured to supply cleaning liquid to the first and second mops mounted on the first and second mop supports, the liquid outlet orifices located in front of the first and second mop supports.

16. The autonomous cleaning robot according to claim **1**, further comprising a lifting ramp extending substantially parallel to the first and second rotation axes of the first and second drive wheels and located at the front of the first and second mop supports, the lifting ramp comprising a lifting surface oriented towards a surface to be cleaned and inclined backwards and downwards, the lifting surface configured to cause a lifting of a rear part of the main body when an obstacle, presenting itself frontally to the autonomous cleaning robot during a forward displacement of the main body, comes into contact with said lifting surface and slides on said lifting surface.

17. The autonomous cleaning robot according to claim **15**, further comprising a lifting ramp extending substantially parallel to the first and second rotation axes of the first and second drive wheels and located at the front of the first and second mop supports, the lifting ramp comprising a lifting surface oriented towards a surface to be cleaned and inclined backwards and downwards, the lifting surface configured to cause a lifting of a rear part of the main body when an obstacle, presenting itself frontally to the autonomous cleaning robot during a forward displacement of the main body, comes into contact with said lifting surface and slides on said lifting surface,

wherein the liquid outlet orifices are provided on the lifting ramp and are distributed along the lifting ramp.

18. The autonomous cleaning robot according to claim **1**, further comprising a rotating cleaning brush movably mounted in rotation in the main body about a brush rotation axis.

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