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(54) **FLOOR CLEANING DEVICE**

FUSSBODENREINIGUNGSVORRICHTUNG

DISPOSITIF DE NETTOYAGE DE SOLS

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(56) References cited:

EP-A2- 2 449 937 US-A1- 2003 033 680
US-A1- 2012 144 620

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Description

Description of Invention

[0001] This invention relates to floor cleaning devices and in particular to devices suitable for cleaning a hard floor surface.

[0002] It is well known to provide floor cleaning devices with driven agitators, to agitate debris lodged in a carpet or stuck to a floor surface. Agitators of many different types are known, including elongate cylindrical rollers, which may provide bristles or other forms of protrusion from the surface of the roller. Other devices include spinning scrubbers having brushes that rotate about axes generally perpendicular to the floor surface. The action of the brushes on the surface being cleaned dislodges dirt so that it is easier for the device to wipe the surface clean and/or to remove the dirt via suction.

[0003] The bristles of standard brushes have a tendency to flay outwardly, so that over time the contact between the bristles and the surface is decreased. Bristles are adept at dislodging loose dirt and particles, but are less readily able to dislodge matter that has dried onto a surface (i.e. become stuck to the surface). Since bristles bend easily on contact with a hard object or engrained dirt, occasionally bristles provide inadequate frictional force to dislodge stubborn dirt.

[0004] It is also known to provide static rubber nodes or projections that form a row along a side portion of a cleaning device, so as to dislodge dirt from the surface. However, it has been thought that such rubber bristles could not feasibly be used as active cleaning elements, due to the increased friction caused by the rubber on a hard surface. Cleaning devices that include bristles angled outwardly around a rotating cleaning element do not generate the required level of friction to achieve the desired cleaning performance, due to the natural flexing of bristles away from the surface as the element rotates. Over time, those bristles commonly adopt a shape that lessens the contact between the bristle and floor, relative to their original form. In contrast, where a bristle or node is oriented directly towards the surface being cleaned (i.e. perpendicular to the surface), rather than at an angle to the surface (or aligned with the surface), the friction and resulting wiping effect is increased. Effects such as the additional force required to drive a device that includes bristles oriented perpendicular to the surface, the heat generated due to the increased friction, and the wear caused to the relatively soft rubber by prolonged use against a surface, have deterred the use of such configurations of bristles.

[0005] US2012/144620 describes a cleaning head that provides two agitators with strips of bristles extending through its inlet.

[0006] US2003/033680 describes an electric toothbrush having an oscillating head with a rubbery cleaning element.

[0007] EP2449937 describes a cleaner having a pair

of arms with counter-rotating agitators angled outwardly.

[0008] According to an aspect of the invention we provide a floor cleaning device, the device having a motor configured to drive an agitation assembly including an agitation member and a plurality of first wiping elements oriented generally perpendicular to the agitation member, such that, in use, relative movement occurs between the agitation assembly and the floor surface, the agitation member is oriented generally parallel to the floor surface and the first wiping elements are disposed generally perpendicular to and directed towards the floor surface, such that each of the first wiping elements is held in contact with the floor surface as the agitation assembly is driven, wherein the first wiping element is formed of one of: rubber, a thermoplastic elastomer, and Polyvinyl Chloride, and wherein the agitation member includes a plurality of second wiping elements formed of a different material to the first wiping elements.

[0009] Further features of the above aspect of the invention are described in the appended claims.

[0010] Embodiments of the invention will now be described, by way of example only, with reference to the following figures, of which:

Figure 1 is a side view of an embodiment of a cleaning device according to the invention;

Figure 2 is a cross-sectional view through a floor head of a cleaning device;

and Figure 3 is a perspective view of a portion of an agitation assembly of a floor head.

[0011] With reference to Figure 1, a surface cleaning device 10 is shown. In the following example embodiments, the device is a floor cleaning device 10 suitable for cleaning a hard floor surface, but it should be understood that the principle of the invention may be applied to surface cleaning devices of any sort (such as window cleaning devices, for example, or devices for cleaning walls).

[0012] In broad terms we provide a device 10 for cleaning a surface, the device 10 having a motor 13 configured to drive an agitation assembly 20, the agitation assembly 20 including a first wiping element 42, such that relative movement occurs between the agitation assembly 20 and the surface to be cleaned as the agitation assembly 20 is driven, wherein the first wiping element 42 is formed of one of: rubber, a thermoplastic elastomer, and Polyvinyl Chloride.

[0013] In embodiments, the device 10 is a suction cleaner having a motor for generating suction, a body comprising a separator unit 16 and a dirt cup for storing separated dirt, wheels 18 for manoeuvring the device over a surface, and a handle 14 graspable by a user. The device 10 has a surface-facing floor head 12 that provides a suction mouth 35 through which dirt-laden air is drawn into the device 10. In other embodiments, the floor head

may simply provide a cleaning assembly for dislodging dirt from a surface, without using suction to remove the dislodged dirt. In embodiments, the device 10 may form part of a detachable cleaning tool or cleaning attachment for use with a floor cleaning device or suction cleaner.

[0014] As shown in Figures 2 and 3, the device 10 has a motor 13 configured to drive an agitation assembly 20, the agitation assembly 20 including a first wiping element 42, such that the agitation assembly 20 is driveable so as to cause relative movement between the agitation assembly 20 and the surface to be cleaned. The device 10 includes at least one first wiping element 42. The first wiping element 42 is flexible, and provides a greater amount of friction through contact with the surface than a standard bristle, or group of bristles, of a brush cleaner. Preferably the first wiping element 42 is durable and resilient, so that it returns to its natural state after deforming through contact with the surface, or with an object such as debris on the surface. The first wiping element is formed of one of: rubber, a thermoplastic elastomer, and Polyvinyl Chloride. It will be understood that the term 'rubber' refers to a natural rubber, or to a synthetic rubber, which are both suitable.

[0015] When used in combination with a suction cleaner, and as shown in Figure 2, the agitation assembly 20 may be disposed at and/or within the suction mouth 35 of suction channel of the floor head 12. The agitation assembly 20 agitates dirt and debris lying on the surface directly below the suction mouth 35, so that the debris is loosened, enabling it to be sucked into the suction channel of the cleaner. In embodiments, one of more wheels or rollers 33 may be provided behind the suction mouth 35, configured so as to allow the suction mouth 35 to sit close to the surface.

[0016] In embodiments, the agitation assembly 20 comprises an agitation member 24 on which at least one group of first wiping elements 42 is disposed, such that the first wiping elements 42 of the or each group are disposed adjacent the other first wiping elements 42 in that group. Preferably, and as shown in Figure 2, the agitation assembly 20 comprises a plurality of agitation members 22, 24, 26, 28, 30.

[0017] Each of the first wiping elements 42 forms a protrusion extending from an agitation member 22, 24, 26, 28, 30. Each of the elements 42 is substantially cylindrical, and may be tapered so as to be substantially frustoconical (as shown in Figure 3). The protrusions may be elongate. In other embodiments, the first wiping elements 42 do not taper along their length (i.e. are cylindrical). In other embodiments, the first wiping elements 42 are substantially conical. As shown in Figure 3, the first wiping elements 42 of the or each group are aligned with one another so as to form a row.

[0018] In other embodiments the first wiping elements 42 may be small rounded protrusions, or spikes, rather than being elongate.

[0019] The agitation members include second wiping elements 40. The second wiping elements 40 are formed

of a different material to the first wiping elements 42. Preferably, the second wiping elements 40 each provide a lower frictional resistance on contact with the surface being cleaned than the first wiping elements 42. In embodiments, the second wiping elements are bristles 40, which may be set out in patches or 'clumps'. The first wiping elements 42 may be deployed amongst patches of bristles 40, to improve the cleaning performance of a standard bristled brush of a cleaning device. In embodiments, the second wiping elements 40 are not formed of rubber, a thermoplastic elastomer, or Polyvinyl Chloride.

[0020] The agitation members 22, 24, 26, 28, 30 are adapted to rotate when driven by a motor 13. Motors suitable for driving agitators are well known, and the choice of motor, and options for positioning and configuring the motor, would be apparent to the skilled person.

[0021] The motor 13 is arranged to drive at least one of the agitation members 22, 24, 26, 28, 30. In embodiments, each agitation member 22, 24, 26, 28, 30 is driven independently by the motor 13, via a drive shaft connected to the agitation member 22, 24, 26, 28, 30.

[0022] In embodiments each agitation member 22, 24, 26, 28, 30 has a body 34, and a plurality of arms 36 extending outwardly from the body 34. The body 34 may be of a generally round shape. A drive shaft (not shown) may be attached centrally to the body 34 (or received in an aperture or recess in the body), to transfer drive to the agitation member 22, 24, 26, 28, 30 from the motor 13. Each arm 36 provides a base portion 38 to which bristles 40 are attached, or to which the first wiping elements 42 are attached.

[0023] In alternative embodiments of the technology, each agitation member 22, 24, 26, 28, 30 is driven so that it rotates about an axis that is inclined to the surface being cleaned. According to the invention, and as shown in the Figures, the axis of rotation is generally perpendicular to the surface being cleaned.

[0024] As shown in the Figures, one or more of the first wiping elements 42 is oriented so that its respective length extends generally perpendicular to the agitation member 22, 24, 26, 28, 30 and respective base portion 38. Where the first wiping element 42 is formed as a protrusion (i.e. so that its 'length' may not be well-defined) the protrusion extends in a direction generally perpendicular from a surface of the agitation member 22, 24, 26, 28, 30. The agitation member 22, 24, 26, 28, 30 is oriented generally parallel to the surface being cleaned, and the first wiping elements 42 project generally perpendicular to the surface being cleaned (and, in use, directly towards that surface).

[0025] In addition, the first wiping elements 42 project substantially parallel to the axis of rotation of its respective agitation member 22, 24, 26, 28, 30. In this context, the term 'parallel' is intended to include co-axial alignment. The first wiping members 42 are each held in contact with the surface being cleaned as the agitation assembly is driven. So, the first wiping members 42 are each held in contact with the surface throughout a clean-

ing operation, as the agitation members 22, 24, 26, 28, 30 rotate. In this context, a 'cleaning motion' is one complete rotation of the agitation member 22, 24, 26, 28, 30. In this way, the cleaning effect of those wiping members 42 is maximised, by maintaining cleaning contact. Orientating the first wiping members 42 so that they are directed perpendicular to the surface means that a sufficient amount of friction may be generated to provide the desired cleaning performance.

[0026] In embodiments, and as shown in Figures 2 and 3, the agitation members 22, 24, 26, 28, 30 are aligned across the width of the device 10 so as to provide agitation across a substantial width of the surface to be cleaned. The agitation members are configured such that adjacent agitation members 22, 24, 26, 28, 30 rotate in opposite directions. So, for example, members 22, 26 and 30 may rotate clockwise, and members 24 and 28 may rotate anticlockwise. In such embodiments, portions (i.e. the arms) of adjacent agitation members 22, 24, 26, 28, 30 may mesh together as the agitation members 22, 24, 26, 28, 30 rotate.

[0027] In other embodiments of the technology, the agitation members 22, 24, 26, 28, 30 may be disposed in other orientations and may be spaced from each other. In embodiments, the agitation members 22, 24, 26, 28, 30 may rotate in a common direction.

[0028] As shown in Figure 3, in preferred embodiments, the agitation members 22, 24, 26, 28, 30 include a plurality of patches of second wiping elements 40 and a plurality of groups of first wiping elements 42. The patches of bristles 40 and groups of first wiping elements 42 are disposed alternately about the axis of rotation of the body 34 of each agitation member 22, 24, 26, 28, 30, on alternate arms 36.

[0029] The device 10 may be configured so that the entire agitation assembly 20 is moveable between a deployed position in which at least a portion of the agitation assembly 20 is in contact with the surface, and a retracted position in which the agitation assembly 20 is spaced from the surface. In the retracted position, the second wiping elements 40 and first wiping elements 42 are not in contact with the surface. When the agitation assembly 20 is retracted, the device 10 may be manoeuvred across the floor more easily, with less resistance.

[0030] In embodiments, the device 10 may be configured so that the height of the agitation assembly 20, relative to the surface to be cleaned, is adjustable. In this way, the device 10 may be adapted for use on different surfaces, and the frictional contact between the agitation assembly 20 and the surface may be increased, or reduced, as desired.

[0031] The device 10 may also include a fluid dispenser for dispensing a fluid on the surface to be cleaned. The fluid may be water (which may be dispensed as liquid, or as a mist, for example). In embodiments, the fluid may include a cleaning agent. In embodiments, the fluid dispenser dispenses fluid onto a portion of the agitation assembly 20. The fluid may be dispensed directly onto

the rotating agitation members 22, 24, 26, 28, 30, for example, and subsequently applied to the surface being cleaned via the second wiping elements 40 and/or first wiping elements 42.

[0032] In addition to the agitation assembly 20, a separate brush strip or wiping strip 32 may be provided. As shown in Figure 2, the wiping strip 32 may be a squeegee of the type generally known in the art. The squeegee blade may be formed of a rubber material, for example. In embodiments, the wiping strip 32 may be disposed in front of a suction mouth 35 of the cleaner, in the direction of travel.

[0033] It has been found that by using first wiping elements as described, the ability of a device to remove stubborn dirt from the surface is greatly increased over the use of standard bristles alone. The problems caused by the increased level of friction (i.e. slowing the device, and resisting the movement of the agitators) are reduced by using both first wiping elements and second wiping element (typically bristles), in combination. By alternating strips of bristles with groups of wiping elements, the rotation of the agitation members means that substantially all of the floor surface being cleaned comes into contact with both types of agitator. Therefore, the cleaning advantages of each type of agitator are realised, whilst limiting any negative impact on the ease and speed of movement of the device.

[0034] Whilst the examples given relate to the use of agitators that rotate about an upright axis, the present invention also applies to agitators that rotate about an axis generally parallel with the surface - such as roller agitators, for example. In yet further embodiments, non-rotational agitators may be used.

[0035] When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

Claims

1. A floor cleaning device (10), the device (10) having a motor (13) configured to drive an agitation assembly (20) including an agitation member (22, 24, 26, 28, 30) and a plurality of first wiping elements (42) oriented generally perpendicular to the agitation member (22, 24, 26, 28, 30), such that, in use, relative movement occurs between the agitation assembly (20) and the floor surface, the agitation member (22, 24, 26, 28, 30) is oriented generally parallel to the floor surface and the first wiping elements (42) are disposed generally perpendicular to and directed towards the floor surface, such that each of the first wiping elements (42) is held in contact with the floor surface as the agitation assembly (20) is driven, wherein the first wiping element (42) is formed of one of: rubber, a thermoplastic elastomer, and Polyvinyl

Chloride, and

characterised in that the agitation member includes a plurality of second wiping elements (40) formed of a different material to the first wiping elements (42).

2. A device (10) according to claim 1, wherein each first wiping element (42) is one of: substantially cylindrical, substantially conical, or substantially frustoconical. 10
3. A device (10) according to any preceding claim, wherein at least one group of first wiping elements (42) is disposed on the agitation member (22, 24, 26, 28, 30), such that the first wiping elements (42) of the or each group are disposed adjacent the other first wiping elements (42) in that group. 15
4. A device (10) according to claim 3, wherein the first wiping elements (42) of the or each group are aligned with one another in a row. 20
5. A device (10) according to claim 3 or claim 4, wherein each first wiping element forms an elongate protrusion extending from the agitation (22, 24, 26, 28, 30) member. 25
6. A device (10) according to any preceding claim, including a plurality of agitation members (22, 24, 26, 28, 30). 30
7. A device (10) according to any preceding claim, wherein the or each agitation member (22, 24, 26, 28, 30) is adapted to rotate about a respective axis when driven by the motor (13), the or each axis of rotation is generally perpendicular to the surface to be cleaned. 35
8. A device (10) according to claim 6 or claim 7, wherein the agitation members (22, 24, 26, 28, 30) rotate in a common direction. 40
9. A device (10) according to claim 6 or claim 7, wherein adjacent agitation members rotate (22, 24, 26, 28, 30) in opposite directions. 45
10. A device (10) according claim 9, wherein portions of adjacent agitation members (22, 24, 26, 28, 30) mesh together as the agitation members (22, 24, 26, 28, 30) rotate. 50
11. A device (10) according to any preceding claim, wherein the second wiping elements (40) are bristles.
12. A device (10) according to claim 11 wherein the or each agitation member (22, 24, 26, 28, 30) includes a plurality of patches of bristles and a plurality of

groups of first wiping elements (42).

13. A device (10) according to any one of the preceding claims, configured such that the agitation assembly (20) is moveable between a deployed position in which at least a portion of the agitation assembly (20) is in contact with the surface to be cleaned, and a retracted position in which the agitation assembly (20) is spaced from the surface.
14. A device (10) according to any one of the preceding claims, wherein the device (10) is a suction cleaner.

15 Patentansprüche

1. Bodenreinigungsvorrichtung (10), wobei die Vorrichtung (10) einen Motor (13) aufweist, der ausgelegt ist, eine Agitationsbaugruppe (20) antreibt, die ein Agitationselement (22, 24, 26, 28, 30) und eine Vielzahl von ersten Wischelementen (42) einschließt, die generell senkrecht zum Agitationselement (22, 24, 26, 28, 30) derart orientiert sind, dass, im Gebrauch, relative Bewegung zwischen der Agitationsbaugruppe (20) und der Bodenfläche stattfindet, wobei das Agitationselement (22, 24, 26, 28, 30) generell parallel zur Bodenfläche orientiert ist und die ersten Wischelemente (42) generell senkrecht zu und in Richtung der Bodenfläche derart angeordnet sind, dass jedes der Wischelemente (42) in Kontakt mit der Bodenfläche gehalten wird, während die Agitationsbaugruppe (20) angetrieben wird, wobei das erste Wischelement (42) aus einem der folgenden gebildet ist: Gummi, einem thermoplastischen Elastomer und Polyvinylchlorid, und **dadurch gekennzeichnet, dass** das Agitationselement eine Vielzahl von zweiten Wischelementen (40) einschließt, die aus einem Material hergestellt sind, welches von den ersten Wischelementen (42) verschieden ist.
2. Vorrichtung (10) nach Anspruch 1, wobei das erste Wischelement (42) ist eins von: wesentlich zylindrisch, wesentlich konisch oder wesentlich kegelförmig.
3. Vorrichtung (10) nach irgendeinem vorhergehenden Anspruch, wobei wenigstens eine Gruppe von ersten Wischelementen (42) auf dem Agitationselement (22, 24, 26, 28, 30) derart angeordnet ist, dass die ersten Wischelemente (42) der oder jeder Gruppe nahe den anderen ersten Wischelementen (42) in jener Gruppe angeordnet sind.
4. Vorrichtung (10) nach Anspruch 3, wobei die ersten Wischelemente (42) der oder jeder Gruppe miteinander in einer Reihe ausgerichtet sind.

5. Vorrichtung (10) nach Anspruch 3 oder Anspruch 4, wobei jedes erste Wischelement einen länglichen Überstand bildet, der sich aus dem Agitationselement (22, 24, 26, 28, 30) erstreckt.
6. Vorrichtung (10) nach irgendeinem vorhergehenden Anspruch, die eine Vielzahl von Agitationselementen (22, 24, 26, 28, 30) einschließt.
7. Vorrichtung (10) nach irgendeinem vorhergehenden Anspruch, wobei das oder jedes Agitationselement (22, 24, 26, 28, 30) angepasst ist, sich bei Antrieb durch den Motor (13) um eine jeweilige Achse zu drehen, wobei die oder jede Drehachse generell senkrecht zur zu reinigenden Oberfläche ist.
8. Vorrichtung (10) nach Anspruch 6 oder Anspruch 7, wobei sich die Agitationselemente (22, 24, 26, 28, 30) in einer gemeinsamen Richtung drehen.
9. Vorrichtung (10) nach Anspruch 6 oder Anspruch 7, wobei sich angrenzende Agitationselemente drehen (22, 24, 26, 28, 30) in entgegengesetzte Richtungen drehen.
10. Vorrichtung (10) nach Anspruch 9, wobei Abschnitte von angrenzenden Agitationselementen (22, 24, 26, 28, 30) ineinandergreifen, während sich die Agitationselemente (22, 24, 26, 28, 30) drehen.
11. Vorrichtung (10) nach irgendeinem vorhergehenden Anspruch, wobei die zweiten Wischelemente (40) Borsten sind.
12. Vorrichtung (10) nach Anspruch 11, wobei das oder jedes Agitationselement (22, 24, 26, 28, 30) eine Vielzahl von Stellen aus Borsten und eine Vielzahl aus Gruppen erster Wischelemente (42) einschließt.
13. Vorrichtung (10) nach irgendeinem der vorhergehenden Ansprüche, die derart ausgelegt ist, dass die Agitationsbaugruppe (20) zwischen einer ausgefahrenen Position, in welcher wenigstens ein Abschnitt der Agitationsbaugruppe (20) in Kontakt mit der zu reinigenden Oberfläche ist, und einer eingefahrenen Position, in welcher die Agitationsbaugruppe (20) von der Oberfläche beabstandet ist, beweglich ist.
14. Vorrichtung (10) nach irgendeinem vorhergehenden Anspruch, wobei die Vorrichtung (10) ein Saugreiniger ist.

Revendications

1. Un dispositif de nettoyage de surface (10), le dispositif (10) ayant un moteur (13) configuré pour entraîner un ensemble d'agitation (20) incluant un élément

d'agitation (22, 24, 26, 28, 30) et une pluralité de premiers éléments d'essuyage (42) orientés généralement perpendiculairement à l'élément d'agitation (22, 24, 26, 28, 30), de telle sorte que, lors de l'utilisation, un déplacement relatif se produit entre l'ensemble d'agitation (20) et la surface de plancher, l'élément d'agitation (22, 24, 26, 28, 30) est orienté généralement parallèlement à la surface de plancher et les premiers éléments d'essuyage (42) sont disposés généralement perpendiculairement à, et dirigés vers, la surface de plancher, de telle sorte que chacun des premiers éléments d'essuyage (42) est maintenu en contact avec la surface de plancher lorsque l'ensemble d'agitation (20) est entraîné, dans lequel le premier élément d'essuyage (42) est formé de : un caoutchouc, un élastomère thermoplastique ou un polychlorure de vinyle, et **caractérisé en ce que** l'élément d'agitation inclut une pluralité de deuxième éléments d'essuyage (40) formés dans un matériau différent des premiers éléments d'essuyage (42).

2. Un dispositif (10) selon la revendication 1, dans lequel chaque premier élément d'essuyage (42) est : sensiblement cylindrique, sensiblement conique ou sensiblement tronconique.
3. Un dispositif (10) selon l'une quelconque des revendications précédentes, dans lequel au moins un groupe de premiers éléments d'essuyage (42) est disposé sur l'élément d'agitation (22, 24, 26, 28, 30), de telle sorte que les premiers éléments d'essuyage (42) du ou de chaque groupe sont disposés adjacents aux autres premiers éléments d'essuyage (42) dudit groupe.
4. Un dispositif (10) selon la revendication 3, dans lequel les premiers éléments d'essuyage (42) du ou de chaque groupe sont alignés les uns avec les autres dans une rangée.
5. Un dispositif (10) selon la revendication 3 ou la revendication 4, dans lequel chaque premier élément d'essuyage forme une saillie allongée s'étendant de l'élément d'agitation (22, 24, 26, 28, 30).
6. Un dispositif (10) selon l'une quelconque des revendications précédentes, incluant une pluralité d'éléments d'agitation (22, 24, 26, 28, 30).
7. Un dispositif (10) selon l'une quelconque des revendications précédentes, dans lequel le ou chaque élément d'agitation (22, 24, 26, 28, 30) est adapté pour tourner autour d'un axe respectif lors de l'entraînement par le moteur (13), le ou chaque axe de rotation est généralement perpendiculaire à la surface à nettoyer.

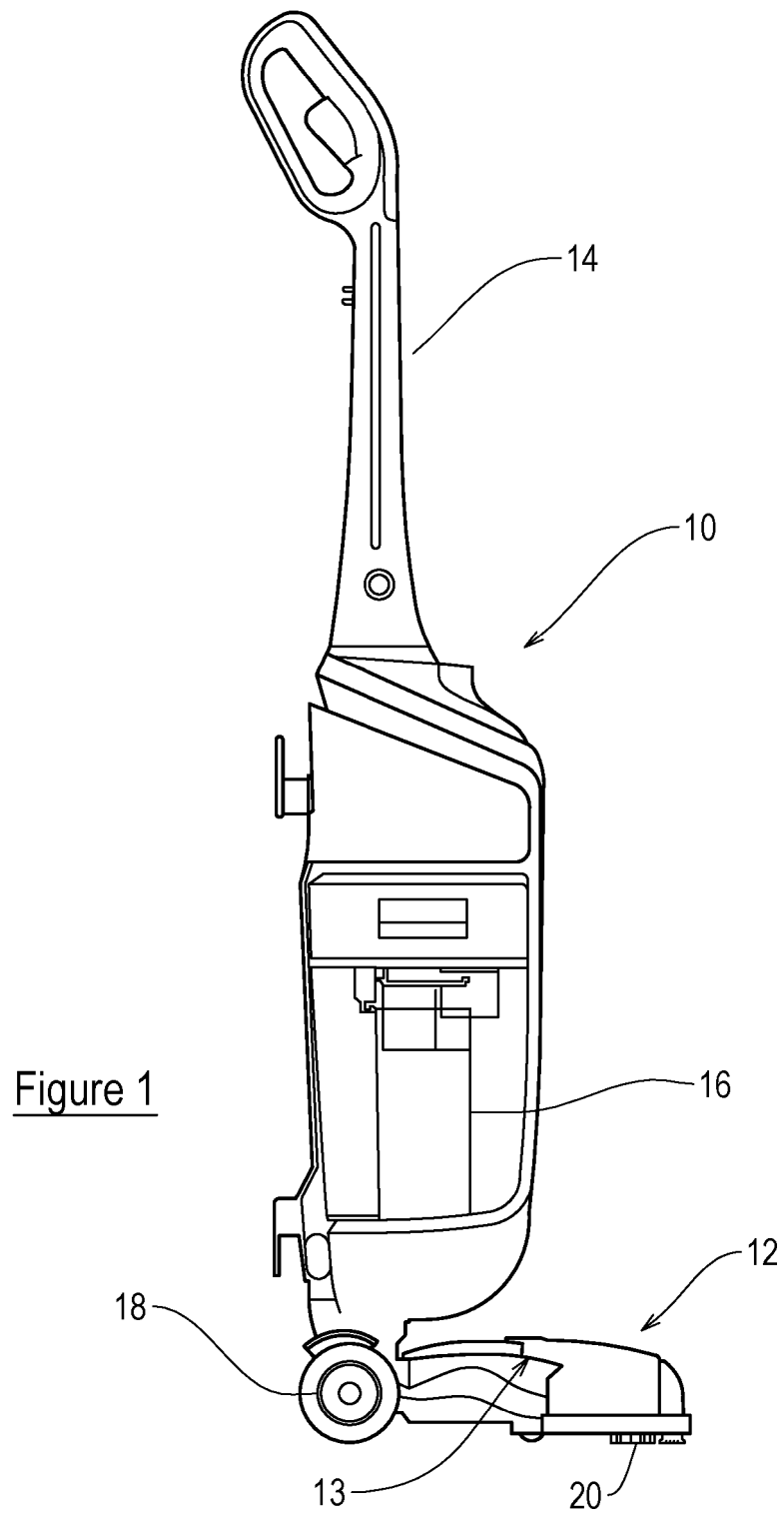
8. Un dispositif (10) selon la revendication 6 ou la revendication 7, dans lequel les éléments d'agitation (22, 24, 26, 28, 30) tournent dans une direction commune.
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9. Un dispositif (10) selon la revendication 6 ou la revendication 7, dans lequel les éléments d'agitation adjacents tournent (22, 24, 26, 28, 30) dans des directions opposées.
- 10
10. Un dispositif (10) selon la revendication 9, dans lequel des parties d'éléments d'agitation adjacents (22, 24, 26, 28, 30) s'engrènent ensemble lorsque les éléments d'agitation (22, 24, 26, 28, 30) tournent.
- 15
11. Un dispositif (10) selon l'une quelconque des revendications précédentes, dans lequel les deuxièmes éléments d'essuyage (40) sont des poils de brosse.
- 20
12. Un dispositif (10) selon la revendication 11, dans lequel le ou chaque élément d'agitation (22, 24, 26, 28, 30) inclut une pluralité de zones de poils de brosse et une pluralité de groupes de premiers éléments d'essuyage (42).
- 25
13. Un dispositif (10) selon l'une quelconque des revendications précédentes, configuré de telle sorte que l'ensemble d'agitation (20) peut être déplacé entre une position déployée dans laquelle au moins une partie de l'ensemble d'agitation (20) est en contact avec la surface à nettoyer, et une position retractée dans laquelle l'ensemble d'agitation (20) est à distance de la surface.
- 30
14. Un dispositif (10) selon l'une quelconque des revendications précédentes, dans lequel le dispositif (10) est un appareil de nettoyage par aspiration.
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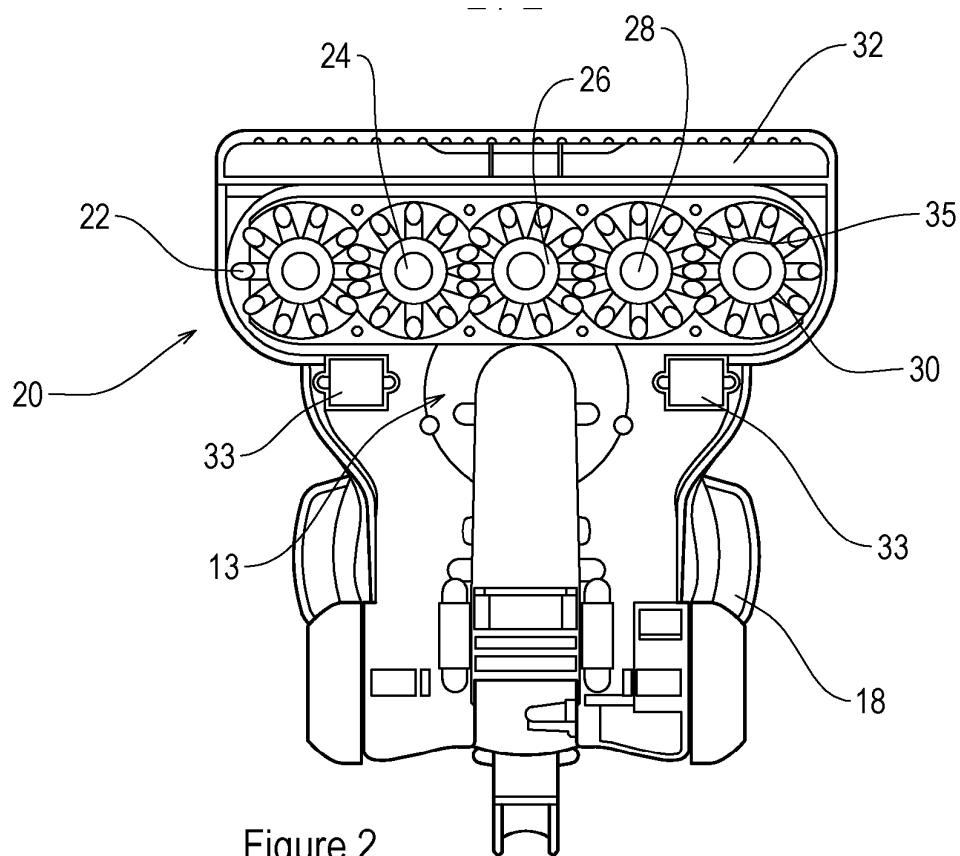


Figure 2

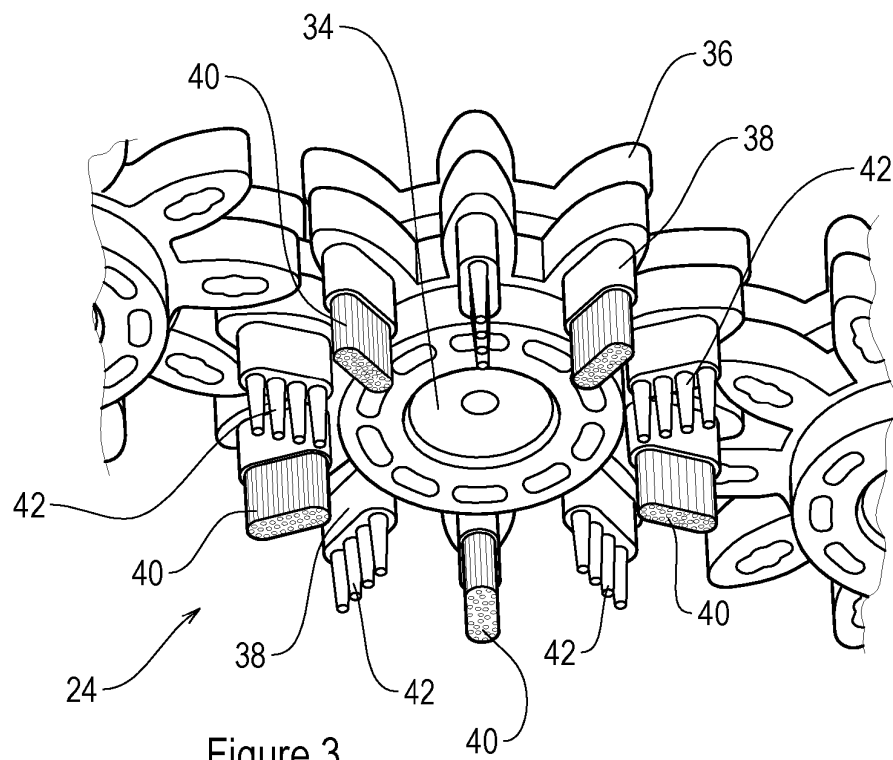


Figure 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2012144620 A [0005]
- US 2003033680 A [0006]
- EP 2449937 A [0007]